Minimizing information overload with five modes for learning

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Abstract

This thesis addresses the challenge of information overload faced by students in the Exphil course at the University of Bergen. Through user research, I found that the numerous theories, topics and philosophers in the Exphil syllabus lead to the feeling of information overload, and thus a negative experience with the course. In collaboration with Universitetsforlaget, we designed and developed the prototype *Kunne Exphil* with five modes for learning aimed at minimizing information overload and thus improving the user experience.

The primary research question is: To what degree can design principles in the five modes for learning minimize information overload in Kunne Exphil? This thesis explores this question by presenting the background, relevant theories, and methodologies used in creating the prototype. A user-centered iterative design process was employed, and the prototype is a direct result of the user needs found in the qualitative research.

The analysis focuses on the application of Don Norman's design principles across five learning modes: Kort forklart, Dybdemodus, Tenkerne, Spørsmål, and Huskekort. Each mode was assessed for its effectiveness in minimizing information overload. The findings indicate that the design principles applied in the five learning modes minimize information overload to varying degrees. Kort forklart and Tenkerne were particularly effective, while Dybdemodus, Spørsmål, and Huskekort provided a moderate degree of minimizing information overload.

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1. Introduction

"(...) when reading about the philosophers and such, I remember that it was difficult. The theories and concepts were difficult, and understanding the big philosophers. I cried after some of these seminars"

This is a quote from one of the participants we interviewed in our user research, and is descriptive to one of the primary issues the students are facing with the university course *Exphil* today: information overload. The numerous theories and concepts are difficult to understand, and the philosophers are difficult to keep track of. The students are overwhelmed with the Exphil syllabus, and are thus struggling with motivation.

Furthermore, the overall reputation of Exphil is generally perceived negatively. It is an obligatory course, and is often thought of as irrelevant in relation to the different study programmes that are not related to philosophy. I know this based on the user research conducted in this project, as well as from personal experience throughout my academic career in conversations with my peers. Exphil is, however, a course that will continue to be a part of bachelor programmes at the University of Bergen, and it is therefore highly relevant to tackle this challenge. My two co-students and I have done precisely this in this master's project.

We have over the course of the last year collaborated with Universitetsforlaget, one of Norway's leading academic publishers, in designing and developing our prototype Kunne Exphil. With this prototype, we provide the students with a path to mastering Exphil, or as it is presented in our prototype: "Veien til å Kunne Exphil". Kunne Exphil has five modes for learning, three of them being modes for reading and learning, and two for testing comprehension and memory. Our primary goals have been designing for a motivating user experience, and to minimize information overload while working with the Exphil syllabus. I will in this theses address the latter, namely minimizing information overload. The research question for this thesis is therefore:

To which degree can design principles in the five modes for learning minimize information overload in Kunne Exphil?

In this thesis, I aim to explore the issue of information overload, and analyze to which degree information overload can be minimized through designing five modes for learning using Don Norman's design principles. To do this, I will present the background for this project, relevant definitions and theories, and the methods used in the process of creating our Prototype Kunne Exphil, before going into the analysis that addresses the research question. I will lastly summarize and conclude this thesis, and present possibilities for future work.

1.1 Thesis outline

Chapter 2 presents the background for the practical component of this project, and thus the premise of this master's thesis. In this chapter, I present, the collaborators for this project, the digital learning platform Kunne, a brief overview of the university course Exphil, the challenge with Exphil, namely information overload, and lastly the user group we have designed our prototype for.

Chapter 3 presents theory and definitions that served as the backdrop for this thesis. This included definitions of interaction design, user experience design, user-centered design, and iterative design as they are the main field of study for this project. I will then present definitions on information overload, cognitive overload, and a brief comparison of these, before Jakob Nielsen's definition of progressive disclosure. I will then present design principles, why and how we use them, and lastly Don Norman's design principles.

Chapter 4 presents the methodological approach for this project, namely a user-centered iterative design process. Here, I presented the two iterations and the methods used in each. This includes the student involvement with the MIX100 students, the focus groups, and the two evaluations: SWOT-analysis and expert evaluations. Furthermore, semi-structured interviews, prototyping, and user testing will be presented as the methods used in the second iteration. The method used to analyze the collected data material from the user research, namely a thematic analysis, will then be presented.

Chapter 5 provides an analysis of this thesis research question, where the five modes for learning are presented, as well as the user needs, our solution in response to these, and an analysis that explores to which degree design principles in the five modes for learning minimize information overload.

Chapter 6 summarizes and concludes this thesis, and presents potential future work.

2. Background

This chapter will present the background for the practical component of this project, and thus the premise of this thesis. Firstly, the collaborators for this project, Universitetsforlaget, will be introduced, as well as their digital learning platform Kunne. Following this, the chapter will give a brief overview of the university course Exphil Philisophicum, referred to as Exphil in this thesis. The chapter then goes into the challenge we were presented with by Universitetsforlaget, and lastly the user group we have designed our prototype for.

2.1 Universitetsforlaget and the digital learning platform *Kunne*

In this project, we have collaborated with the Universitetsforlaget, one of Norway's leading academic publishers who develop and publish non-fiction books, journals and digital services. They are an imprint of H. Aschehoug & Co. with over 1,700 books in their catalogue (Universitetsforlaget, n.d.).

During the fall of 2022, Universitetsforlaget launched the digital learning platform Kunne for the University of Oslo and the University of Agder. This is a platform designed to provide students with an effective and clear introduction to understanding philosophical topics and philosophers, its content created in collaboration with experts in the field of philosophy with teaching experience in Exphil (Universitetsforlaget, n.d.). Kunne presents the student with relevant syllabus through videos, quizzes, short texts, and audio recordings of the texts. Universitetsforlaget markets this as a way of learning "more effectively and engagingly", and that it is created for those who want a simpler and more engaging way to understand the syllabus (Kunne, n.d.). Students get access to

Kunne for one semester by paying a one-time fee of 649 kroner. Kunne is currently a digital supplement to the physical Exphil textbooks, meaning that the students need to purchase the textbooks to get access to the complete syllabus.

As of today, Universitetsforlaget offers Kunne to the University of Oslo, the Norwegian University of Science and Technology, University of Agder, the Norwegian Business School, NHH Norwegian School of Economics, and Kristiania, and is currently in the process of expanding to the University of Bergen. This is the process we have been tasked to tackle.

2.2 Exphil

Examen philosophicum, referred to as Exphil in this thesis, is a mandatory introductory course in philosophy, and is included in all bachelor's degrees at the University of Bergen (UiB, n.d.). As described on the University of Bergen's webpage, Exphil is intended to provide students with an introduction to the ways of thinking, working, and writing at the university, and to offer philosophical perspectives on academic culture and education (UiB, n.d.).

The objective of Exphil is for students to become aware of the fundamental problems of science, and to be trained on independent and critical thinking (Store Norske Leksikon, n.d.) This is a 10 credit course, and is typically one of three courses a student has to take during their first semester, meaning that it is one of the first courses in their academic career. Before starting the course, the students choose which course model they prefer, being either the seminar or the final exam model. If the student chooses the former, they have mandatory seminars, presentations, quizzes, and assignments throughout the semester, in addition to the final semester assignment. If they choose the latter, they have no mandatory seminars or other assignments, only lectures that are optional, and a final exam at the end of the semester.

Generally, the syllabus for Exphil varies depending on the universities, as well as the different faculties within each institution. The course syllabus covers a wide range of philosophical themes and disciplines, such as ethics, metaphysics, rationalism, utilitarianism, and virtue ethics. To each theme and discipline, Exphil covers all the central philosophers, varying from the ancient Greek philosophy with Socrates, Plato,

and Aristotle, to the renaissance philosophy with René Descartes and David Hume, to mention a only few. To summarize, the Exphil syllabus is quite extensive with material that requires thorough reading and understanding.

2.3 The challenge with Exphil

"Exphil can seem overwhelming at both first and second glance" (Kunne, n.d.). On their webpage, Kunne - and thus Universitetsforlaget - acknowledge the current struggle students are facing with Exphil, being aware of how extensive and difficult the syllabus is. When we were approached by Universitetsforlaget during the fall of 2022, they presented the challenge they have been trying to solve with Kunne: how to make Exphil more comprehensible and thus more motivating for students. Within this challenge, several underlying and equally prevalent challenges exist today, one of the key issues being the overwhelming syllabus which can lead to frustration, discouragement, and an overall lack of interest in Exphil.

Apart from Universitetsforlagets understanding of the challenge with Exphil, it seems as if there is a general consensus about the Exphil course among students, stretching between first to last-year students. Exphil's reputation of being overwhelming and difficult is widely spread, seemingly acting like folklore, and reaches even those who have yet to start their academic career.

As mentioned above, Universitetsforlaget is with Kunne aiming to make learning Exphil "more effectively and engagingly" for those who want a simpler and more engaging way to understand the syllabus. The challenge they presented to us was therefore the same as the one they are trying to solve, only with the syllabus for the University of Bergen. As will be presented later in this thesis, however, the challenge and its premise was further defined during our user research.

2.4 The students

As will be presented further in Chapter 4, this project has been a user-centered design process from start to finish. The user is therefore the key factor for understanding the

challenge, and thus being able to design a solution that will solve the challenges they face with Exphil today.

The target users in this project are students enrolled in Exphil. The participants for the research were new students and students that have studied at other institutions, steering the demographic towards young adults in the age group 19 to 26 years old.

As this is a user centered design process, we learned more about the users and their needs throughout the research. The target user group was therefore further defined along this process, and provided us with a broader understanding of their needs. Some of the characteristics within the user group was that they find the course to be overwhelming, they miss a sense of progression during the semester, and generally lack motivation when working with the syllabus.

3. Theory

In this chapter, I will present theory and definitions that are relevant for the analysis in this thesis. The chapter will first define interaction design, user experience design, user-centered design, and iterative design as they are the main field of study for this project. It will then provide definitions on information overload, cognitive overload, and a brief comparison of these. Furthermore, it will present Jakob Nielsen's definition of progressive disclosure, before going into the last section of this chapter: design principles. In this section, design principles, why we use them, and how we use them will be presented, before going into Don Norman's well-established design principles that are the foundation for the analysis of this thesis, and why I have chosen to use these principles.

This theory is presented to establish the foundation of the theoretical aspect of the analysis. The *overall approach* we have used to develop the concept and prototype is interaction design, user experience design, and a user-centered iterative design process. The *problem* we are trying to solve with this prototype is information and cognitive overload. *How* we have solved this, related to my thesis, includes aspects from progressive disclosure, but mainly the established and widely used design principles.

3.1 Interaction design

In the book *Interaction Design: Beyond Human-Computer Interaction*, interaction design is defined as the process of "designing interactive products to support the way people communicate and interact in their everyday and working lives" (Preece et al., 2019, p. 9). How the product is *supporting* the user is the main focus of this definition. Interaction design is a field where it is about making computer-based products usable for ordinary people, and refers to the skills one must have to create good interfaces between people and technology (Nyre, 2024, p. 304). With interaction design, the goal is to "enhance people's understanding of that can be done, what is happening, and what has just occurred" (Norman, 2013, p. 5). The importance of understanding user-product interactions are prevalent in these definitions.

In the field of interaction design, designers are trained to finding the real problems, and solving these based on the users needs. Norman emphasizes this, saying "a brilliant solution to the wrong problem can be worse than no solution at all: solve the correct problem" (2013, p. 218). *Finding* and *solving* the *correct problem* is therefore the main task for a interaction designer. In the process of doing this, research methods such as interviews and focus groups, and methods for development such as prototyping and user testing, are fundamental. I will cover these in the following chapter.

Moreover, Preece et al. (2019) outline several central approaches and disciplines within the field of interaction design. These include, but are not limited to, human-computer interaction (HCI), industrial design, user experience design, user-centered design, and participatory design (p. 10). Among these, the main focus of this thesis lies primarily on the latter three, and will therefore be defined further in this chapter.

3.2 User experience design

Don Norman and Jakob Nielsen summarize the definition of user experience (UX), saying that "'user experience' encompasses all aspects of the end-user's interaction with the company, its services, and its products" (Nielsen & Norman, 1998). Furthermore, Norman and Nielsen set the first requirement for an exemplary user experience, saying it should meet the "exact need of the customer, without fuss or bother" (1998). In

Norman's book *The Design of Everyday Things,* he defines experience design as "the practice of designing products, processes, services, events, and environments with a focus places of the quality and enjoyment of the total experience" (2013, p. 5). UX design can therefore be explained as the process of creating a product designed to provide users with a positive experience while using it. Preece et al. (2019), however, stress that one cannot design the user experience itself, meaning that designers cannot design a *good* user experience, but rather design *for* a good user experience (p. 13). As Norman puts it, all artificial things are designed (2013, p. 4), and all these things will therefore evoke a user experience. It is therefore the designers task to design for the intended user experience.

3.3 User-centered design

Don Norman introduced the concept of user-centered design, which is a philosophy based on the needs and interests of users, with the aim of creating products that are usable and understandable (Nordbø, 2017, p. 31). Norman calls it "the process that ensures that the designs match the needs and capabilities of the people for whom they are intended" (Norman, 2013, p. 9). User-centered design does as the term implies, it centers around the users, meaning that they are largely involved in the design process. Some of the fundamentals of user-centered design include having an early focus of the users and the tasks they want to complete, a continuous evaluation of the design, and having an iterative design process (Heim, 2008, as cited in Nordbø, 2017, p. 31). In her book *Introduksjon til interaksjonsdesign*, Nordbø lists a set of principles for user-centered design defined by researchers at Uppsala University of Sweden based on theory and practices. These include user focus, active user involvement, prototyping, and evaluating the usability (Gulliksen et al., 2003, as cited in Nordbø, 2017. p. 32). The main focus of a user-centered design process is to understand the users and their needs, and to use this understanding when designing a new product or service.

3.4 Iterative design

An iterative design process is a fundamental component of a user-centered design approach. In the book *Interaction Design: Beyond Human-Computer Interaction*, Preece, Rogers, and Sharp cover three principles for a user-centered approach, first introduced by John Gould and Clayton Lewis when the HCI field was being established:

- early focus on users and tasks,
- empirical measurement,
- and iterative design (Gould and Lewis, 1985, in Preece et al., 2019, p. 48).

The principle of iterative design establishes that when designing and developing, user testing and the results generated by these results in fixing the found problems, testing the new solution, and evaluating the new result. The iterative process should have cycles of "design-test-measure-redesigning" (Gould & Lewis, 1985, in Preece et al., 2019, p.48).

Preece et al. (2019) expands on this principle, saying that iterations "allows designs to be refined based on feedback", and the activities in an iterative process should therefore inform each other and be repeated (p. 49).

Implementing an iterative process in the development of a product ensures that the correct problem is being tackled, and that the solutions are aligned with and responding to the user needs.

3.5 Information overload

In the article *Perspectives on Information Overload,* professors David Bawden, Clive Holtham and Nigel Courtney suggests that there is "no single generally accepted definition of information overload", explaining, however, that the term is usually used to describe a situation where "an individual's efficiency in using information in their work is hampered by the amount of relevant, and potentially useful, information available to them" (Bawden et al., 1999, p. 249). Furthermore, they explain that information overload occurs when the received information becomes a hindrance, not help, when there is too much information accessible. Bawden, Holtham and Courtney (1999, p. 249) underline that *the information* in this definition must be "of some potential value, and it must be accessible", and that it is "usually associated with a loss of control over the situation, and sometimes with feelings of being overwhelmed" (p. 249).

Information overload can therefore be summarized as a situation where the user is presented with too much information for them to be able to process. If the user is presented with more information than they can handle, the user experience can in turn be affected negatively.

3.6 Cognitive overload

When talking about cognitive overload, or cognitive *load*, in the field of user experience, it refers to the amount of mental resources that are required to operate a specific system imposed by a user interface (Whitenton, 2013). If the user experiences too much information coming in compared to their ability to handle it, the performance may suffer and it will in turn take longer to understand the information and cause the feeling of being overwhelmed (Whitenton, 2013). Furthermore, cognitive overload can be separated into two categories: intrinsic and extraneous cognitive overload.

3.6.1 Intrinsic and extraneous cognitive overload

Whitenton defines *intrinsic cognitive load* as "the effort of absorbing that new information and of keeping track of their own goals" (Whitenton, 2013). This is the information designers wish for the user to absorb, meaning that it is the information the user came to get in the first place. *Extraneous cognitive load*, however, is something designers should eliminate or minimize, and is "processing that takes up mental resources, but doesn't actually help users understand the content" (Whitenton, 2013).

3.7 Information overload vs cognitive overload

Information overload and cognitive overload are related terms, but differ in focus and scope. Based on the definitions above, cognitive overload refers to the mental burden placed on the user when they are required to *process information beyond their cognitive capacity*, whereas information overload refers to a situation where the user is presented with an *excessive amount of information*, often more than they can effectively process or manage. Cognitive overload focuses on the information itself and the mental strain placed on the user during a information processing task, while information overload

refers to the overwhelming amount of information presented to the user. Information overload can therefore lead to cognitive overload and other usability challenges.

3.8 Progressive Disclosure

Progressive disclosure is a technique within interaction design that sequences information and actions across multiple screens to minimize the feeling of overwhelm (such as information or cognitive overload) for the user (Spillers, 2004, as cited in Spillers 2015). This method involves initially presenting users with a limited set of essential features, and revealing additional, often more complex options upon user request. Jakob Nielsen states that progressive disclosure helps with managing user interface complexity by keeping the initial interaction simple, which will in turn enhance the usability (Nielsen, 2006). This approach is particularly beneficial for novice users who can then focus on the primary tasks without being overwhelmed by other options, while advanced users can get access to more features as needed. The effectiveness of progressive disclosure lies in its ability to improve learnability, efficiency of use, and reduce error rates by prioritizing and gradually introducing features based on user needs and context (Nielsen, 2006).

3.9 Design principles

Design principles are used to aid interaction designers when designing for a specific user experience (Preece et al., 2019, p. 26). The user experience in the context of this thesis is one that minimizes or removes the feeling of information overload when working with the Exphil syllabus. Such principles are not only used to aid interaction designers when designing, but also to evaluate a prototype or a finished product or service. A heuristic evaluation is a method used to identify problems in a user interface, and the evaluators use a set of predetermined heuristics, meaning guidelines (Moran & Gordon, 2023). In this thesis's analysis, how the selected principles have been used throughout the design process to minimize information overload is the main focus.

3.9.1 Why Don Norman's design principles?

Don Norman, the American author, professor, and pioneer in design thinking is a highly influential figure in the design industry, and is known for his work on user-centered design principles. Using Norman's principles is a well established tool for designers as it ensures that the design of a product is intuitive and user-friendly. These principles are rooted in understanding the user's needs and behaviors, and guide designers in making informed decisions that enhance the overall user experience. In the development of the concept and prototype for this project, we have done exactly that, and in the analysis of this thesis, I will analyze how the principles have been implemented to lessen information overload.

Norman wrote the book *The Design of Everyday Things,* a book he himself describes as "a starter kit for good design" (2013, p. xi). By applying Norman's design principles, designers can create solutions that not only meet functional requirements but also resonate with the users on a more intuitive level. To get a overview of the principles and how designers commonly utilizes them, I will present them in the following section.

3.10 Don Norman's design principles

Don Norman's design principles are discoverability, affordances, signifiers, constraints, mappings, feedback, and conceptual models, and are all defined in his book *The Design of Everyday Things* (2013). I use his definitions from this book while I present the principles further in this section.

Discoverability

Don Norman's design principle of *discoverability* emphasizes the importance of users being able to intuitively understand how to interact with a product. He states that "when we interact with a product, we need to figure out how to work it", explaining that this includes discovering *what* it does, *how* it works, and what operations are possible (2013, p. 10). This principle ensures that users can quickly and easily understand the functionalities and capabilities of a product without extensive instructions.

Norman explains that discoverability is achieved through the appropriate application of five fundamental psychological concepts: affordances, signifiers, constraints, mappings, and feedback (2013, p. 10). By effectively incorporating these elements, designers can create products that communicate their use clearly and intuitively, leading to a more satisfying user experience. This approach can then reduce stress and overwhelm for the user, thereby minimizing information and cognitive overload.

Affordances indicate possible actions, signifiers guide where actions should take place, constraints limit possible errors, mappings create logical relationships between controls and effects, and feedback provides immediate and informative responses to user actions. Together, these concepts ensure that users can effortlessly *discover* how to use a product.

Affordances

Norman defines the principle of *affordance* as "the relationship between a physical object and a person" (2013, p. 11). He states that "perceived affordances help people figure out what actions are possible without the need for labels and instructions" (Norman, 2013, p. 13).

Norman explains that the principle of *affordance* originated with the psychologist J. J. Gibson, who has provided several advances to our understanding of human perception (2013, p. 12). Gibson emphasized that all senses work together, and we gather information about the world through the combined result of all our senses. He used the phrase "information pickup" to describe this process, believing that the information collected by our sensory apparatus "determines our perception without the need for internal processing or cognition" (2013, p. 12). By applying the principle of affordance, designers can create user experiences that guide users through their interactions, thereby minimizing the potential feeling of overwhelm.

Building on Gibson's work, Norman defines affordance as "a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used" (2013, p. 11). In other words, affordance gives clues as to what something *is for.*

This understanding of possible actions makes affordances an important concept in design, making sure that objects intuitively communicate their potential uses to the users.

Signifiers

Don Norman's design principle of *signifiers* emphasizes the importance of clear communication in guiding user behavior. According to Norman, affordance determines what actions are possible, while signifiers communicate where this action should take place, saying that "we need both" (2013, p. 14). This distinction highlights that while affordances reveal the range of possible actions with an object, signifiers are necessary to indicate precisely *how* to perform those actions. Such signifiers refer to "any mark or sound, and perceivable indicator that communicates appropriate behaviour to a person" (2013, p. 14), underscoring that signifiers can be visual, auditory, or tactile cues that help users understand what to do. By effectively using this principle, designers can then reduce the confusion and overwhelm that could otherwise occur with no signifiers.

Constraints

Norman's design principle of *constraints* emphasizes the importance of guiding user actions and simplifying their interpretation by limiting possible interactions. Norman defines constraints as "providing physical, logical, semantic, and cultural constraints guides actions and eases interpretation" (2013, p. 72). These constraints serve as boundaries that prevent users from making errors by restricting their choices to only the appropriate options, which in turn will reduce the likelihood of user mistakes. A common example of constraints in design is the use of inactive buttons, which removes the possibility for users to click on them when an action is not applicable or available.

By incorporating constraints, designers can create more intuitive and error-resistant interfaces, enhancing the overall user experience by making the system's functionality clearer and more predictable.

Mappings

Norman defines the principle of *mappings* as "the relationship between the elements of two sets of things" (2013, p. 20), meaning that it focuses on the correlation between controls and their actions. This principle is about creating a clear and understandable

relationship between controls and their outcomes, ensuring that users can predict the effects of their interactions.

He elaborates that "the relationship between controls and their actions follows the principle of good mapping, enhanced as much as possible through spatial layout and temporal contiguity" (2013, p. 72). This means that the placement and arrangement of controls should match the actions they initiate, making the interface more intuitive. In practice, good mapping helps users understand and predict how different controls will affect the system, reducing the need for extensive instructions and minimizing user errors. Extensive instructions would demand more attention from the user. If every function and element had extensive instructions, it could lead to the user feeling overwhelmed, and thus a negative user experience.

Effective mapping is essential in design, as it helps with bridging the gap between user actions and system responses, enhancing the user experience.

Feedback

Norman's design principle of *feedback* highlights the role of communicating the results of an action to the user. He asserts that communicating the result of an action is fundamental in making sure that users understand the outcomes of their interactions. To be effective, feedback must be immediate as well as informative, providing users with timely and relevant information to guide their next steps (2013, p. 23). However, Norman warns that "poor feedback can be worse than no feedback at all, because it is distracting, uninformative, and in many cases irritating and anxiety-provoking" (2013, p. 24).

This highlights the importance of well-designed feedback that *enhances* rather than *hinders* the user experience. Properly designed feedback can also help reduce information overload by providing users with the necessary information in a clear and concise manner, without demanding further attention or cognitive effort. It allows users to stay focused on the task at hand, and thus reduces the mental load which leads to a better user experience.

Furthermore, he notes that the principle of feedback is essential, but not if it gets in the way of other things such as a "calm and relaxing environment" (2013, p. 24). He here emphasizing the need for feedback to be supportive of the overall user context.

Conceptual model

The design principle of *conceptual model* highlights the importance of intuitive design in creating user understanding and control. Norman emphasizes that this principle provides "true understanding", and that it may be the most important principle out of the seven he has defined (2013, p. 10).

Norman defines a conceptual model as "an explanation, usually highly simplified, of how something works" (2013, p. 25). According to Norman, "the design projects all the information needed to create a good conceptual model of the system, leading to understanding and a feeling of control" (2013, s. 72).

A well-designed conceptual model allows users to predict the effects of their actions and understand the system's workings, in turn increasing their confidence and efficiency. This simplification is important for making complex systems accessible and manageable, and for making interactions more intuitive and less cognitively demanding. In summary, effective conceptual models are essential in design, bridging the gap between user expectations and system functionality.

4. Methods

In this chapter, the methods used in our joint project will be presented, as well as the methods used in this thesis analysis.

In the first part of this chapter, I will present the overall method used: a user-centered iterative design process with two main iterations. In this section, how we approached this method and the reasoning behind our choice of doing so will be covered. I will then go into the first iteration and present the methods we used and how we analyzed the material. Following this, I will present the second iteration, the research we did, and how we developed and tested the prototype.

The second part of this chapter will cover the method used in the analysis of this thesis, and how I have approached this.

4.1 A user-centered iterative design process

This project has been a user-centered iterative design process from start to finish, meaning that it has been a process "that ensures that the designs match the needs and capabilities of the people for whom they are intended", and that it is based on the needs and interests of users (Norman, 2013, p. 9). We have used qualitative methods in our research, and centered the process around the target users, and therefore involved these users in the development of the prototype. As mentioned in the previous chapter, some of the fundamentals of a user-centered design process include having an early focus of the users, a continuous evaluation of the design, and having an iterative design process (Heim, 2008, in Nordbø, 2017, p. 31).

To ensure that the users were a central part of this project, we started the process - including both the planning and the initial phase of the project - with the users, and included them throughout the research, concept development, prototyping, and testing.

4.1.1 Two iterations

The final prototype is a result of two main iteration. The first iteration focused around the MIX100 students, which I will present further in the following section. The MIX100 involvement resulted in seven prototypes developed based on the material they collected. Following this process, we invited a selected group of these students to participate in focus groups. To finish the first iteration, we did expert evaluations of the seven prototypes, and a SWOT-analysis of Kunne as it is today with the findings from the focus groups.

The second iteration consisted of further research on the users with semi-structured interviews. In this iteration, we also conducted individual thematic analyses of the data material, which in turn contributed directly to the design of the final prototype. The main part of the second iteration was prototyping, in which we designed to respond to the user needs that were prevalent in the user research. Furthermore, we user tested the prototype and iterated these steps - prototyping and user testing - until we finalized the prototype.

The methods in each iteration will be presented in the following sections.

4.2 Iteration 1

In the first iteration, the primary method was participatory design with the students enrolled in MIX100: *Introduction in Media and Interaction Design.* Furthermore, we conducted two focus groups with a selected group of these students, did a SWOT-analysis of Kunne based on the insights from the focus groups, and did expert evaluations of the seven prototypes that were the result of the participatory design.

Each method will be introduced with definitions and common procedures, before I present how we executed our research using the aforementioned methods.

4.2.1 Student involvement with MIX100

Tone Bratteteig, professor of Design of Information Systems at the University of Oslo, defines participatory design in her book *Design for, med og av brukere*, as having future users participating in the design process, and affecting the end result of the design (2021, p. 16). In this approach, the focus is on designing *with* the users, meaning that the people that are meant to use the system or product we are designing, are a partaking in deciding what should be designed (2021, p. 16). Furthermore, Bratteteig refers to three reasons for choosing participatory design as an approach:

- User participation ensures a better knowledge base for the design process, since the users are experts on the future environment of the design outcome,
- it proves to be easier to implement new systems if the users have participated in the design process,
- and that those who will eventually use a system or product must have the opportunity to influence how it is designed, especially if it will affect their lives (2021, p. 16).

In the fall of 2023, we initiated our research project using a participatory design approach with the 32 first-year students enrolled in the Media and Interaction Design course MIX100 as our participants. Most of these students were enrolled in the Exphil course at the time, making them an ideal representative sample of the target user group.

One of the primary objectives of the MIX100 course is to develop an idea from a concept to an interactive prototype (UiB, n.d.). We could therefore task them with

creating prototypes with possible solutions for Universitetsforlaget, where they design elements that could be incorporated in Kunne. The challenge we gave them was:

"How can Universitetsforlaget create a digital learning platform that motivates Exphil students?"

In this challenge, the students were split into seven groups, and were all instructed to do user research, to explore elements of gamification, and to design a prototype that would motivate Exphil students.

The result of this process was the development of seven prototypes, each exploring different approaches and solutions to the design challenge we presented based on the insights from their own research of the users. These prototypes had features such as progress bars, quizzes, generated calendars and to-to lists, and visualized paths of the Exphil syllabus.

This participatory design method facilitated active student participation, which in turn resulted in valuable insights to our research with practical, user-centered design solutions. To get further perspectives and reflections about both this process, and about Kunne as a digital learning platform for Exphil, we concluded this process with two focus groups.

4.2.2 Focus group

A focus group is a form of group interview, normally with three to ten participants that represent a sample of the target group, led by a trained facilitator (Preece et al., 2019, p. 271). An advantage of focus groups is that they can provide a better environment for facilitating discussions around sensitive topics and themes. With several participants present, it can be easier for individual participants to voice their opinions on a given issue (Preece et al., 2019, p. 272).

We conducted two focus groups, the first one with seven participants, and the second with six. These participants were all MIX100 students, each one representing the group they worked with during this semester. Similarly to the semi-structured interviews, we prepared topics and a few open questions for the groups to discuss. We recorded both sessions, and later transcribed the interviews. Each student also signed a consent form where they were provided information about the project and how the

collected data would be handled.

The aim for these focus groups was to encourage the participants to talk amongst themselves about the topics and questions that were asked, which would hopefully give us different opinions and point of views on varying topics, or shared sentiments on common issues. These topics and question included their reflections on their prototypes, their troughs about the MIX100 course, their opinions on gamification, and their perspectives on Kunne as a digital learning platform for Exphil.

During this semester, we - my two colleagues in this project and I - were aware of the different roles we had in relation to the students. We were co-teachers in this course, where we were closely involved with each part of their projects, in addition to having workshops with the students. We were also researchers, where the work they did and their prototypes would serve as the result of the first iteration of our master's project. Because of this, we explained that the role we had during these focus groups were the ones of researchers, not teachers, and that we wanted their honest opinions on the different topics. We did this to prevent the students from answering the questions based on what they thought we *wanted* to hear as teachers, and not what they, as the target user and participants in the participatory design, actually thought.

Challenges during the focus groups

During the first few minutes of the first focus group, the students talked to *us*, the facilitators, rather than amongst themselves which is what we intended for them to do. They also seemed to wait for our permission to speak when wanting to comment on something another student said. We therefore emphasized that this was meant to be a discussion between *them* and that they should to talk freely amongst themselves early on in the focus group so that the rest of the discussion would continue as intended.

This is something we then highlighted at the beginning of the second focus group. During this focus group, however, the students still seemed hesitant to have ongoing discussions on the different topics, and opted to give short and concise answers. We therefore needed to be more participatory during the interview to keep the discussion going, probing them with follow-up questions or asking them to elaborate.

4.3.1 Analyzing the material

Before starting the second iteration, we analyzed the data material from the participatory design process and the focus groups using a SWOT analysis and expert evaluation. We did this analysis and evaluation together in FigJam, an online whiteboard, and visually collected and mapped the findings.

4.3.1.1 SWOT analysis

SWOT stands for *strengths*, *weaknesses*, *opportunities*, and *threats*, and is an analysis method used for identifying internal and external factors in an organization, a project, or a business (Gürel, 2017, p. 994). The strengths and weaknesses are the internal factors of the organization, while the opportunities and threats are the external factors of the environment (Gürel, 2017, p. 995). By conducting a SWOT analysis, designers can identify areas for improvement and innovation, ensuring that strategic decisions are informed by a understanding of the project and its possibilities.

We used the insights from the focus groups to do a SWOT analysis on the concept of Kunne as Universitetsforlaget has designed it, as well as for the potential in further development. We categorized the findings from both focus groups, and placed these findings in potential strengths, weaknesses, opportunities, and threats. Doing this gave us a clear overview of the user needs, highlighted the current issues with Kunne, and underlined the challenges the students faced with Exphil.

4.3.1.2 Expert evaluation

As Nordbø states, an expert evaluation does as its name implies, it involves an evaluation conducted by experts (2017, s. 173). The experts, in this context, are the interaction designers. An expert evaluation is conducted when the designers do not have access to users, or when they want to evaluate a product by looking for general violations of design principles and usability (Nordbø, 2017, p. 173). The interaction designers evaluate a product or service based on experience and knowledge of theory and practice in the field, and therefore rarely follow strict methods for evaluating. They do, however, benefit from having a framework to rely on, and one of the methods with such a framework is a heuristic evaluation (Nordbø, 2017, p. 173). As mentioned in the previous chapter, a heuristic evaluation is a method used to identify problems in a user

interface, and the evaluators use a set of predetermined heuristics, meaning guidelines (Moran & Gordon, 2023).

In our expert evaluation of the seven student-created prototypes, we selected three principles from Don Norman (2013): feedback, mapping, and visibility (discoverability), and three principles from Preece, Sharp and Rogers (2019): effectiveness, efficiency, and utility. We used these to do a heuristic evaluation of each prototype, taking screenshots of different elements and functions, and writing down notes on how they respond to the principles.

This evaluation gave us an overview of the prototypes, their functions, and usability problems. We also found strengths that could potentially be incorporated in our prototype.

4.3 Iteration 2

In the second iteration, we did further research on the users and their needs with semi-structured interviews. Using both the insights from the first iteration, and the findings from the semi-interviews, we then started our own design process. This process consisted of concept development, prototyping, and user testing. The latter two methods were iterated as needed, and the result of this iteration is our final prototype.

Each method will be introduced with definitions and common procedures, before I present how we executed the method.

4.2.3 Semi-structured interviews

Semi-structured interviews are interviews that use both open and closed questions, where the interviewer has a guide with a basic script and pre-decided topics (Preece et al., 2019, p. 269). This ensures that the same topics are covered in each interview. In semi-structured interviews, the interviewer starts with pre planned questions, and then asks follow up questions to probe the interviewee to elaborate (Preece et al., 2019, p. 270-271).

During the user research in this iteration, we conducted nine semi-structured interviews, six of them being with students taking Exphil during the time of the interview, and the last three with students having taken Exphil either a year or several

years prior to the time of the interview. Each student we interviewed signed a consent form where they were provided information about the project and how the collected data would be handled.

We made an interview guide with topics including their thoughts on Exphil in general, the lectures and seminars, the syllabus, and their preferred learning methods. We included questions that could lead us to design implications, such as asking about their wants and needs for the syllabus to be more comprehensible, and the tools for motivation they use when learning something new.

Before we contacted students that were, at this time, taking Exphil, we conducted a pilot interview. This gave us the opportunity to check whether the questions were clear or not, and thus the opportunity to change those questions to avoid possible confusion before continuing with the research. The participant for the pilot interview did not only indirectly give us pointers as to what we needed to change about the interview guide, but also valuable insights into the perspective on Exphil. as a student having taken the course a few years prior. Because of this, we expanded the categories for the interviewees into two groups; students taking Exphil at this time, and students that finished the course at least a year ago. The former was the group we had already planned on interviewing, but given the insights we got from the pilot interview - that we also included in our data analysis - we realized that we could get an even broader insight and perspective by including the latter.

We used semi-structured interviews as a method of research to get a deeper understanding of the user group, their current thoughts on Exphil and the way the course is structured, and to get insights into how they prefer to learn new content. In addition to getting answers to the preplanned questions and topics, using this method gave us the opportunity to ask follow-up questions, and to ask questions that were not included in the interview guide but were relevant to the research.

4.3.2 Prototyping

Preece et al. (2019) defines a prototype as "one manifestation of a design that allows stakeholders to interact with it and to explore its suitability." (p. 422). They continue, saying that the prototype will usually emphasize one set of characteristics in the product, and de-emphasize others (2019, p. 422).

Lim et al. (2008) defines two fundamental aspects of prototypes, saying that they are (1) "for traversing a design space, leading to the creation of meaningful knowledge about the final design as envisioned in the process of design", and (2) "purposefully formed manifestations of design ideas" (p. 7:3). Designers often demonstrate interactions without finalizing other aspects of the prototype, like appearance or functionality. This framework identifies an initial set of design aspects, called *filtering dimensions*, where designers focus on specific aspects within the design by filtering out other unnecessary aspects (2008, p. 7:3). Prototypes that manifest certain design aspects must, according to Lim et al. (2008), consider material, resolution (low- to high-fidelity), and scope, which they call *manifestation dimensions*. They continue, saying that "the best prototype is one that, in the simplest and most efficient way, makes the possibilities and limitations of a design idea visible and measurable" (p. 7:3).

In the process of prototyping, we dissected the insights with thematic analyses of the material. The themes of these analyses are gamification, participatory design, and information overload. With these analyses, we found what we believed to be the best way to respond to the insights, and designed the prototype accordingly.

We used the insights from the first iteration to start the second, continued gathering data material to help us better understand the users and their needs, and designed the prototype with the insights *from* the user, *for* the user. Within this iterative process, we did smaller, more frequent iterations of the prototyping and user testing until we finalized the prototype we believe provide the solutions needed by the users, and thus Universitetsforlaget.

We prototyped using Figma, a collaborative design tool, starting with wireframes of the initial concepts. To avoid using time and resources on possible ideas that would not appeal to the user needs, we tested the concept with a student as early as possible. Based on the feedback, we continued prototyping where we actively incorporated the insights from our user research and analyses.

Throughout this process, we did continuous filtering of which aspects of the prototype should be prioritized, and which dimension of manifestation they needed to be to reach the highest level of fidelity we deemed necessary at the time. For example, prioritized making one chapter of the Exphil syllabus available and functioning through the interactions in the prototype, and not the complete syllabus seeing that it would not be necessary for the user to understand the concept. Similarly, we designed two

complete philosopher profiles (in *Tenkerne*) with the structure and information needed to respond to the user needs, and not profiles for all the philosophers. Which aspects we prioritized varied throughout the process, often depending on which features we deemed most necessary to test with the users.

4.3.3 User testing

User testing us a well established observational methodology used to uncover problems and opportunities in design. The typical goals with these tests are to (1) identity problems in the design, (2) uncover opportunities to improve the design, and (3) to learn about the user's behaviour and preferences (Moran, 2019). To ensure that the prototype, the concept, and the user experience is aligned with the user needs, there needs to be an iterative design process driven by observations (user tests) of the users and how they interact with the prototype (Moran, 2019).

We did three rounds of user tests throughout the second iteration:

Round one

The first test was with a first-year master student. The participant tested a low-fidelity prototype consisting of simple wireframes that showcased the core ideas. This prototype had no textual or visual content, and only provided the user with enough information about the concept so that they could give feedback. This gave us pointers as to how the ideas respond to the user needs we discovered in our research and analyses, and became the foundation for the continued work on the prototype.

Round two

The second test was with a second-year master student. The participant tested a mid- to high-fidelity prototype, which included more refined design elements than the low-fidelity prototype, but was still not as fully developed as a high-fidelity prototype. This prototype had visual design elements, interactive features, and some textual content that gave the participant a more realistic user experience.

Round three

The third round consisted of two tests: one with a first-year bachelor student, and one with a developer. These participants tested a high-fidelity prototype which closely

resembled the final version in terms of functionality, design, and user experience. The feedback we got during these tests resulted in smaller tweaks and bugs being fixed, and overall confirmed that our design responded to the user needs.

The practical approach

In all three rounds of user testing, each participant was first given a consent form with information about the project and how the data collected would be handled. We then gave an informal introduction to the project, and had a loose conversation about the prototype they were about to test. Furthermore, we asked the participants to *think aloud,* a usability method defined by Jakob Nielsen as a way of getting the participant to continuously think out loud while they test the design, meaning "simply verbalizing their thoughts as they move through the user interface" (2012). Having the participants think aloud gave us valuable insights into aspects of the prototype that worked, caused confusion, were unclead, and generally how they reacted to the features and elements that were implemented. Throughout the test, we gave the participants tasks, such as asking them to go to the chapter introduction for a specific chapter, or to explore the philosophers through the profiles (*Tenkerne*). The tasks combined with the think aloud method gave us insight and an understanding on how the user interacted with the prototype, and their thought process throughout each interaction.

4.4 Combining methods

It is important to note that each research method has limitations. Combining methods can therefore help with mitigating biases that are inherent in any one approach (Preece et al., 2019, p. 260). Our combination of methods enables us to explore the various perspectives of the challenges the user faces today with Exphil, and thus lets us gain a better understanding of their needs.

4.5 Method for the thesis analysis

In our individual analyses of the data material, some recurring problems and themes were defined. These findings were therefore directly used to develop the design of the

prototype from the early stages of the second iteration, making the process an analytically informed design. The content of this iteration is therefore characterized by our analytical approach to the user research, where the user needs were fundamental throughout the entire process.

In this section, I will therefore present the methods used for analyzing the material: a thematic analysis.

4.5.1 Thematic analysis of the data material

Braun and Clarke defines a thematic analysis as a method for "systematically identifying, organizing, and offering insight into patterns of meaning (themes) across a data set" (2012, p. 57). Furthermore they explain that this method allows researchers to make sense of and see collective or shared experiences, and that conducting a thematic analysis is "a way of identifying what is common to the way a topic is talked or written about and of making sense of those commonalities" (Braun and Clarke, 2012, p. 57).

After having finished the first iteration, and the user research done in the second iteration (the semi-structured interviews), we conducted thematic analyses of the collected data material, where we searched for patterns and shared experiences with Exphil, learning, and motivation. Additionally, recurring problems that could be translated into design implications were highlighted. The result of these analyses were then directly fed into the design process while prototyping, making the end result user-centered at its core.

The issue of information overload became clear in my analysis, seeing that a recurring and prevalent theme was the feeling of overwhelm with the Exphil syllabus, leading to a lack of motivation and overall negative experiences and feelings towards the course. The thematic analysis is therefore directly linked to both the development of the prototype, and the analysis of this thesis. Thus, the insights and findings will be presented in the following chapter throughout the analysis of the research question:

5. Analysis

In this chapter, I will analyze the five modes for learning in Kunne Exphil with Don Norman's design principles, and answer this thesis research question:

To which degree can design principles in the five modes for learning minimize information overload in Kunne Exphil?

In the analysis, I will first introduce the five modes for learning that we have designed as a result of the user-centered iterative design process. I will then go into each mode, first presenting the *user needs* with quotes and findings from the qualitative data (please note that the quotes are translated to English from Norwegian). Furthermore, *our solution* to these needs will be presented. Lastly, *the design principles* and how they have been utilized in each mode to minimize information overload will be analysed to answer the research question. Each figure presented in the following sections are screenshots and visual elements from our final prototype. This analysis will use the theory and definitions which were covered in chapter 3. I use Don Norman's principles from his book *The Design of Everyday Things* (2013) when referring to the principles while analyzing the modes in relation to information overload.

5.1 Five modes for learning

All aspects of Kunne Exphil are results from responding to the user needs that were discovered in the research. These include the onboarding, generated to-do lists (*Gjøremål*), the progress overview, and the encouraging messages on the dashboard. However, the main aspect of Kunne Exphil that tackles the user needs for *learning* the Exphil syllabus, while minimizing the feeling of information overload, are the five modes for learning. The first three modes - Kort forklart, Dybdemodus, and Tenkerne - are for reading and learning, and the following two - Spørsmål and Huskekort - are for testing comprehension and memory.

While designing these modes, we have actively taken design choices that are based on our knowledge and experience with established design principles. As Preece et

al. (2019) states, design principles are used to aid interaction designers when designing for a specific user experience (p. 26). The user experience we have designed for is one that minimizes information overload and motivates the users when working with the Exphil syllabus. I will thus assess to which degree the five modes for learning, with the use of Don Norman's principles in the design, achieves this. I will be using the presented theory in Chapter 3 as a backdrop for the analysis.

5.1.1 Mode 1: Kort forklart

In this section, I will present the user needs, our solution, and then analyze the features and design elements in this mode in relation to the research question.

5.2.1 User needs

During our research in both the first and second iterations, challenges related to the *extent* and *complexity* of the Exphil syllabus became evident. Several of the participants said outright that they needed the syllabus to be simplified and presented in a way that is more approachable than what it currently is in the textbooks and lecture notes.

This can be seen in the results in a number of the semi-structured interviews, where the participants were asked about their preferred learning methods. When asked if they had any particular ways of learning they liked or felt like they needed in order to understand the content, one participant answered:

> *"That things are simplified and, uh, that things are explained in a way that starts from the basics, and that it's simplified. There are a lot of advanced words used in the lectures, as if we should already know them. So in the books, it's just a lot of stuff. For me, it becomes very messy. Whereas if it just says 'this is how it is, and this is how it is' then I learn best."*

The same participant continued later in the interview, saying:

> *"Basically, again, it's about simplifying. Let's say you have a chapter, and then you simplify it by focusing on what's most important (...) I learn best when it's like 'this is this'. That they tell you what, how, and why. (...) What is most important, what*

you should know, and how everything is connected, because it's a bit difficult to understand sometimes, I think."

We followed up asking the participant about how this could be solved, so that the syllabus would be less overwhelming, easier to understand, and more manageable. They answered, explaining:

"Kind of like [the professor] explaining what truth is, and then providing a simple example. Because I noticed [the professor] was at a high level, he's been doing this for a long time. So for me, it's that it's explained simply, that it's logical. But when it's written very much like 'truth is a lie' or something like that, like, you know, it gets a bit too philosophical."

It was clear that this participant was feeling overwhelmed with the syllabus and the way it is currently being formulated to the students, and that they needed a way for the syllabus to be more approachable to avoid information overload.

When we asked the participants about their thoughts on the obligatory seminars, another participant expressed their feelings about the Exphil syllabus and how exasperated they were with how the curriculum was being presented, both in the seminars and the books:

"I find the entire Exphil syllabus incomprehensible. I think they should somehow make it understandable, because people often come straight from high school, and like, this is the University, of course, but there are a lot of difficult words."

The same can be seen in this quote as the ones from the participant above: the syllabus and the way it is being presented today is not facilitating for a good user experience, and consequently overwhelms the users with too much "incomprehensible" information, as this participant states.

Furthermore, in the focus groups, we asked the participants what their "dream version" of Kunne Exphil would look like. One of the participants answered similarly as the ones mentioned above, where they underlined the need for a simplified presentation

of the syllabus to avoid feeling overwhelmed:

"Maybe a webpage where the curriculum is very short and concise, and that it is clear that you can see that you are working your way through it, the progress, so that it doesn't feel so endless"

In summary, the students are currently feeling overwhelmed and frustrated with the *extent* of Exphil, which in turn leads to discouragement. It is evident that the feeling of information overload is present when it comes to both the volume and the level of difficulty of the syllabus, and is therefore, as found in my analysis of the data material, one of the greater, most common issues with Exphil today.

As the participants have stated on several occasions themselves, the current textbooks are not facilitating for a positive learning experience, as they seem to enhance the feeling of information overload. Based on these insights, the users need a simplification of the syllabus, which will in turn make the course and its content more approachable.

5.2.2 Our solution

Kort forklart ("In Short") introduces the user to a chapter's most central themes and philosophers, and provides definitions that are prevalent throughout the chapter in question. This mode is therefore the starting point for each chapter, and familiarizes the user with its core concepts. Having started a chapter with Kort forklart will in turn makes it easier for the user to start reading in *Dybdemodus.* Figure 1 illustrates the users' initial encounter with this mode.
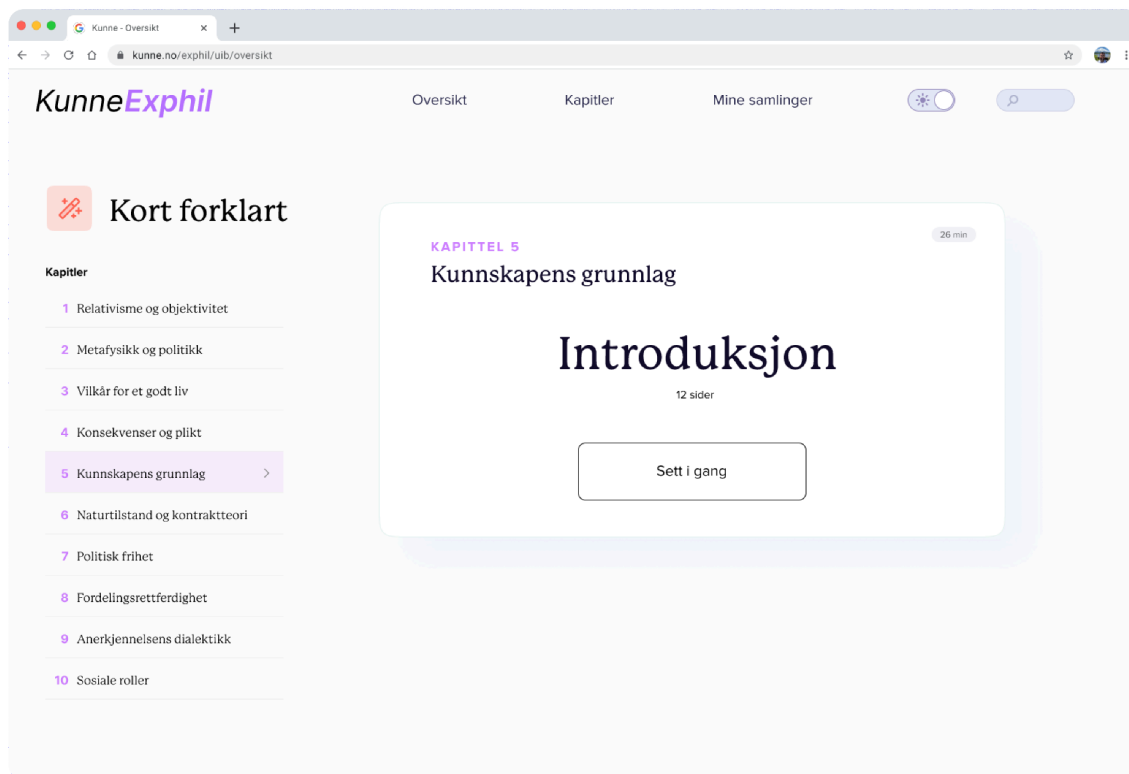
Figure 1: Kort forklart, the first slide for Chapter 5 "Kunnskapens grunnlag".

5.2.3 Minimizing information overload with constraints

For the learning mode Kort forklart, the principle that has the greatest effect on minimizing information overload is *constraints*. This principle emphasizes the importance of guiding user actions and simplifying their interpretation by limiting the possible interactions.

Norman's definition of constraints is mainly focused on the *interactions* made available to the user (2013). I would argue, however, that it is equally applicable when comes to the *information* made available. Therefore, I find Norman's definition of this principle to be too limiting in describing which elements the designer would be constraining, and I will in this section show how and why we have used this principle to minimize information overload, with focus on the *information*, not the *interactions*.

In our design, we have applied this principle in relation to which information is shown to the user, whether it is simplified or filtered out. Kort forklart is the first step for each chapter, and therefore serves as the first building block the students require to create a foundation for understanding the content in their continued reading of the syllabus. This is also communicated to the users, as shown in Figure 2, in both the onboarding and on the dashboard.
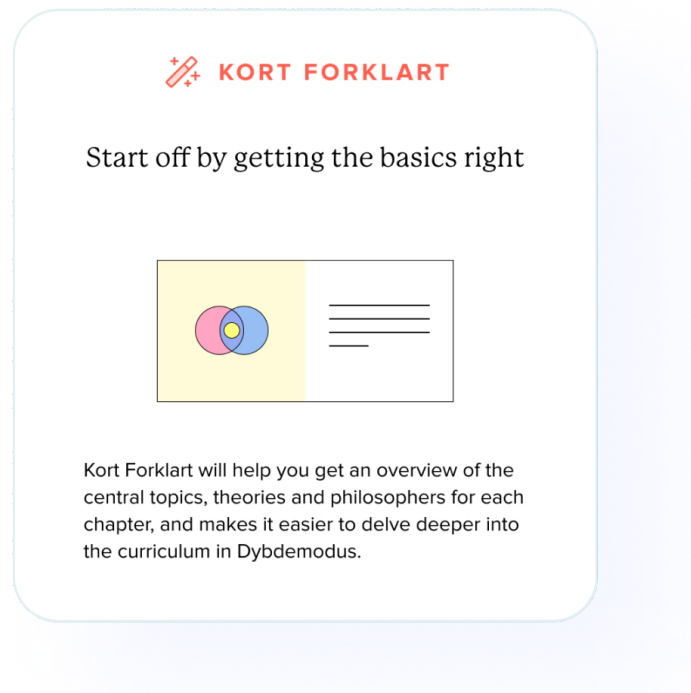

Figure 2: Kort forklart is the first step in mastering Exphil.

In this mode, as shown in Figure 3, the users are only shown the key topics, definitions, and philosophers of the chosen chapter over a series of slides, and are not given any lengthy descriptions that would demand much time or cognitive effort. As presented in Chapter 3, too much information coming in compared to the users' ability to handle it can lead to the performance suffering due to information overload. This will in turn require more time and mental effort from the user for them *to understand the information,* thus leading to extraneous cognitive overload, where the process of understanding the information takes up mental resources, but does not in turn help the user with understanding the content (Whitenton, 2013).
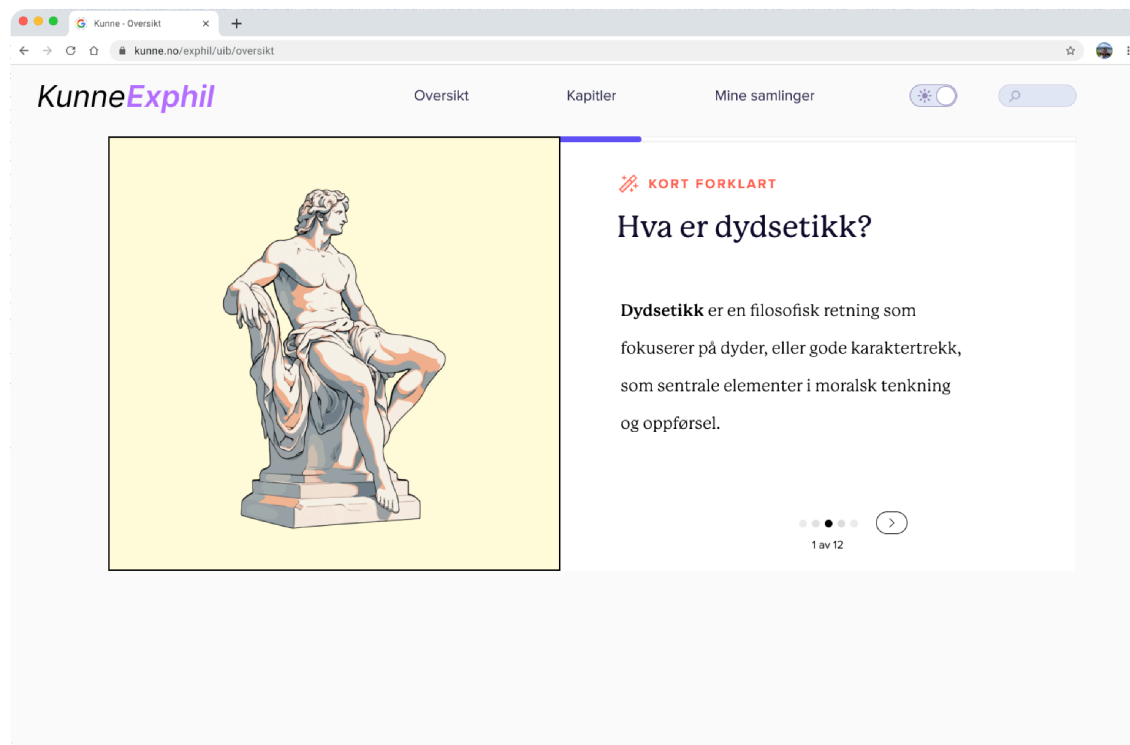
Figure 3: A slide in Kort forklart with a simplified definition of "dydsetikk".

In my analysis, it is evident that the syllabus presented in the physical textbooks the students use today leads to the them feeling overwhelmed, where the *volume* of information and the level of difficulty is the primary cause. Applying the technique of progressive disclosure in Kort forklart through simplifying and sequencing the content across several slides (Spillers, 2004, in Spillers 2015) in addition to constraints, will give the users a foundation and understanding of the topic at hand, and thus makes the chapter in its whole less overwhelming.

Filtering out information that is not essential to understand the foundation for a topic, along with condensing and simplifying the presented information, will in turn give the student a feeling of control. I would therefore argue that our use of constraints in Kort forklart, with focus on the *information* and not the *interactions,* will minimize the feeling of information overload in their continued work to a high degree, especially when reading the chapters in Dybdemodus.

5.1.2 Mode 2: Dybdemodus

In this section, I will present the user needs, our solution, and then analyze the features and design elements in this mode in relation to the research question.

5.3.1 User needs

In the semi-structured interviews, we asked the participant about their preferred format for reading, being either a physical textbook or digitally on screen. We knew from our initial meeting with Universitetsforlaget that they were planning on incorporating the complete syllabus in Kunne for the University of Bergen, as opposed to the condensed and edited content on Kunne for the University of Oslo and Agder. We therefore wanted to explore this further to map out the user needs to this specific aspect.

When asked the participants if they prefer reading physical books or on a digital format, there were some varying opinions. One participant preferred reading on screen, saying:

"I would like to read digitally. I find it very useful to search for specific words. It helps me to read through."

Another participant, however, preferred having a physical book, mainly out of habit:

"I'd rather have a physical book. (...) I guess digital is more useful, but I don't know, I've just always had a book when I'm studying. So, yeah, habit."

Similarly, another participant expressed that they use physical books because this is the format the syllabus is currently in. However, they still preferred reading on screen because of the practicality:

"It's usually the screen because it's more practical. (...) I use books too, considering all the syllabus is in book form (...) The screen is just as good, easier to keep track of everything and you can save it in files and such. More possibilities."

One participant simply stated:

"Digital, because of Ctrl+F"

This participant was here referring to the function of searching for specific words and phrases in a digital document. When we asked if they could elaborate, they said:

"I find digital easier, it's more organized. Books are cumbersome. I like reading, but when it comes to schoolwork, I find it extremely inconvienient to use books (…). The good thing about the Exphil books was the keywords on the sides, but still, you know, it would've been so much easier if it was digital."

Another participant expressed a similar feeling of reading on paper versus screen. When reading, they prefer using a physical book, but when reading for a specific assignment, they prefer a digital format. This participant also mentioned the function of highlighting the text in a PDF. They said:

"When I'm reading, I like to read a book, but if I need to use it in an assignment, I like to have it as a PDF or on my computer so I can highlight and look at [both the text and the assignment] at the same time."

Furthermore, we asked the participants in the interviews and focus groups about their expectations of a digital learning platform, specifically Kunne Exphil. One participant expressed that they would assume that it would replace the physical books, and there would be several interactive functions that would aid them when reading the syllabus:

"It would be a replacement for books (…) it would be more interactive ways to learn, that's what I expect. (…) It's probably quizzes and maybe a feature where you can highlight things in the text. Let's say you can highlight an area and then save it somewhere."

In summary, there are varying thoughts about whether *reading* a physical textbook or digitally is the preferred method. Those who preferred reading physical books also did

so seemingly out of habit. The books, however, were described as impractical, and as mentioned in the user needs in the previous section about Kort forklart, the books are a source to the feeling of overwhelm. A digital format, however, helps them stay organized and thus provides a feeling of overview of the syllabus.

Furthermore, there was a pattern when it comes to working actively with the material: the students prefer to have the syllabus digitally with additional functions, such as highlighting and saving notes, and easy access and overview to the different chapters.

5.3.2 Our solution

Dybdemodus ("Depth mode") is the Exphil syllabus in its whole, giving the user access to all chapters that would otherwise be available in the physical textbook. In Dybdemodus, the user can highlight text which can then be saved as notes in *Mine samlinger* ("My collection")*,* or be used to create *Huskekort* ("Flashcards"), as shown in Figure 4. The notes can be color-coordinated, which gives the users the opportunity to get a visual categorization of the highlighted text.
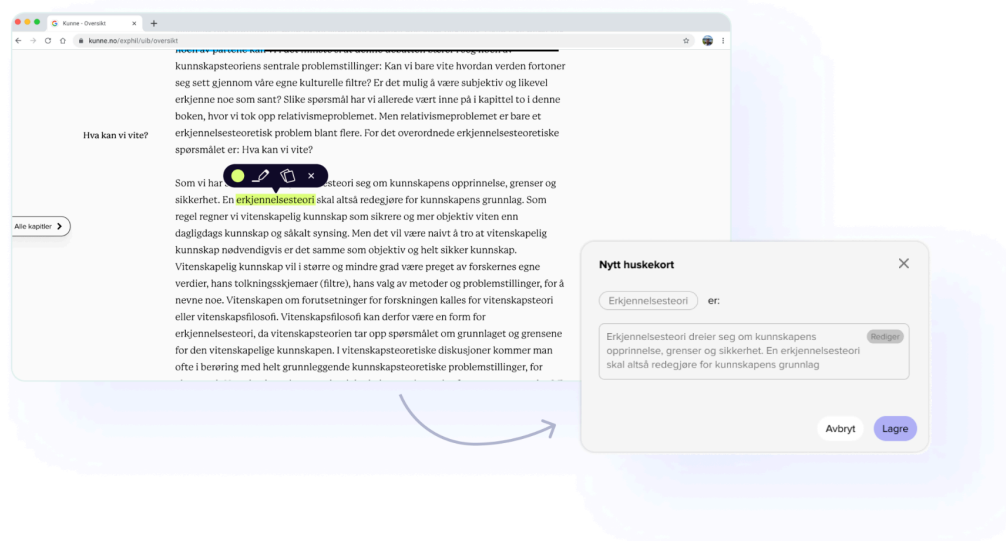

Figure 4: Dybdemodus, the user can highlight text to save as notes, or make Huskekort.

5.3.3 Minimizing information overload with mappings and signifiers

We knew from the initial phase of this project that Universitetsforlaget were planning on incorporating the complete syllabus in Kunne for the University of Bergen. This was also confirmed as a user need in our research, where several of the participants preferred using a digital format while reading, and using additional functions such as searching for words and highlighting text. Furthermore, the users expect the complete syllabus to be available, so that they do not need to rely on additional textbooks.

In the second iteration, during the concept development and early prototyping phase, we recognized that incorporating every chapter of the Exphil textbook into Kunne Exphil could potentially *cause* information overload rather than alleviate it, contrary to our goal. We were therefore aware of this challenge when designing Dybdemodus.

Although one of the most prominent user needs was simplifying topics in the syllabus, it is not ideal nor realistic to simplify the syllabus as a whole. Therefore, we are not able to minimize the feeling of information overload to a high degree in Dybdemous, seeing that this is the mode where *all information* is presented. However, I would argue that this information (namely the complete Exphil syllabus) can cause what Whitenton (2013) defines as *intrinsic cognitive load,* meaning the effort of absorbing the information we here *wish* for the users to absorb, and that the users came to get in the first place.

We did, however, still want to minimize the overall cognitive load in this mode, and therefore implement interactive features in our design using Norman's principles *mappings* and *signifiers* (2013)*.*

The user can highlight text in Dybdemodus and save it in *Mine samlinger* ("My collection"), or to create Huskekort (this mode will be further presented later in the analysis). In the tool box that appears after having marked text in Dybdemodus, as shown in Figure 5*,* the icon for highlighting the text is a universal icon, similar to those used in Microsoft Word and Google Docs. Thus, using mapping to create a relationship between the icon and the function, the user can easily predict the possible actions.

Figure 5: The user highlight and color-coordinate text or create Huskekort.

Furthermore, the use of signifiers communicates the result of their actions to the user. It is most prominent in the function of choosing different colors while highlighting text, where the result is color-coded notes that are categorized accordingly, as shown in Figure 5. Highlighting text in Dybdemodus and saving it in Mine samlinger aids the users in structuring and categorizing the information, and thereby lessens the feeling of information overload to some degree. Moreover, the highlighted text can be categorized by color, which will further assist the user with creating structure. Although the use of the principles mappings and signifiers do not directly affect the feeling of information overload in Dybdemodus, they do assist the user in making the interactive functions intuitive, and thus require little cognitive load.

In summary, the mode itself does not facilitate for minimizing information overload, as it would contradict the intention of the mode (i.e. making the *complete syllabus* available to the user), but rather facilitates for a good user experience with intuitive functions using design principles, that in turn lets the user categorize and structurize the information as they wish.

5.1.3 Mode 3: *Tenkerne*

In this section, I will present the user needs, our solution, and then analyze the features and design elements in this mode in relation to the research question.

5.4.1 User needs

In the semi-structured interviews and the focus groups, we asked the participants questions about Exphil as a course, the lectures, seminars, and what they felt were the most challenging parts of the syllabus. One participant emphasized that *the numbe*r of philosophers, topics, and terms were one of the main factors, saying:

"I think there was something about the theories of the philosophers too. There are so many of them, so I mix them up a lot (...). And everyone had, like, an opinion on this and an opinion on that and, yeah. It was a bit jumbled. The book that we used, (...) that one is written all over the place, I think."

Another participant shared a similar sentiment, explaining their negative experience with the seminars about the philosophers:

"I remember, for example with Immanuel Kant, when reading about the philosophers and such, I remember that it was difficult. The theories and concepts were difficult, and understanding the big philosophers. I cried after some of these seminars"

After giving the participants brief explanation of Kunne as it is today for the University of Oslo and Agder, we asked what they would have expected of such a platform, and what they would want to be included in their "dream version" of Kunne Exphil. Several of the participants mentioned an overview of the philosophers and their key topics and theories. One participant said that she would want:

"(...) a separate space for [philosophers], where you have one for each philosopher they cover in the curriculum, with keywords, what they stand for, and what kind of ethical theory they are behind."

When asked if they would want "something like profile pages", the participant answered enthusiastically:

"Yes! Short introductions to all the philosophers, so I can divide them into categories, which theories they represent. I feel like that would have been very helpful. Because there are a lot of names."

It became evident that the users want and need a platform where they can read about the philosopher separately, and thus became an important design implication we explored further in iteration 2.

Furthermore, another participant in one of the the focus groups mentioned that they would want something like a google-search function on Kunne, saying:

"It could be like Google but just for Exphil. 'Who is Socrates?' and then you get a little 'Socrates blah blah…' and then a reference to the chapter in the book or something. That you get it briefly, because there are a lot of people who don't want to read 200 pages about, yeah, about what? Right, an easy explanation, often that's what people want. Most, or many, just want to pass the subject. But yeah, a Google for Exphil"

Throughout the interviews and focus groups, it became clear that the participants were experiencing information overload with the content of Exphil in the current way it is being presented, which in turn lessened the overall motivation. In my analysis, the information overload seems to occur mainly because of the *number* of different philosophers and the relevant themes and concepts connected to them, especially when some of the themes overlap.

Their specific needs are also highly visible in the quotes presented in this section, namely separate introductions of each philosopher with an overview of their philosophy, related terms and keywords, and comparisons between them and other philosophers.

5.4.2 Our solution

With *Tenkerne* ("The Thinkers"), the user gets an overview of all the central philosophers in the Exphil syllabus in one place. Each philosopher gets their own profile with a summary of their philosophy, definitions to key terms related to them, and comparisons to other philosophers that have opposing or similar philosophies. The users get to know each philosopher one by one with Tenkerne, and will therefore be familiar with them later when reading the different chapters. Figure 6 illustrates the users' initial encounter with Tenkerne.
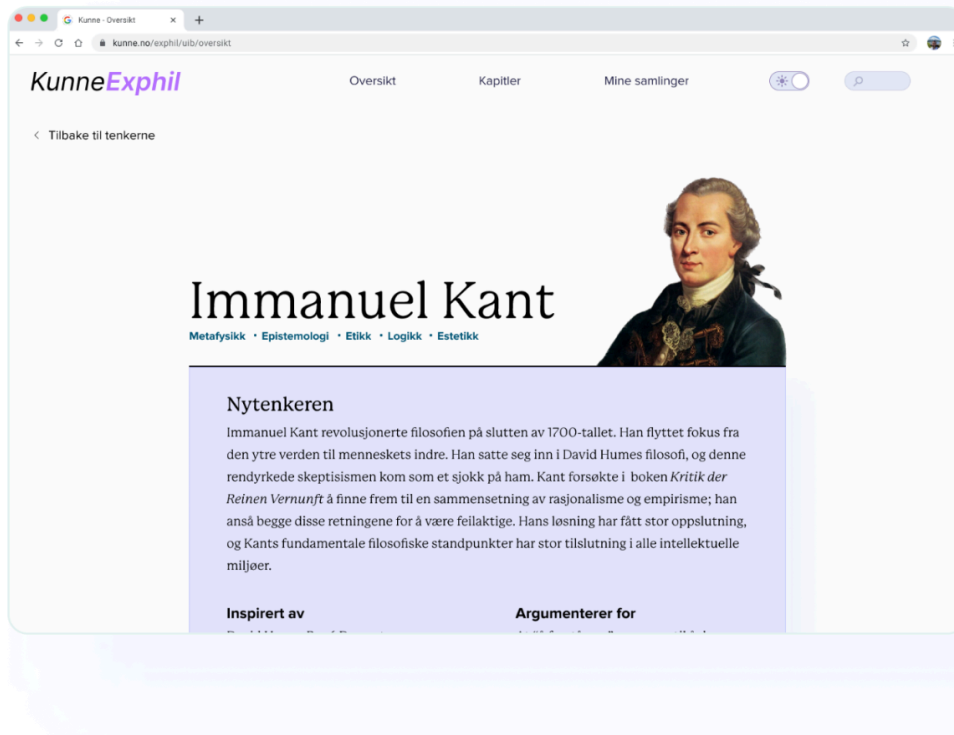
Figure 6: The users' initial encounter with Tenkerne..

5.4.3 Minimizing information overload with constraints and affordance

In order to minimize information overload for the users, they get an overview with short and concise summaries of the key philosophers in Exphil. In the design of the profiles, we have used constraints (2013) in a similar matter as presented in Kort forklart, with focus on the *information*, not the *interactions*.

On each profile, the philosopher is presented with related keywords that aims to provide the user with an immediate clue as to which philosophical topics the philosopher is related to. Furthermore, a short description of the philosopher is presented, and a brief summary of their most central theories and disciplines. In this, we have constricted the information available to the user, only providing them with surface-level details in order for them to get to know the philosophers. This design implication, with focus on using constraints, is a direct response to the users' needs discovered in our research and analyses, and is reflective to the quotes presented in above. The users need a space where they can learn about each philosophers specifically, without being interrupted or distracted by extensive information.

As shown in Figure 7, a philosophers key topics and philosophical views are presented on a card, here "Kants tanker". The only definition visible to the user is the one belonging to the active button, here "Metafysikk". The visible definition will be swapped once the user clicks on another buttons on the card, and the belonging definition to the now clicked topic will appear. Thus, only one definition is visible at a time, which further constricts the information presented to the user and minimizes potential information overload.
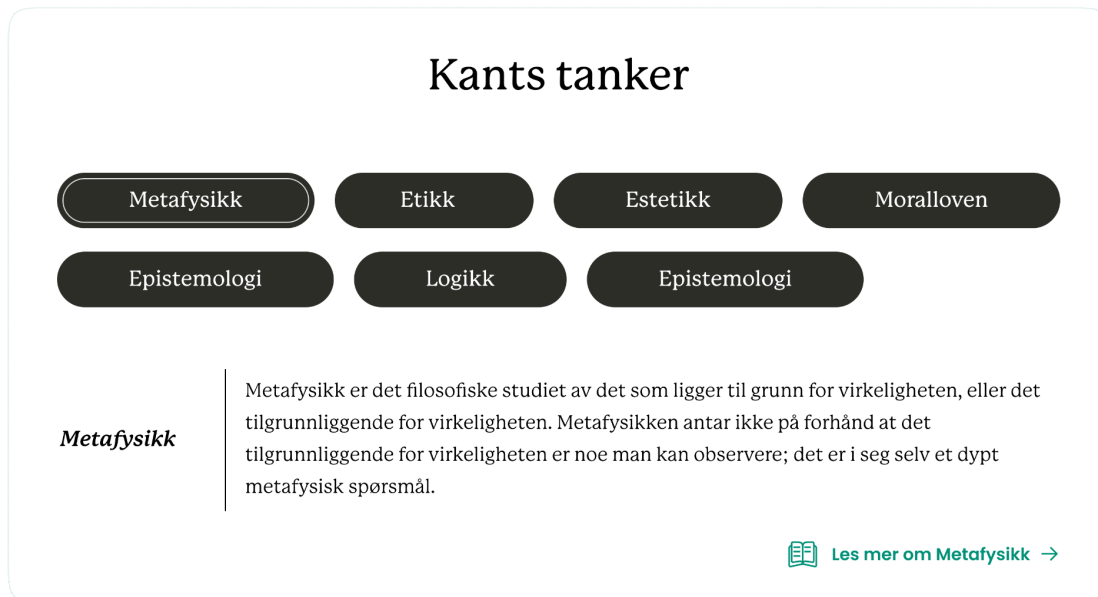

Kants tanker

Metafysikk   Etikk   Estetikk   Moralloven

Epistemologi   Logikk   Epistemologi

Metafysikk   Metafysikk er det filosofiske studiet av det som ligger til grunn for virkeligheten, eller det tilgrunnliggende for virkeligheten. Metafysikken antar ikke på forhånd at det tilgrunnliggende for virkeligheten er noe man kan observere; det er i seg selv et dypt metafysisk spørsmål.

📖 **Les mer om Metafysikk →**

Figure 7: Kants tanker, key topics and philosophies are presented with belonging definitions

Additionally to the definition, a link will appear in the right corner that takes the user to the parts of the syllabus that presents the topic in question. The user can then do further reading if wanted. This is a design implication we added as a result of the last rounds of user tests, where one of the participants pointed out that a link would be beneficial so that they would not need to look for an extended definition themselves. By providing these links, we are not constricting the information to the same extent as in Kort forklart, but still to a degree that in turn minimizes information overload.

In addition to constraints, the design principle affordance is relevant to mention for this mode. In our day-to-day life, we use profiles across several platforms to present ourselves to a following or an audience, often providing general information about

ourselves and our interests. Thus, we recognize that this is what a profile *is for,* which is the intended effect of this principle (2013)*.* With Tenkerne, similar qualities are implemented in the design of the philosopher profiles, and the users will in turn know that this is a way of getting to know the philosophers. They then know where to look if they wish to read specifically about the philosophers and the related information to them, because of their expectations and experiences with profiles. As a result, having profiles available on Kunne Exphil that the users can visit and revisit at any given time will in turn minimize information overload to a high degree as it provides them with the basic and fundamental information about each philosopher, enabling them to recognize and understand the extensive philosophical topics with greater ease.

A design principle we did not actively use, that I later found would have potential for further minimizing information overload, is feedback. In this mode, we could have implemented elements of feedback to let the user know whether they have comprehended the information on each profile, which could give them pointers as to whether they should revisit specific profiles or not. This is therefore something that should be explored in future development of this mode.

5.1.4 Mode 4: *Spørsmål*

In this section, I will present the user needs, our solution, and then analyze the features and design elements in this mode in relation to the research question.

5.5.1 User needs

We knew at the start of this project that we would be designing *a digital learning platform* for Universitetsforlaget. It has therefore been highly relevant to explore which interactive ways of learning the users preferred, and if there were any methods for learning that would respond to their struggles with Exphil and the feeling of overwhelm. Because of this, we included sections in the semi-structured interviews about interactive ways of learning.

Some of the answers, such as being able to search for words and phrases, and highlighting and saving text as notes, have been mentioned in the previous modes. In addition to this, quizzes were mentioned as a way for the users to test their knowledge on specific themes and topics. One participant said:

"If I need to go through a big topic for something like an exam, I've found that quizzes are a good way to go over things."

Another participant also mentioned quizzes as an interactive way of learning when they were asked about their expectations of Kunne Exphil as a digital learning platform:

"(...) kind of like a quiz variant that's more solid than Quizlet. So you know that what you're getting here is correct and relevant. (...) I think that would be great. Also with different types of quizzes, introductions, summaries, and flashcards."

Quizlet[1] is a platform where users can create their own flashcards or do multiple choice tests to revise and test their knowledge on specific topics, and was mentioned by several participants as a way for them to interactively work with the Exphil syllabus. As will be further presented in the user needs for the following mode *Huskekort*, quizzes and flashcards are what the users favor in terms of interactive activities. In the analysis of the data material, there was also a correlation between working with flashcards and quizzes as a way of not only testing the knowledge they have at the given time, but also to get pointers as to what they need to revisit or continue working on.

5.5.2 Our solution

Spørsmål ("Questions") is the first testing mode, which lets the user test their understanding of a topic or chapter. In Spørsmål, the user goes through a series of questions with multiple-choice answers, as shown in Figure 8. At the end of each round of questions, Spørsmål provides the user with a summary of the results, offering immediate and visual feedback. This will in turn let the user map out which parts of the syllabus they have mastered, and which parts of the syllabus that require further reading.
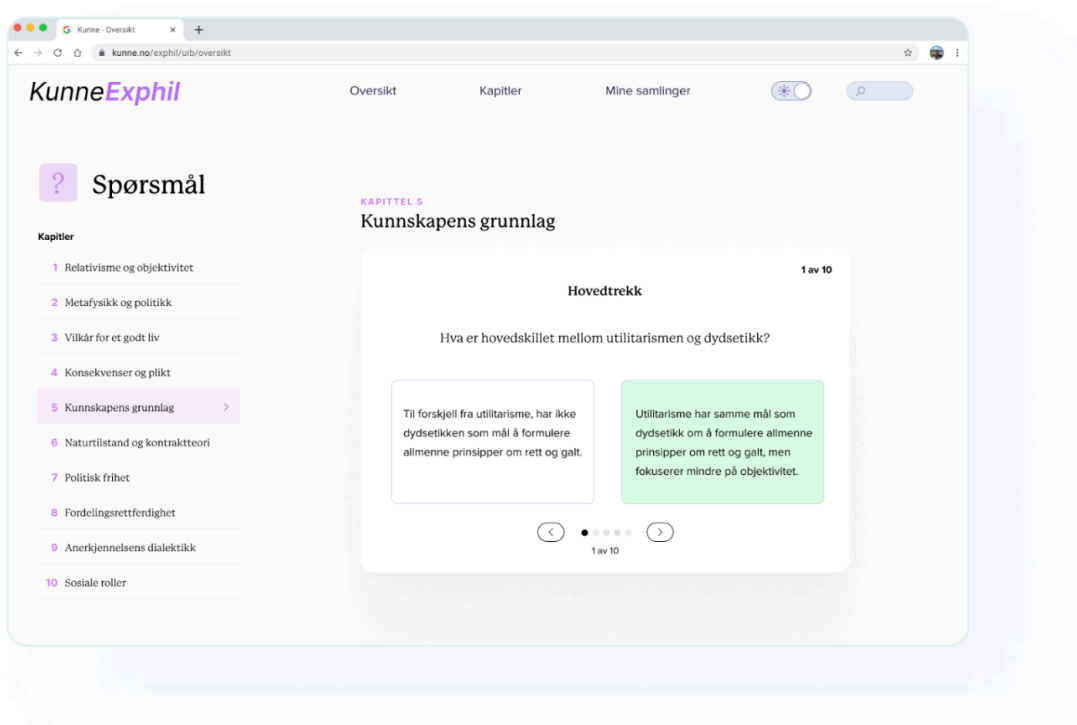
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[1] https://quizlet.com/

Figure 8: Questions with multiple-choice answers.

5.5.3 Minimizing information overload with feedback and constraints

The most prominent and effective design principle for minimizing information overload in this mode is *feedback*. This principle highlights the importance of communicating the results of an action to the user, which in turn allows users to stay focused on the task at hand, and thus reduces the mental load (2013).
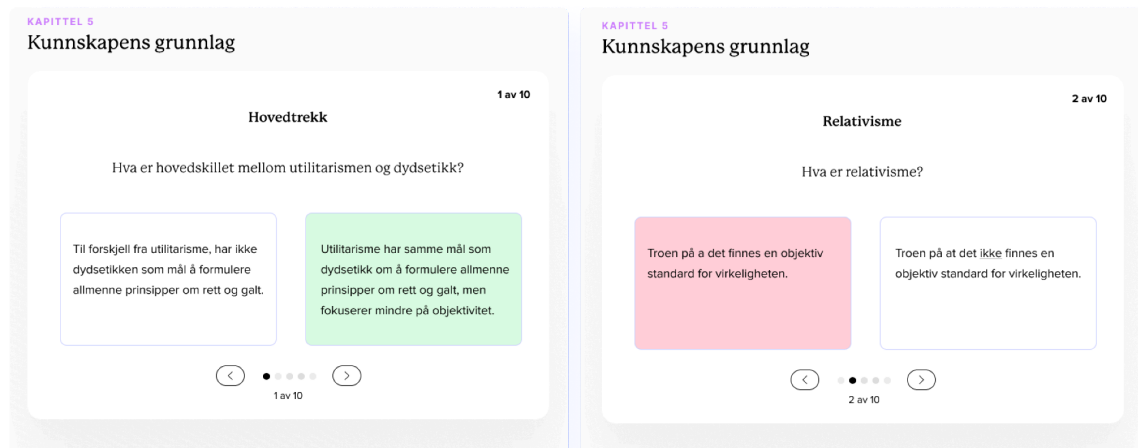
Figure 9: Answered questions that are correct or incorrect

In Spørsmål, we have implemented elements of feedback to provide users with immediate and visual confirmation of whether their answers to the questions are correct or incorrect, as shown in Figure 9. This ensures that users receive an instant response, allowing them to understand their performance and learn from their mistakes. Additionally, at the end of a completed round of questions, the user receives an overview with visual feedback of all their correct and incorrect answers, as well as the answer key, as shown in Figure 10. It was confirmed by the participant in the second user test (referring to *Round two in 4.3.3 User testing*), that feedback in the form of an answer key with all the questions and answers is helpful when testing their knowledge on a specific topic. The feedback then serves as a way for users to get an idea of their overall knowledge in relation to a specific chapter, as well as a source for finding definitions and explanations of key terms and topics.
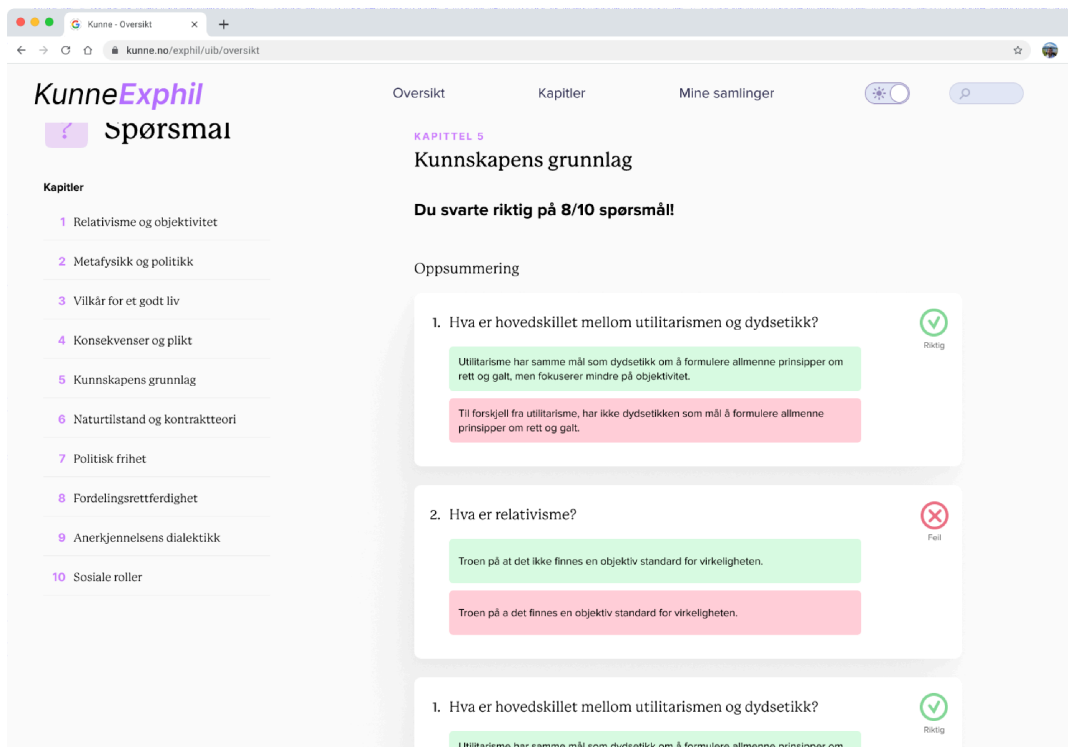
Figure 10: The answer key; a visual feedback of all correct and incorrect answers.

This kind of feedback in Spørsmål helps users stay motivated, and promotes feelings of control and competence. The immediate feedback not only enhances the learning experience but also supports users in tracking their progress and identifying areas that may require further reading. Ultimately, our goal with Spørsmål is to provide users with an understanding of which parts of the syllabus they have mastered and which parts they need to revisit, giving them a sense of control over their learning progress.

Constraints is another principle we have included in this mode. During the quiz, users are only able to answer one question at a time, and are not provided with a long list of questions and possible answers. As Bawden et al. (1999, p. 249) stated, when there is too much information accessible, the received information becomes a hindrance, not help, and thus causes information overload.

This design facilitates for a more focused user experience with only the one question available to the user, thus removing the potential feeling of overwhelm and information overload that could appear if every question with multiple choice answers was displayed.

There are, however, further added features that could potentially result in a

higher degree of minimization of overwhelm and information overload. We could have expanded the element of feedback though providing the users with direct links to the chapter or topic they need to do further reading on, or to other modes for continued learning or testing. This could then give the users a direct clue as to which parts of the syllabus that require their time and attention, and thus remove some of the cognitive load.

In summary, this mode minimizes information overload to a moderate degree with the use of constraints and feedback, but does not reach a high degree of minimization as there are further design elements that could be implemented.

5.1.5 Mode 5: *Huskekort*

In this section, I will present the user needs, our solution, and then analyze the features and design elements in this mode in relation to the research question.

5.6.1 User needs

As mentioned in the previous mode, it became clear during our research that there were some interactive ways of learning that were common across our pool of participants. Flashcards were one of them. One participant mentioned Quizlet when we asked about their preferred ways of interactive learning, saying:

> *"Like Quizlet, where you write definitions and then click and flip the card… (…) Flashcards! I find that really useful."*

Similarly, another participant explained that quizzes and flashcards help them breaking up the often long work sessions into smaller intervals where they can test their knowledge, saying:

> *"It's really handy with Quizlet-like flashcards. And quizzes, because they're easy things you can do, right, you don't sit down thinking 'oh, now I'm going to take a quiz that takes three hours' or something. So it's very much, like, you can break it up and work in short sessions"*

In summary, both quizzes and flashcards are already an established way for the users to actively work with the syllabus. The users need a way of testing their knowledge. They also need a method for mapping out which topics they need to revise or do further reading on, so that they get an overview of their progress in order to reduce the feeling of overwhelm.

5.6.2 Our solution

With *Huskekort* ("Flashcards"), the user gets an interactive way of working with the Exphil syllabus. This is an exercise that can be done both alone and in groups. Kunne Exphil provides premade stacks of Huskekort in the different categories for each chapter. The user can also create their own Huskekort while reading in Dybdemodus, or make their own stacks with the premade cards. As shown in Figure 10, while going through the stacks, the user chooses whether to put a Huskekort in a "practice more"-stack or not, depending if they need to revise on particular themes later on.
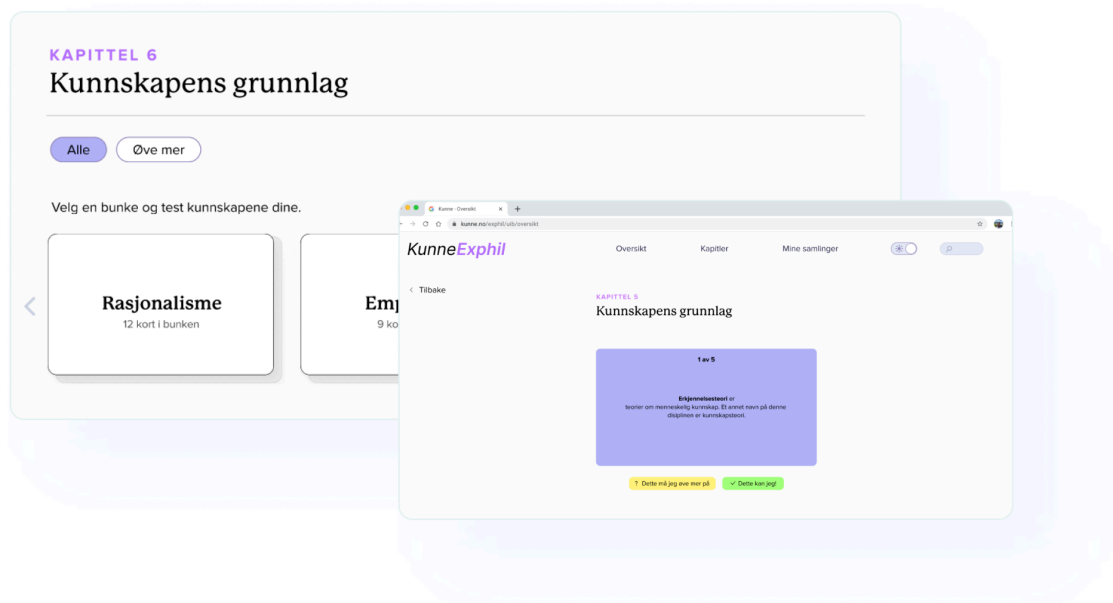

Figure 11: The user can add Huskekort to a "practice more"-stack.

5.6.3 Minimizing information overload with affordances and conceptual models

Norman's principle of affordance is evident in the design of this mode. Our design of the flashcards makes its purpose immediately apparent to users, emphasizing its role in revising, repeating, and practicing comprehension of specific themes and topics. It is

therefore clear to the users what the flashcard *is for,* which is the intended effect of this principle (2013). Similarly, the principle of conceptual models has the same effect in this mode. The flashcards look like physical flashcards, where a term is on one of the sides, and the definition is on the other, as shown in Figure 11. These are also categorized into stacks of flashcards, as it would be in real life. The design of these flashcards are facilitating for a more intuitive and less cognitively demanding user experience, thus reducing information overload.
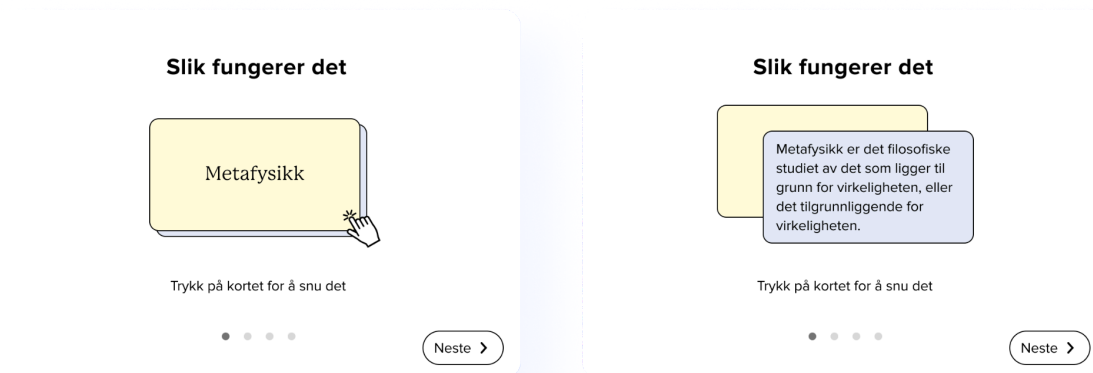

Figure 11: A user guide to how Huskekort works.

In our research, it is clear that the users are already familiar with and actively using flashcards as a way of working interactively with the Exphil syllabus. Implementing flashcards with the intuitive design is, as confirmed in the findings from the research, a way for the students to test their knowledge and reinforce learning through repetition. Moreover, the flashcards in Huskekort help the users easily map out which parts of the syllabus they have mastered and which areas require further reading, which can in turn lessen the feeling of overwhelm.

Similarly to Sprøsmål, this mode, with the use of affordance and conceptual models, minimizes information overload to a moderate degree, as it provides the users with a way for them to process the information, namely the Exphil syllabus, on their own terms.

5.2 "Veien til å Kunne Exphil"

There is one design principle that has not yet been discussed in the five modes, but still has an impact on minimizing information overload on Kunne Exphil, and is therefore relevant to include. *Discoverability* (2013) is not prevalent in one of the modes, but is evident in the onboarding and user guide to how Kunne Exphil works as presented on the dashboard, see Figure 12, making the platform intuitive. The slogan for our prototype is "Veien til å Kunne Exphil", (translated to "The Path to Mastering Exphil"), and in the demonstration of *how* the users can accomplish this, using discoverability effectively lets the users know which possibilities they have.

However, the core concept in our prototype is that we, as in Kunne Exphil, show the users the path to mastering Exphil, relieving them of the task of figuring out how to approach this course. Kunne Exphil does this by instructing the user to use the five modes: three for learning, and two for testing. Doing this will as a result minimize the cognitive load of discovering *how* to use the platform, and rather lets them discover that the path is already laid out for them.
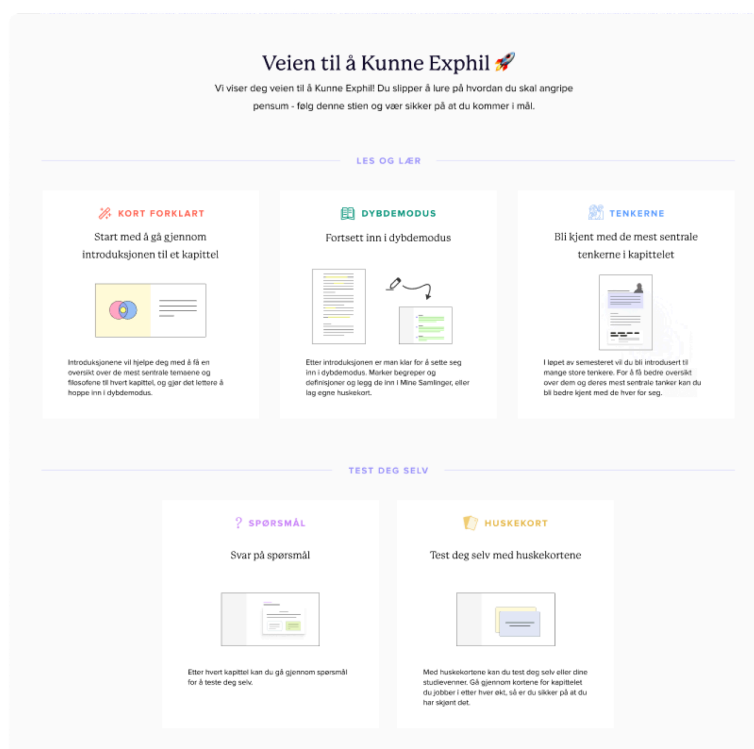

Figure 12: "Veien til å Kunne Exphil" ("The Path to Mastering Exphil").

6. Conclusion

In this thesis, I have first introduced relevant topics for this thesis in Chapter 1, and presented the research question. In Chapter 2, I presented the background for the practical component of this project, and the premise of this master's thesis. The collaborators for this project, Universitetsforlaget were introduced, as well as their digital learning platform *Kunne*. Following this, the chapter gave a brief overview of the university course Exphil, and the challenges with it. Lastly, the user group we have designed our prototype for were presented.

In Chapter 3, I presented theory and definitions that served as the backdrop for this thesis. This included definitions of interaction design, user experience design, user-centered design, and iterative design as they are the main field of study for this project. Furthermore, definitions on information overload, cognitive overload, and a brief comparison of these were presented. Jakob Nielsen's definition of progressive disclosure was explained. Design principles, why we use them, and how we use them were presented, and lastly, Don Norman and his well-established design principles were presented and defined. The theory was presented to establish the foundation of the theoretical aspect of the analysis.

In Chapter 4, I outlined the methodological approach for this project, namely a user-centered iterative design process. In this chapter, I presented the two iterations and the methods used in each. In the first iteration, how we conducted the student involvement with the MIX100 students, the focus groups, and the two evaluations - SWOT and expert evaluations - were introduced and explained. I then did the same for the second iteration, where I presented the methods: semi-structured interviews, prototyping, and user testing. I then presented the method I used to analyze the collected data material from the user research, namely a thematic analysis. Here, I presented how the analysis was conducted, and how the result was directly fed into the design and development of the prototype.

In Chapter 5, I analysed the use of Don Norman's design principle in the five modes for learning on Kunne Exphil, and assessed to which degree they minimize information overload. To do this, I presented the five modes for learning, and then continued into each mode to analyze them in relation to the research question. Here, I first presented the user needs, then our solution, and finally how the use of the relevant

design principles minimized information overload. In this analysis, I have answered the research question:

To which degree can design principles in the five modes for learning minimize information overload in Kunne Exphil?

In summary, the five modes for learning and their design with the use of design principles are each minimizing the feeling of information overload to different degrees.

The use of constraints in Kort forklart, will minimize the feeling of information overload to a high degree due to the simplifying and filtering of information presented to the user, and for creating a foundation for further reading which leads to less overwhelm.

Dybdemodus is not designed to minimize information overload in itself, as it is the mode where the complete syllabus is presented, meaning *all information.* However, the interactive features that were implemented in this mode, with the use of mappings and signifiers, will with their effect lessen the cognitive load, and thus the feeling of information overload to some degree.

In the mode Tenkerne, the use of constraints and affordance minimize information overload to a high degree as it provides the users with the basic and fundamental information about each philosopher, using profiles as a source for getting to know the philosopher separately.

Spørsmål minimizes information overload to a moderate degree with the use of constraints and feedback, but does not reach a high degree of minimization as there are further design elements that could be implemented.

Similarly to Spørsmål, Huskekort minimizes information overload to a moderate degree with the use of affordance and conceptual models, as it provides the users with a way for them to process the information, namely the Exphil syllabus, on their own terms, and functions as a way for the users to map their knowledge and understanding of the different topics in Exphil.

Overall, in my analysis of the five modes of learning and the design principles used in the design of these, I contend the modes Kort forklart and Tenkerne achieved a high degree of minimizing information overload, while the modes Dybdemodus, Spørsmål, and Huskekort provided a moderate degree.

6.1 Future work

This process has been user-centered from start to finish, and the users, their challenges, and needs have therefore been vital in the design and development of Kunne Exphil. Although it was confirmed in the user tests that the platform we have designed responds to the user needs found in our research and analyses, it could be beneficial to do further testing and iterations of the prototype, to further ensure that its features and elements are designed to reach the best possible user experience, both with Kunne Exphil as a product, and Exphil as a course.

Our data is a result of a qualitative approach to the user research, and our findings are therefore not generalizable to all students. It is also directed towards the course Exphil, and our solution is therefore tailored to the users' experiences and needs to this specific course. It could therefore be beneficial to do further research with an expanded pool of participants that includes students from different study programmes. Doing this could as a result expand the target users of Kunne, and Universitetsforlaget could in turn offer a tailored digital learning platform to students across universities, faculties, and departments.

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