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Creating a Digital Learning Tool for the Medical Course *'Weg Met de Dokter - Laat de Natuur Jouw Werk Doen'*

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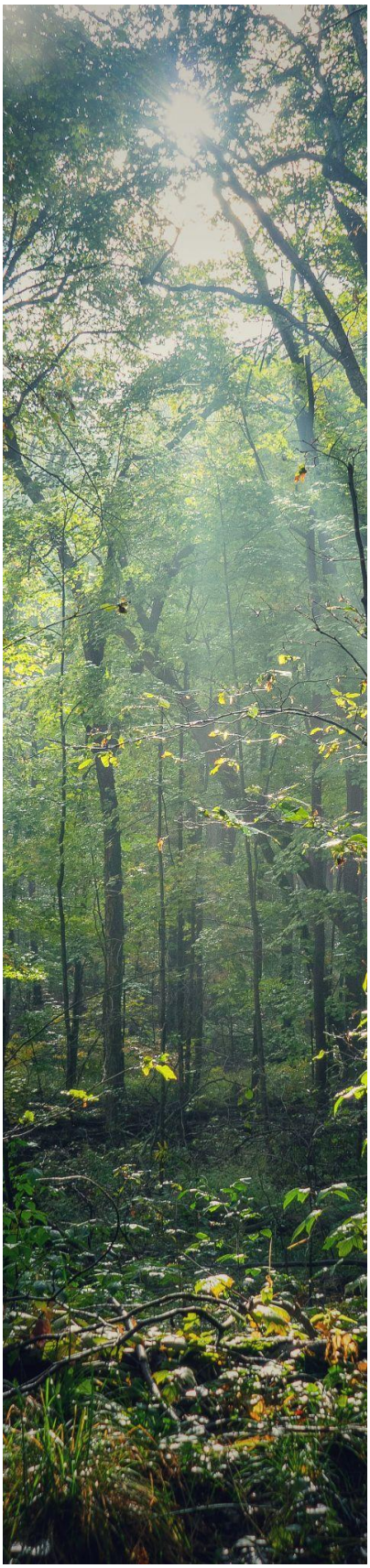

Abstract

The bachelor's thesis aims to discover how to develop a digital learning tool that effectively conveys the course information of the medical course: '*Weg Met de Dokter - Laat de Natuur Jouw Werk Doen!*'. This course aims to educate Dutch general practitioners on how to incorporate nature-based interventions into their medical practices. Alongside many physical effects, nature also induces various psychological effects that have a positive impact on well-being, such as lowering stress, regulating emotion, and restoring attention. To support the health of the general practitioners, this thesis also investigated how to digitally induce nature's psychological effects, and how to integrate them into the digital learning tool. Through extensive background research; stakeholder analysis; and iterative and user-based design; an interactive infographic was created that provides general practitioners with an effective and calming learning experience. The tool was positively received by the client, Pim van den Dungen, and will be further developed into a fully finalized product, which will be used starting in October 2023.

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1 Introduction

In this section, the context of this thesis, the challenge this thesis attempts to address, and the research questions are described. Additionally, an outline of the rest of its contents is presented.

1.1 Context

In his thought-provoking book *Homo Sapiens*, Yuval Harari posits that in many ways, humans were happiest as hunters, gatherers, and nomads. 70,000 years ago, we spent our days outside, lived in close-knit communities, and worked for only roughly four hours a day. Almost all of our time was spent running, climbing trees, swimming, exploring new areas, building relationships, eating a natural diet, caring for others, and relaxing (Harari, 2018). While they certainly experienced many cultural and circumstantial difficulties, their physical lifestyle may well have been optimal for their happiness and health.

We possess the same physiology as our ancestors 70,000 years ago. However, our radically different modern lifestyle has existed for only 0.001% of the time in all of human history (Harari, 2018). When looking throughout history, it is evident that as we progressively stray from our original lifestyle, our mental and physical health worsens. For example, skeleton studies indicate it was only during the agricultural revolution, when humans spent long hours in the fields and started consuming wheat products, that hernias, arthritis, and cavities made their first-ever appearance (Harari, 2018).

Our bodies have not evolved fast enough to be compatible with our current lifestyle. Modern humans suffer from a plethora of ailments, from obesity, cancer, and cardiovascular disease, to burn-outs, depression, and anxiety disorders (Milne, 2018). Through science and empirical evidence, our Western world of medicine has become highly developed and adequately equipped to treat most of these ailments. However, it often occurs that the symptoms of these ailments are treated without tackling their root causes or ensuring their prevention. Fortunately, it is possible to incorporate the healthier lifestyles of the past into our modern society. The field of evolutionary medicine states that for optimal mental and physical health, we should live the lives that our bodies have originally evolved for (Naugler, 2008). Many ailments can be both treated and

prevented by adopting a lifestyle that allows our bodies and minds to thrive. This lifestyle includes, among others, exposure to fresh air, sunlight, and natural environments, performing exercise, consuming a natural diet, maintaining close relationships, and regulating stress (Milne, 2018).

This thesis project focuses on the exposure to natural environments component of evolutionary medicine. There are a large number of scientific studies that indicate that spending time in nature can aid in both healing and preventing a vast array of complications and illnesses. Its effects are apparent through its ability to not only balance cortisol levels, elevate depression and anxiety, and regulate circadian rhythms, but also improve immune system function, lower blood pressure, and prevent cardiovascular diseases (Jimenez et al., 2021).

Modern Western medicine frequently disregards nature's potential for healing in favor of pharmaceutical treatments. However, as an increasing number of scientific studies generate evidence that supports nature's benefits, it is becoming more apparent that nature may be a potent aid in both the prevention and treatment of a wide range of physical and mental health conditions. Placing a greater emphasis on nature in modern treatments has the potential to positively impact an incredibly large number of people and aid patients in living healthier and happier lives.

Pim van den Dungen, the client of this thesis, aims to contribute to this goal by working to shift Western medical practices in the Netherlands to be more natural and holistic. While working as a general practitioner based in Amsterdam, he has been creating a course for other general practitioners to educate them on how they can combine nature-based interventions with modern medicine in order to be able to provide more effective care for their patients. This would influence medical practices to be more focused on tackling the root problems of many ailments to not only treat them more effectively, but also prevent them from occurring in the future.

1.2 Challenge

The client's course spans three days and takes place in a forest in Hierden, the Netherlands. Not only does the course contain a large amount of theoretical information, but it also contains

exercises so that the participants can feel the revitalizing and healing effects of nature for themselves. After the course ends, the client wishes to distribute the conveyed information via a digital learning tool that, where possible, further reflects and supports the course contents related to nature, health, and mindfulness. The challenge for this graduation project is the creation of this digital tool. Furthermore, the client requested that, if it is possible, the reader should in some way induce the psychological effects of nature and guide the user through the course contents in a calm and mindful way. It should convey a sense of professionalism and credibility. Additionally, it should also be easily transferable to a non-digital medium, which can be used while the course takes place in the forest.

1.3 Research Questions

Throughout this thesis, the following research question will be answered:

Main RQ: *How to develop a digital learning tool that conveys course information for general practitioners, which evokes the psychological effects of nature in the user?*

To achieve this, there is a need for a deeper understanding of how to create digital learning tools that incorporate the psychological effects of nature. The following sub-research questions will be investigated to aid in investigating the main research question:

Sub RQ1: *What are the psychological effects of nature?*

Sub RQ2: *How can the psychological effects of nature be manifested through a digital medium?*

Sub RQ3: *How can the psychological effects of nature and student learning be combined in a digital tool?*

Sub RQ4: *How can design be used to increase a sense of credibility in the user?*

1.4 Outline

The contents of this thesis are distributed among nine different chapters. The context, challenges, and research questions are introduced in Chapter 1. Chapter 2 describes the background

research, whose purpose is to provide enough background knowledge to aid in answering the sub-research questions. It consists of a literature review and an assessment of the state of the art on relevant subjects. The approach for the design process, as well as the tools and techniques needed throughout the process, are outlined in Chapter 3. Chapter 4 illustrates the ideation phase, and the chosen concept is further specified in Chapter 5. The realization phase is described in Chapter 6, and in Chapter 7, the prototype is evaluated. In Chapter 8, the discussion and future work are discussed, and ultimately, Chapter 9 concludes the thesis.

2 Background Research

This section includes the background research conducted in order to partly answer sub-research questions 1 through 4 and gain enough insight to effectively start the ideation process. It starts with literature research on relevant topics and challenges, then investigates state-of-the-art projects related to this thesis.

2.1 Literature Review

To realize this thesis project, there is a need for a deeper understanding of how to create a digital learning tool that incorporates the psychological effects of nature. Therefore, the main goal of this literature review is to provide insight into the question: '*How to incorporate the psychological effects of nature into a digital learning tool*?' Specifically, it will explore the psychological effects of nature, through what techniques these effects can be manifested through a digital medium, how these techniques can be combined with course content, and the various components and features of digital learning tools that can achieve this, including pedagogical strategies, (graphic) design principles, and technology tools.

The body of this literature review consists of three sections, in which each section attempts to answer a sub-research question that will aid in investigating the main research question. The first section gives insight into what the different psychological effects of nature entail. The second section explores possible techniques and methods for how the psychological effects of nature are able to manifest through a digital medium. Lastly, the third section investigates how digitally-induced psychological effects of nature can be combined with digital student learning.

Additionally, this review will examine the challenges and limitations of implementing such components and features, such as the transferability of nature's psychological effects, the balance between user relaxation and engagement, and the need for appropriate design principles. It will also highlight gaps in current knowledge and identify areas for future research. Ultimately, this literature review will contribute to the ongoing discussion on incorporating the psychological effects of nature into digital learning tools and their potential to support the well-being and success of learners in the digital age.

2.1.1 The Psychological Effects of Nature

For millions of years, Homo Sapiens' well-being and survival depended on connecting with nature. However, humans have only recently begun living in urban environments. Therefore, it is most likely that attraction to nature and other living organisms is an innate part of who we are, and that exposure to nature has numerous benefits for our health, both physical and psychological (Wilson & Kellert, 1993). This hypothesis is called *biophilia*, and there are many scientific studies that support it. Some of these will be elaborated on in this section, namely those that focus on the beneficial psychological effects of nature on humans.

2.1.1.1 Mindfulness

Mindfulness evokes attention and awareness in a person's present-moment experience. This can take on many forms, including heightened introspection of bodily sensations, emotions, mental images, mental talk, and perceptual experiences such as sounds or touch. Mindfulness also encourages an attitude of openness and acceptance toward one's experience, in a curious, detached, and non-reactive way (Creswell, 2017). Nature has a unique way of gently guiding a person into a mindful state. Its way of inducing mindful states is due to its capability to gently

capture and hold an individual's attention, allowing internal processes to naturally occur and cognitive processes to be restored (Ohly et al., 2016). This process and its effects are explained by Kaplan's *Attention Restoration Theory* (ART), which will be elaborated further in the following paragraph.

2.1.1.2 Attention Restoration Theory

According to ART, attention is a finite resource that periodically needs to be restored. Prolonged use of voluntary attention, which entails the active maintenance of focus while dealing with incoming distractions, leads to fatigue (Yap et al., 2022). This can have negative consequences, such as negative emotions, impulsivity, decreased sensitivity to interpersonal cues, and an inability to focus or complete tasks that require directed attention (Yap et al., 2022).

Fortunately, ART further states that natural environments have the capacity to restore these attention deficits and that there are four cognitive states along the way to restoration (Ohly et al., 2016; Yap et al., 2022). The first stage is the clearing of the mind. Here, individuals are psychologically detached from their thoughts and concerns and allow them to pass through the mind in a non-reactive manner, and fade away. In the second stage, mental fatigue recovery takes place, where directed attention is recovered and restored to normal levels. The third stage, called *soft fascination*, allows the individual to be gently distracted and engaged in a low-stimulation activity (Yap et al., 2022).

ART makes a distinction between soft and hard fascination (Ohly et al., 2016). Hard fascination holds an individual's attention in a highly stimulating activity that does not provide the opportunity to introspect, such as watching TV. Soft attention, however, reduces internal noise and provides a state of introspection and relaxation. Both types of fascination contribute to the restoration, although soft attention is significantly more effective. Soft attention allows for the attention system to rest and recover, as it is effortless (Ohly et al., 2016). Ultimately, in the last cognitive state, the individual is provided a space for reflection on their life, priorities, and actions (Yap et al., 2022).

2.1.1.3 Stress Reduction Theory

Aside from nature's ability to induce mindfulness and restore attention, it also has an influence on our physiological state. *Stress Reduction Theory* states that being exposed to certain natural environments that were evolutionary beneficial for our well-being automatically stimulates a stress-reducing response and activates the parasympathetic nervous system (Ulrich et al., 1991). In contrast, exposure to busy urban environments activates the sympathetic nervous system and has a stress-inducing effect. One study that demonstrates nature's influence showed that post-surgery patients recovered faster when having access to a view of nature from their room, as opposed to patients who had a view of urban buildings. It was found that viewing natural scenes lowers blood pressure, reduces muscle tension, and decreases levels of cortisol (Ulrich, 1984). The study also illustrated the favorable psychological impacts on emotions, levels of anxiety, and sensations of ease and calmness (Ulrich, 1984).

2.1.1.4 Mood Regulation

Hedonic well-being, also known as emotional well-being, encompasses elevated levels of pleasant emotions, diminished levels of unpleasant emotions, and a feeling of contentment with one's life and existence. Studies show that even brief contact with nature promotes positive emotional states. One example of a study that affirms this is one that sampled 20,000 residents in the UK, and observed that people were generally happier and had higher life satisfaction when living in natural environments than when living in urban ones (Capaldi et al., 2014). Spending time in forests is also associated with reduced feelings of hostility, depression, and anxiety (Jimenez et al., 2021). Simultaneously, nature fosters awe, wonder, and other positive emotions.

So, it is evident that nature regulates mood and elicits positive emotions (Capaldi et al., 2014). This is achieved by nature's ability to spur positive psychological and emotional states and its capability to make individuals feel captivated and engrossed in their surroundings (Ballew & Omoto, 2018). This is most likely due to the many rich and complex qualities of nature, such as fractal properties. These qualities are highly fascinating and facilitate psychological states of *absorption*. Absorption refers to a mental state where an individual is deeply immersed and invested in an activity or surroundings, and it occurs effortlessly. The condition of being fully engaged and fascinated by the

features of nature seems to be a crucial factor in the emotional impact of nature (Ballew & Omoto, 2018).

In order to understand how exactly these effects are induced, it is relevant to gain a deeper understanding of the induction of positive emotions from a neuropsychological perspective. In a study aimed at investigating this, stimuli from nature were found to stimulate the brain's reward system. This leads to the release of dopamine, which is associated with pleasure and motivation. The activation of this reward system is linked to increased feelings of happiness and satisfaction (Bratman et al., 2015). Furthermore, exposure to nature can lead to changes in brain structure and function. Participants who walked in nature for 90 minutes showed reduced activity in the prefrontal cortex, a region of the brain associated with, among other things, rumination and negative thoughts. The study also observed an increase in activity in the subgenual prefrontal cortex (Bratman et al., 2015). This region of the brain plays an important role in mood regulation and eliciting positive emotions as a response to stimuli (Drevets et al., 1997).

2.1.2 Incorporating Nature's Psychological Effects into a Digital Medium

Nature's psychological effects are most profound when individuals physically find themselves in nature (Willman, 2021). However, a significant number of studies indicate that it is possible to replicate these effects in digital environments to a certain extent.

2.1.2.1 How Technology Can Induce the Psychological Effects of Nature

Humans have an innate attraction toward the natural world. *Biophilic design* recognizes this and states that the positive experience of natural systems and processes in the environment around us is critical to human health, performance, and well-being (Kellert et al., 2011). When using biophilic design, emphasis is placed on integrating natural elements such as patterns, shapes, colors, plants, and natural light. The goal is to create settings associated with positive emotional experiences, enjoyment, pleasure, interest, fascination, and wonder (Kellert et al., 2011). Related to biophilia is the *technobiophilia hypothesis*, which states that the positive effects of natural environments can also be induced through non-natural and virtual spaces, while simultaneously maintaining their restorative effects. Examples of technobiophilic design are waterfall screensavers or digital fireplaces, both of which can have a significant restorative effect (Oe et al., 2011).

When incorporating certain images and videos of nature into a digital medium with the goal of inducing a restorative effect, fractals are an interesting natural element to keep in mind. Several studies indicate that the psychological benefits of viewing nature can be explained by nature's fractal properties. *Fractal patterns*, which are responsible for nature's visual appeal, are widespread in natural surroundings, ranging from tiny to large structures. These patterns consist of recurring, self-similar shapes at different scales with varying degrees of repetition (Robles et al., 2021). Examples of fractals that occur in nature are snowflakes, pinecones, or tree branches.

Interestingly, one study discovered that when exposed to images of fractals, an increase in alpha-brain wave activity was measured in study participants (Hagerhall et al., 2015). Alpha brain waves are recorded when an individual is in an awake yet relaxed state of mind and are associated with introspection and attention to inner processes. This results in stress reduction and the restoration of attentional capacities. Among participants, a preference for mid-range D values of 1.3 - 1.5 in fractals was measured, which is the prevalent level of complexity in nature (Hagerhall et al., 2015).

So, digital images and videos of nature have a restorative effect (Oe et al., 2011), and emphasizing nature's fractal properties can strengthen this effect (Hagerhall et al., 2015). However, digital restoration is most effective in facilitating restoration when it engages senses beyond just sight (Annerstedt et al., 2013). Because all senses together work to enable individuals to fully experience the world around them, a digital scene becomes significantly more credible and immersive when simulated in a multisensory manner (Willman, 2021).

To illustrate this, scientific evidence suggests that natural sounds (e.g., wind rustling through leaves) reduce stress and increase perceived restoration (Annerstedt et al., 2013). In one study, it was found that the sounds of water and bird song were perceived as stress-reducing, while technological sounds were considered unpleasant arousals (Annerstedt et al., 2013). Some studies propose that auditory stimulation may have an even stronger impact on stress reduction than visual elements (Willman, 2021). Moreover, to optimally enhance the restorative effect of a

soundscape, it should be multi-layered and balance the dimensions of noise, music, and sound (Annerstedt et al., 2013).

2.1.2.2 Inducing Mindfulness Through a Digital Medium

An important element of mindfulness is being attentive to one's own thoughts, feelings, and sensations. This is a type of self-awareness that can be referred to as *body awareness* or *interoception* (Creswell, 2017). This skill includes the ability to focus attention on specific bodily sensations, such as shortness of breath or muscle tension (Creswell, 2017). A challenge of digital environments is their focus on external experiences presented on the screen without promoting the exploration of one's inner thoughts and bodily sensations (Sliwinski et al., 2015). Consequently, it is unclear whether a game that stimulates attention and awareness of an external and virtual world can replicate this state of mind in the player's inner world.

Fortunately, interoceptive awareness can be stimulated digitally by directing awareness to specific areas or processes of the user's body, such as the breath (Sliwinski et al., 2015). Mindful breathing involves being fully present and aware of the experience of breathing, the sensations it causes, and the ability to notice and gently redirect the attention whenever it wanders (Levinson, 2014). An example of how this can be done is by, for example, requiring users to place their finger on a screen when inhaling and release it when exhaling (Sliwinski et al., 2015). Visual and audio feedback could be incorporated, such as animations, changes in color, or the sounds of droplets falling off a leaf. Through the use of feedback, guidance can also be incorporated on what desirable behavior the user should exhibit (Sliwinski et al., 2015). User testing incorporating visualization of breathing had positive effects on both physiological parameters (deeper and slower breathing) and participants' self-assessments (Sliwinski et al., 2015).

2.1.2.3 Restoring Attention Through a Digital Medium

According to ART, four key components characterize a restorative environment: *being away*, *fascination*, *extent*, and *compatibility*. These components could be incorporated into a digital medium in order to enhance its restorative effect. First of all, the environment should provide the individual with a space to be away from concerns, thoughts, and sources of stress (Ohly et al., 2016). A possibility of incorporating this into a digital tool is by encouraging the user to use the

technology in a calm, mindful environment where they cannot be occupied or distracted by the bustle of daily life.

Secondly, the environment should induce soft fascination (Kaplan, 1995). A digital environment could elicit this through gentle stimuli and the attention-drawing components of nature, such as changing cloud formations or leaves rustling in the wind (Ohly et al., 2016). Although the effect of soft fascination is most significant when an individual physically finds themselves in nature, it is also evoked by merely looking at images or movies of natural environments (Yap et al., 2022).

Thirdly, the extent of the environment should be high enough to evoke restoration, meaning that the environment should have sufficiently rich content to make an individual feel totally immersed and engaged (Ohly et al., 2016). In digital terms, this means that the tool should be sufficiently immersive and engaging. Finally, the environment should be adequately compatible with the individual's purpose and the type of activity anticipated in the setting. It emphasizes feelings of enjoyment and unity between the individual and their environment. This creates familiarity and ease, allowing individuals to withdraw their voluntarily directed attention and gain restoration through engagement with the environment (Yap et al., 2022).

Lastly, Kaplan states that an environment should be compatible with the individual's goals and motivation, and allow them to carry out their activities smoothly and without struggle (Kaplan, 1995). He notes six aspects of compatibility, and for the purpose of this literature review, a few of these aspects have been translated into digital design guidelines. The technology should not be too distracting and highly stimulating, but also not contain a deficit of information where the user needs to search for information. Furthermore, it is essential that the user is motivated to use the technology for the sake of pleasure and restoration rather than a feeling of obligation or duty (Ohly et al., 2016). Therefore, it is important that the technology elicit intrinsic motivation. Lastly, the environment must not be too difficult for the user to navigate (Ohly et al., 2016). The technology must therefore be intuitive to use, and the handling should not confuse or distract users from their inner processes.

2.1.2.4 Regulating Mood Through a Digital Medium

As mentioned earlier, exposure to nature leads to a restorative mental state while also inducing positive emotions such as awe, wonder, and satisfaction. For example, exposure to sunlight or a variety of colors is associated with a better mood and reduced symptoms of depression compared to artificial light (Beute & de Kort, 2014). Technologically mediated or virtual exposure to nature (e.g., viewing images or videos) is also associated with enhanced hedonic well-being (Capaldi et al., 2014). In terms of technology, it is important to design for emotions related to both calmness and positivity. However, when virtual nature is compared to actual contact with nature, real nature provides a greater mood boost (Capaldi et al., 2014). Therefore, although looking at photographs or documentaries about nature has some effect, going outdoors is optimal for maximizing happiness.

2.1.2.5 Limitations of Incorporating Nature's Psychological Effects into a Digital Medium

Naturally, there are limitations to digitally inducing nature's psychological effects. One significant problem is that digital environments provide limited sensory input compared to real-world natural environments (Chirico, 2016; Valtchanov et al., 2010; Gonçalves et al., 2022). For example, a VR beach may provide visual and auditory stimuli but can't replicate the smell of salt water, the feeling of having sand between your toes, or the temperature of the water (Valtchanov et al., 2010). This contradicts one of Kaplan's conditions for a restorative environment (Extent) and therefore potentially limits the extent to which digital environments can induce soft fascination, restoration, mindfulness, and positive emotions.

Another limitation is user control over the environment, which leads to a twofold consequence. Firstly, digital environments require users to interact with them actively and artificially (e.g., by clicking/dragging a mouse, holding a VR controller, etc.). Activities like this can demand attention and prevent the induction of soft fascination and restoration (Kaplan, 1995). Secondly, users may not have full control over digital environments, which may limit their ability to adapt to their needs and preferences (Valtchanov et al., 2010). For example, some individuals prefer specific times of the day, specific weather conditions, or specific environments. Preferably, digital environments should be designed in a way that users can create a customized and personalized experience.

Furthermore, digital environments may not be perceived as authentic or credible by users, which may reduce their ability to induce positive emotions, soft fascination, or restoration (Gonçalves et al., 2022; Valtchanov et al., 2010; Chirico, 2016). The authenticity of a digital environment refers to how closely it resembles a real-world natural environment, while its credibility refers to how believable or trustworthy it is perceived to be. For instance, users may perceive virtual natural environments as artificial or synthetic, which reduces their sense of connection to the natural world and may affect their emotional response to them. Also, if the digital environment is poorly designed or unrealistic, the credibility of the environment decreases, and users will not trust or believe in its authenticity (Gonçalves et al., 2022).

2.1.3 Combining Nature's Psychological Effects with Digital Learning

In the previous chapter section, numerous techniques and guidelines were established for translating nature's psychological effects through a digital medium, and these mediums must encourage soft fascination, decrease stress, and induce slight positive emotions such as awe and wonder. However, combining learning theoretical information with these requirements can be challenging, as the relationship between student relaxation and student engagement is complex. Fortunately, research suggests that the appropriate use of restoration or relaxation techniques can enhance student engagement and focus and have positive effects on learning outcomes, attention, and/or motivation (Berman et al., 2008; Müller et al., 2021; Li et al., 2020). So, how do we effectively add theoretical course content in such a way that minimally disrupts the aforementioned requirements? How do we find a balance between user relaxation and user engagement, and between soft fascination and voluntary attention? This section attempts to give insight into these questions.

2.1.3.1 Cognitive Load

Kaplan states that for an environment to be restorative, it should not be too distracting or highly stimulating, while also not containing a deficit of information (Kaplan, 1995). Therefore, the digital tool should not overwhelm the user with too much theoretical content at a time, while simultaneously preventing boredom. Additionally, a balance must be found between exposure to theoretical content, and exposure to calm audio-visual stimuli that replicate a natural

environment. Too much of either can distract the user from either of the two elements or cause overstimulation (Mayer & Moreno, 2003). Finding this balance could be achieved by utilizing

Cognitive Load Theory states that learning is most effective when cognitive load is optimized to match the learner's cognitive capacity. Reducing cognitive load can improve learning outcomes by allowing students to focus more effectively on learning tasks, and it has been shown to improve learning outcomes (Sweller et al., 2022; Mayer & Moreno, 2003). To effectively combine learning with restoration, it is important to carefully manage the cognitive load to ensure that it is not too high or too low (Mayer & Moreno, 2003). Some techniques can help reduce cognitive load and promote restoration while still supporting engagement and learning.

Firstly, according to Cognitive Load Theory, visual aids can reduce cognitive load by presenting information in a more easily digestible format. They can also simultaneously promote restoration by providing calming and aesthetically pleasing stimuli (Sweller et al., 2022; Mayer & Moreno, 2003). Secondly, providing breaks or rest periods during learning activities can help to reduce cognitive fatigue, improve learning outcomes, and promote restoration (Müller et al., 2021). These breaks could include activities such as guided meditation, breathing exercises, or taking a few moments to relax and clear the mind. Conveniently, exposure to natural elements such as natural sounds or images of nature can also promote restoration and reduce cognitive load. They have been shown to have a restorative effect on cognitive function, including reducing mental fatigue and improving attention (Berman et al., 2008).

2.1.3.2 Calm Technology

A helpful method that could be used is *Calm Technology*, which refers to technologies that are designed to minimize the cognitive load and stress of their users while maximizing their productivity and well-being (Tugui, 2011). The technology should require minimal attention to use and should place information in the periphery of our attention where possible. This can be done by making information easily perceived at a quick glance, making it aesthetic, and integrating it into the environment (Peterson, 2009; Tugui, 2011). Furthermore, the technology should be able to communicate information without relying on constant user input. Lastly, the technology should be designed to help users maintain their focus and attention (Peterson, 2009).

2.1.3.3 Design for Emotion

As mentioned above, exposure to nature induces both calmness and slight positive emotions such as awe and wonder. It is possible to digitally replicate these evoked feelings, as designing for emotion makes technologies more spiritual, highlights the designer's unique views, and enhances the audience's emotional experience (Liang, 2021). It is notable to remember that effective emotional design also considers the emotional needs and psychological elements of the user (Liang, 2021). Designing for emotion in learning environments can be beneficial for the user, as inducing positive emotions in the user through design can enhance attention, strengthen memory, increase motivation, and facilitate comprehension (Li et al., 2020; Plass & Kaplan, 2016). This type of design can be achieved through multimedia elements such as visual design, design layout, color, feedback, and sound (Plass & Kaplan, 2016).

One method of evoking emotion through design is through the use of color. Color theory plays an important role in communicating the right affect, feeling, experience, or emotion in visual communication (Plass & Kaplan, 2016). The feeling of calmness is associated with light colors, less saturated colors, and blue/green colors. Positive emotions are associated with more vibrant colors, such as orange or yellow (Bartram et al., 2017). Using the correct balance of these color schemes in visuals can help create a soothing yet positive atmosphere.

Additionally, the use of high-quality visuals, such as high-resolution images or aesthetically pleasing artwork, can help create a sense of awe and wonder in the user (Chirico et al., 2016). When making use of shapes and artwork, curved and rounded shapes are associated with calmness and relaxation, while sharp angles and edges are associated with tension and aggression. Animation is also a credible technique for evoking certain emotions, as animated scenes can be designed to be visually appealing and expressive. Motion can have a significant impact on emotions; for example, slow and smooth movements can evoke a sense of calmness and relaxation (Cohn, 2015).

2.1.3.4 Limitations of Combining Course Content with Digital Restoration Techniques

There are several limitations when it comes to incorporating the learning of theoretical information into a digital tool that evokes the positive psychological effects of nature. Firstly,

cognitive capacity is a finite resource that must be allocated mindfully, especially in a multimedia digital learning environment (Sweller et al., 2011). Digital environments may incorporate multimedia stimuli such as animations, images, and sounds, to both induce psychological effects and enhance learning. Although each element separately may enhance restoration, it is important to note that too much multimedia can overload cognitive resources, leading to cognitive overload and reduced learning (Mayer & Moreno, 2003). Digital learning tools need to be designed in a way that carefully manages multimedia to avoid this effect.

Furthermore, users may differ in terms of their cognitive capacity, learning styles, and preferences. For example, they may have different attention spans and preferred modes of engagement. Some users may need more frequent breaks to restore their attention, while others may thrive on sustained attention. Similarly, some users may be more engaged in hands-on activities, while others may prefer lectures or discussions (Sweller et al., 2011). Digital learning tools should try to accommodate these individual differences, and there may be a need for personalized learning curricula. Furthermore, there are external factors that influence cognitive capacity, such as their emotional state or the environment they are in (Plass & Kaplan, 2016). When these are affected, digital learning tools may not be able to effectively manage cognitive load.

Other limitations occur when designing a digital learning environment that aids in mood regulation and induces some positive emotions. For example, incorporating positive emotions in a digital learning environment could potentially distract learners from the content being taught (Li et al., 2020). For example, if a digital learning environment includes too many gamification elements or animations, learners may become too focused on these elements rather than the content itself (Mayer & Moreno, 2003).

Another aspect to consider is the challenge of using technology itself. Spending long periods in front of a screen can be tiring and can lead to eye strain, headaches, and fatigue (Sliwinski, 2015). This can make it difficult for students to stay engaged in learning activities while also maintaining their well-being (Kay & Lauricella, 2003). Furthermore, technology can be a hindrance to attention restoration and engagement. It can be a source of distraction, for example, by granting easy access

to social media, which makes it difficult for students to focus and makes them prone to multi-tasking behavior (Kay & Lauricella, 2003).

Lastly, some limitations occur within the target user group, which consists of general practitioners based in the Netherlands. Dutch general practitioners are a user group that experiences high workloads and high stress in their daily lives. 70% of them have reported signs of chronic stress, and 15% have experienced full burnout (Van den Brekel-Dijkstra et al., 2020). Causes of this include a high amount of office administration, exposure to a high amount of negative emotions, little time per patient, a high number of patients, the combination of work life and private life, long working hours, and a high amount of pressure (Van den Brekel-Dijkstra et al., 2020). This characteristic of the target user group may lead to them not being willing to take the time to make use of non-mandatory digital environments, or rush through the contents instead of taking the time to absorb its restorative elements. If a person is unwilling or not intrinsically motivated to spend time in a restorative environment, there is no compatibility between the environment and the individual, therefore obstructing the environment's restorative capabilities (Kaplan, 1995).

The time shortage and high perceived stress of the target users further indicate that there is an exceptionally high need for the digital learning tool to be stress-reducing, while simultaneously considering the time pressure that the target audience experiences. This can be conflicting, as it would be logical to assume that, preferably, general practitioners want to recap the course information as quickly as possible. This leaves limited opportunities for breaks, relaxing stimuli, relaxation exercises, and attention restoration. An important feature of the digital tool should be to convey to the user that it is not only a learning device, but also an opportunity to sit down, take a break, and re-energize. If the user is still not open to this experience, the digital tool may need to incorporate a ‘fast-track’ feature for general practitioners who are unable to allocate their time to experience the digital tool in full.

2.1.4 Conclusion

This literature review investigated the question of how to incorporate the psychological effects of nature into a digital learning tool. The topics explored contained the psychological effects of nature, investigating how they can manifest through a digital medium, and identifying the various components and features of digital learning tools that can achieve this. To summarize, the main positive psychological effects of exposure to nature include mindful mental states, attention restoration, mental fatigue restoration, stress reduction, mood regulation, and slight positive emotion generation.

These psychological effects can, to a certain extent, indeed be manifested through a digital medium. The most significant is the incorporation of elements found in nature, such as images, patterns, colors, and gentle attention-drawing stimuli such as the swaying of blades of grass or the changing of cloud formations. Other techniques include stimulating awareness of inner processes, creating a rich and immersive digital environment, incorporating audio containing natural sounds, and incorporating design elements that elicit emotions related to calmness and positivity.

To incorporate these elements together into a digital learning tool, some techniques must be utilized. Using cognitive load theory, a balance must be found in the amount of stimulation that optimally matches that user's cognitive load. This means that the right amount of exposure to theoretical content and calm audio-visual stimuli must be achieved. Calming and aesthetic visual aids, breaks, making information easily perceived, and exposure to natural elements can aid in reducing cognitive load and reducing mental fatigue while supporting engagement in learning environments. Furthermore, by appropriately designing for emotion, we can find a balance between user attention and user restoration. This can be achieved through the effective use of color, design layout, feedback, sound, animation, and high-quality visuals.

Additionally, this review examined the challenges and limitations of implementing these components and features. The main limitation regarding digital mediums is that the transfer of nature's psychological effects is limited due to decreased sensory input in virtual environments, lack of control over environments, and issues regarding the perceived authenticity and credibility

of the environment. Limitations concerning the combination of nature's psychological effects and learning include the balance of multimedia elements and the careful management of cognitive load on the user, the individual differences in students, the high stress and time pressure levels of general practitioners, the balance between positive emotions and focus, and the delicate relationship between student engagement and student restoration.

The main goal of this literature review was to provide the necessary background information to aid in the realization of a thesis focused on the creation of a digital learning tool that induces the psychological effects of nature. Overall, it provides a solid foundation for the thesis by highlighting the specific elements of nature that induce psychological effects, and the different techniques that can be used to incorporate these elements into a digital learning environment. However, the main limitation of this literature review is that, although a thorough investigation could be done on each separate component, there is a lack of information concerning the effective combination of these components. Further research and user testing must be done to investigate the optimal techniques, components, and features a digital tool needs to both incorporate nature's psychological effects and combine them with student learning.

Although the aforementioned challenges are present, incorporating the psychological effects of nature into a digital learning tool can not only be made possible but could also provide significant benefits for the mental well-being of students in this digital age. Although more research needs to be done to truly optimally achieve this goal, we are already in a position where we could relatively easily create a shift in educational practices and promote restoration, mindfulness, and users' mental well-being in digital environments.

2.2 State of the Art

This section investigates the state-of-the-art of related projects regarding nature, the psychological effects of nature, digital teaching tools, and (digital) mindfulness. The purpose is to determine what applications already exist, determine their strengths and weaknesses, and find sources of inspiration. Furthermore, design elements used that enhance the credibility of these applications will also be noted in order to answer the sub-research question: *How can design be used to increase a sense of credibility in the user?*

2.2.1 Educational Courses Related to Nature

A possible source of inspiration that can be used for the thesis project is existing educational courses related to nature and mindfulness. One example is 'Mindful Nature Connection', founded by Hazel Farrer. Along with an 8-week online program, she offers one-on-one coaching, webinars, and multi-day retreats. Her free introductory program consists of meditative and introspective exercises and some theory on nature-connectedness. As found in the literature research, Hazel also mentions Attention Restoration Theory, Biophilia, and Technobiophilia. Her website contains multiple channels of information, provides a clear oversight of contents, and makes use of natural images and colors, as depicted in *Figure 2.1*.

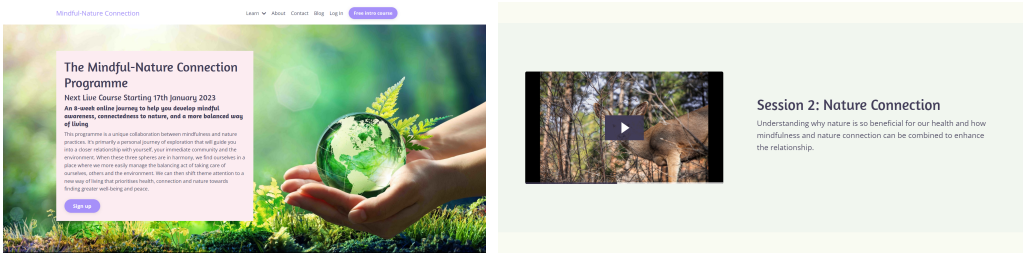


Figure 2.1: Screenshots from the Mindful Nature Connection website (mindful-natureconnection.com)

A similar organization is 'Darach Croft'. They offer an extremely wide range of activities, some of which are connected to forest bathing and nature connection. Similar to Mindful Nature Connection, they offer information across multiple channels, such as books, online information, retreats, and guided offline sessions. Their website is depicted in *Figure 2.2*.

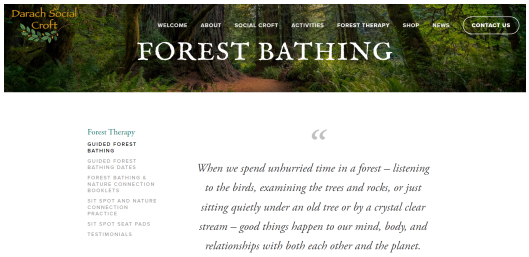


Figure 2.2: Screenshot from the Darach Croft website (darachcroft.com)

Using the two examples above, we can analyze what design elements were utilized in order to enhance a feeling of credibility in the user. The first and foremost step to establishing credibility is ensuring that your website functions optimally and has a fast loading time. 39% of users stop engaging with a website once they feel like images take too long to load (Thibodeaux, 2019). Both websites achieve this design element adequately.

Secondly, website navigation and organization have a significant influence on perceived trustworthiness. Websites come across as more credible when information is both relevant and easy for users to find. Additionally, meaningful and well-organized navigation labels and categories indicate that the content creators consider their users' needs (Thibodeaux, 2019). Both websites have a clear hierarchy and organization of information and are easy and intuitive to navigate.

What both websites achieve considerably less is the usage of appropriate background colors, fonts, design elements, and logos that are also geared toward their target audience. Color schemes, fonts, and logos greatly affect the perceived value of a brand. Also, light colors and large fonts make it easier for the user to absorb information, enhancing the website's credibility (Thibodeaux, 2019).

The website Mindful Nature Connection does not include a logo, utilizes colors inconsistently, and has a large background image that does not seem relevant to her mission or aesthetically appealing. Overall, this website's design does not come across as very clean, sleek, or professional. However, the strengths of the website are a large number of non-stock photos to showcase the contents of her course, large fonts, and a large number of images overall. The website Darach Social Croft also incorporates a large number of photos, but all photos are small and deserve more attention. They have a logo, but it seems amateurishly made and inappropriately placed on top of

busy background banners. In regards to aesthetics and design layout, both websites seem adequately professional and convincing that the organizations are legitimate, but they could both use a great deal of improvement.

What both websites achieve well is establishing the credibility of the team itself. They include a large number of photos of the content creators, contain elaborate biographies, and place a lot of emphasis on credentials and awards. Furthermore, both websites include multiple methods of contact by providing email, phone, social media, newsletters, location, and contact via the website. Unfortunately, neither website displays actual written reviews by clients, which is a very significant element to incorporate if websites want to increase their credibility (Thibodeaux, 2019).

2.2.2 Visual Communication

Visual communication consists of using visual elements to get a message across, inspire change, and evoke emotions (Ezell, 2023). For this project, all three applications of visual communication are extremely relevant, and it is, therefore, important to know what types of visual communication exist, how they are applied, and what their strengths and weaknesses are.

Types of Visual Communication

Visual communication comes in two parts; communication design and graphic design. Communication design refers to creating messages that educate, motivate, and engage the viewer. Graphic design uses design principles to communicate that message in a way that is clear and eye-catching to the intended audience (Ezell, 2023). There are many elements that can be utilized through visual communication. These include text, icons, shapes, videos, imagery, graphs, data visualizations, and the use of color. In *Figure 2.3*, examples of visual communication related to nature are shown.

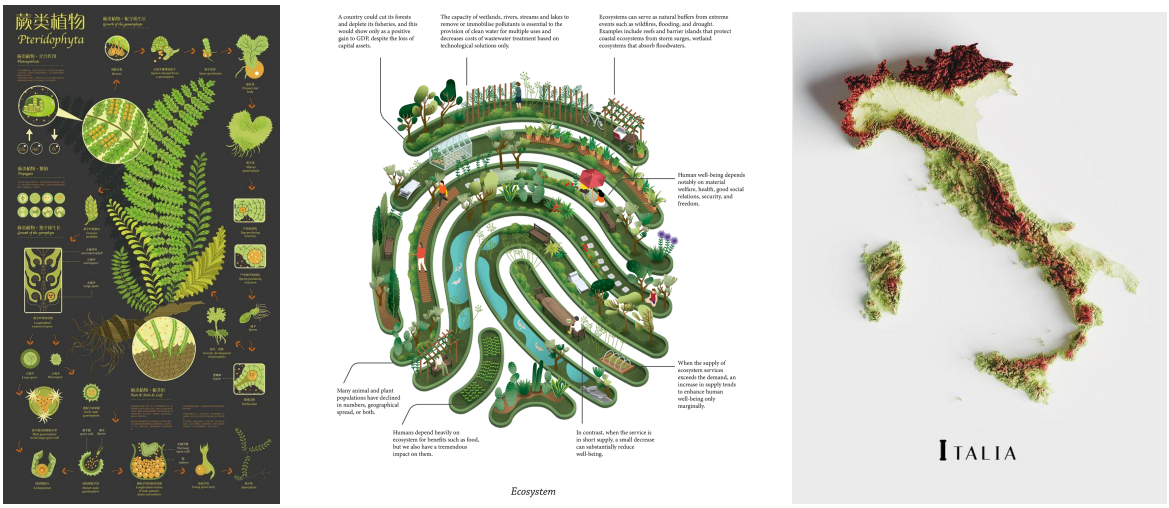


Figure 2.3: Examples of visual communication related to nature

Strengths of Visual Communication

One of the key strengths of visual communication is that it can be used to communicate effectively. Incorporating high-quality images and videos, rather than relying solely on text, can decrease the amount of time required to absorb the content. Furthermore, the amount of resistance to communication (typically when viewers are exposed to large amounts of text), correlates with the amount and quality of information being communicated (Ezell, 2023). By providing your information visually, users are able to process it more effectively.

Visual communication also improves information retention, as it supports both reading comprehension and memory. Visuals can be used to highlight the main points that you are trying to communicate interestingly and effectively, allowing the viewer to connect those points with contexts that are relevant to them and strengthening the memory's connection to the information (Ezell, 2023).

Furthermore, visual communication can be used to evoke specific emotions. As mentioned earlier in Chapter 2.1.4, curved and rounded shapes are associated with calmness and relaxation, while sharp angles and edges are associated with tension and aggression (Cohn, 2015). Color theory also plays an important role in communicating the right affect, feeling, experience, or emotion in visual communication (Bartram et al., 2017). Warm colors are typically associated with feelings such as

excitement, passion, or optimism. Cool colors are typically associated with feelings such as growth, calm, and trust (Clark-Keane, 2022). *Figure 2.4* depicts a chart showcasing the feelings typically generated by each color.

Figure 2.4: Chart depicting psychological effects associated with colors (Clark-Keane, 2022)

For this thesis project, it makes sense to utilize many green colors due to their association with nature, growth, and health. As the thesis client requested to convey a sense of professionalism and credibility, it would also be beneficial to make use of blue colors, as they convey trust, professionalism, calmness, credibility, and power. Blue also conveys a serene environment, which is convenient when evoking a sense of calm in the user (Clark-Keane, 2022).

Weaknesses of Visual Communication

There are several pitfalls in visual communication that are important to be aware of while designing this project. Firstly, visual communication can be time-consuming and costly to produce. For the thesis project, a selection must be made as to which elements of the design will be visually communicated, and which elements will simply remain as text. Creating visual aids also requires some investment, as high-quality visual communication needs some level of complexity and design to be effective and aesthetically pleasing for the user (Business Communication, 2013). In contrast, a visual presentation must also not become too complex, as it quickly becomes difficult for users to interpret it. Furthermore, visual communication is often an incomplete method and is not sufficient on its own to communicate effectively and clearly. Often, oral or textual

communication is required in combination with visual communication to help users understand the full context and meaning.

2.2.3 Attention-Restoring Digital Applications

There have not yet been many digital applications developed that support attention restoration, and there has not yet been a lot of research performed on how these applications might succeed in doing so.

Attention Restoration in a Virtual Reality Driving Simulator

A study by Cassarino et al. investigated whether driving through rural vs. urban road environments would affect attentional capacity in young people after the drive. To do this, they asked 38 young participants to complete a Sustained Attention to Response Task before and after being exposed to a rural or urban road in a virtual reality environment while driving in an immersive driving simulator. Unfortunately, the present study does not support the hypothesis that a short drive in a natural setting may promote attention restoration as compared to an urban setting (Cassarino, 2019). However, the graphics they used in the simulator were of low quality. From research, it has become apparent that for restoration to occur, digital graphics must be of high quality in order to be perceived as credible and authentic by the user.

Simulated Walk in Nature

A study by Crossan et al. observed participants walking on a treadmill while exposed to a simulated natural environment. Their findings state that the participants exposed to the simulated natural environment indeed produced a significant improvement in directed attention performance compared to the control group. Furthermore, the improved directed attention in the nature exposure group demonstrated that only a short 10-min exposure period was needed to have a restorative effect (Crossan et al., 2021). This study also opened a discussion for possible implementations of simulated attention restoration on university campuses, when nature is less accessible. For example, professors could include short ‘nature’ breaks consisting of videos or photos for students and themselves, to quickly restore directed attention. This would allow for more restorative learning environments, and support elevated cognitive performance.

2.2.4 Stress-Reducing Digital Applications

There are an incredibly large number of digital applications that promote relaxation and reduce stress. The app 'Calm' is one example of a meditation and relaxation app that aims to help users reduce stress and improve their mental well-being. The app offers a wide range of mindfulness-based stress reduction techniques, including guided meditation sessions, sleep stories, music tracks, and breathing exercises. Additionally, the app offers personalized content and recommendations to users based on their interests, preferences, and usage history.

The guided meditation sessions offered by the app help users calm their minds, focus on their breath, and become more present in the moment. The guided meditations are led by experienced meditation teachers and are designed to help users reduce stress, improve focus, and enhance their overall well-being. The breathing exercises help users regulate their breathing and calm their minds and are designed to help users reduce anxiety and improve their ability to manage stress. Furthermore, the app offers a daily meditation session called 'Daily Calm' that is designed to help users start their day with a calm and focused mindset.
The app has a simple and intuitive user interface that is easy to navigate. The app's design is clean, and the use of soft colors, background sounds, and calming images contributes to a relaxing user experience, as depicted in *Figure 2.5*.

Figure 2.5: The user interface of the app 'Calm' (www.calm.com)

2.2.4 Digital Games that induce mindfulness

Digital games provide a promising solution for the combination of mindfulness and digital technologies because the interactive nature of games allows the development of experiential knowledge, which can cultivate mindfulness. Games can be so engaging that they make their players forget about time and create an absorbing interaction, which is why gaming has been described as a meditative practice by itself (Sliwinski et al., 2015).

In recent years, several digital games have been released that are purely explorative and have no definite goal. These games can be described as meditative audio-visual experiences. Good examples are the games ABZU and Journey (*Figure 2.6*), where users explore beautifully rendered ocean and desert environments. The games were created with the purpose of eliciting 'zen' emotions in the user.

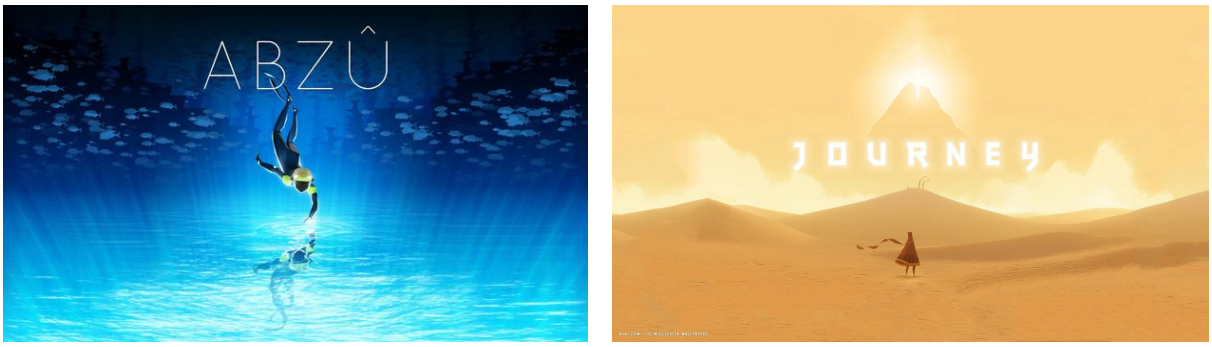


Figure 2.6: Digital Games ABZU (left) and Journey (right)

2.2.5 Animation

As mentioned in the literature review in Section 2.1, animation can act as an effective digital medium to elicit emotions and convey information. Headspace is a company specializing in meditation that produces beautifully animated explanatory videos to help beginners on the journey to mindfulness. Their animation style is unique in that they only use essential and abstract forms and shapes while placing a lot of importance on color to evoke calm yet positive emotions. Through subtle and harmonious colors, rounded shapes, and a natural 'fluidic' style, they create dreamlike scenes. Furthermore, they try to convey words with feelings instead of meaning using

their abstract shape language (*Figure 2.7*). Animators state that they look to nature for inspiration, not just because it is relatable but also because of its innate links with the peaceful state of meditation (Brewer, 2021).

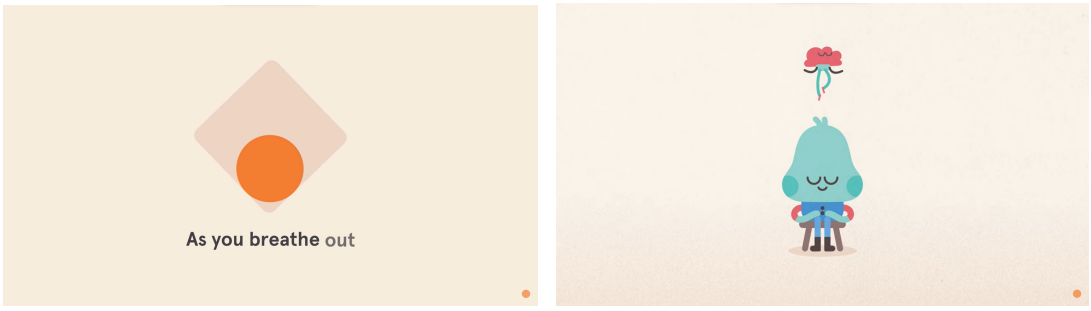


Figure 2.7: Screenshots of Headspace meditation clips 'Breathe', and 'The Noting Technique' (Headspace, 2018)

2.3 Discussion and Conclusion

In this section, the conclusion from the background research is provided. Through literature research and the analysis of the state-of-the-art, sub-research questions (SRQs) 1 through 4 can be answered.

SRQ1: What are the psychological effects of nature?

The main positive psychological effects of exposure to nature include mindful mental states, attention restoration, mental fatigue restoration, stress reduction, mood regulation, and slight positive emotion generation.

SRQ2: How can the psychological effects of nature be manifested through a digital medium?

These psychological effects can, to a certain extent, indeed be manifested through a digital medium. The most significant is the incorporation of elements found in nature, such as images, patterns, colors, and gentle attention-drawing stimuli such as the swaying of blades of grass or the changing of cloud formations. Other techniques include stimulating awareness of inner processes,

creating a rich and immersive digital environment, incorporating audio containing natural sounds, and incorporating design elements that elicit emotions related to calmness and positivity.

SRQ3: How can the psychological effects of nature and student learning be combined in a digital tool?

Using cognitive load theory, a balance can be found in the amount of stimulation that optimally matches that user's cognitive load. This means that the right amount of exposure to theoretical content and calm audio-visual stimuli must be achieved. Calming and aesthetic visual aids, breaks, making information easily perceived, and exposure to natural elements can aid in reducing cognitive load and reducing mental fatigue while supporting engagement in learning environments. Furthermore, by appropriately designing for emotion, we can find a balance between user attention and user restoration. This can be achieved through the effective use of color, design layout, feedback, sound, animation, and high-quality visuals.

SRQ4: How can design be used to increase a sense of credibility in the user?

Through the analysis of the state of the art, we can answer this sub-research question. To enhance a sense of credibility in the user, certain design elements need to be utilized. For starters, it is crucial that the design functions optimally and is easy to use without hindrances. It must also be easy and intuitive to navigate, and have a clear and structured organization of contents. This goes hand in hand with a sleek, organized, and uncluttered design. It is also beneficial to adequately introduce the content creators by showcasing photos and mentioning accreditations and awards. Lastly, it must be clear that all information is accurate, up to date, and pulled from creditable sources.

Graphical elements also play a role in enhancing credibility. Background colors, fonts, logos, and other design elements must be appropriately chosen for the correct target group. For this project, it is beneficial to make use of green and blue colors, due to their associations with nature, health, growth, professionalism, credibility, and trust. Additionally, light color schemes and large fonts also aid in enhancing credibility.

3 Methods and Techniques

This chapter describes the methods used for the creation of this thesis, which follows the Creative Technology Design Process. The following sections explain how each sub-process was approached: ideation, specification, and realization.

3.1 Design Method

The Creative Technology Design Process, depicted in *Figure 3.1*, is an iterative process that combines two approaches. On the one hand, it adopts a human-centered design approach and focuses on human daily life. On the other hand, it makes use of engineering design principles and fosters the development of many prototypes. Additionally, it makes use of divergence-convergence and spiral models of design practice. In the divergence phase, the design space is opened and defined. It utilizes lateral thinking techniques and fosters the creativity of the designer. The converging phase consists of reducing the design space until a certain solution is reached. The spiral model aspect of the design process allows for various paths in the process, driven by the nested questions of problem-solving (Mader & Eggink, 2014).

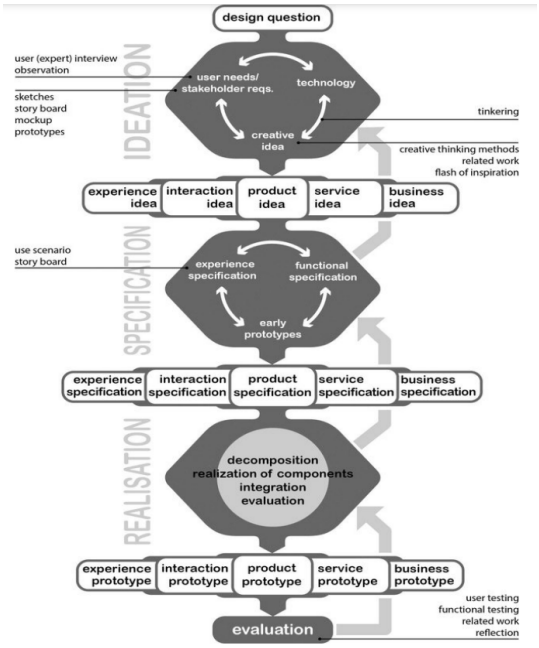


Figure 3.1: The Creative Technology Design Process (Mader & Eggink, 2014)

3.2 Ideation

During the ideation phase, the project design and its preliminary requirements were formulated. Firstly, user needs and stakeholder requirements were investigated. This was done by performing interviews and observations, and by performing a stakeholder analysis. A creative idea was formulated by determining the types of technology that could be used, analyzing the user domain, brainstorming methods, and drawing inspiration from related work (Mader & Eggink, 2014).

3.2.1 Stakeholder analysis

Stakeholders are all groups or individuals that can affect or be affected by the project (Newell, 2020). To ensure that all relevant stakeholders and their needs are thoroughly considered, a stakeholder analysis must be performed. This consists of identifying the stakeholders; grouping them according to their levels of participation, interest, and influence in the project; and determining how best to involve and communicate with each of these stakeholder groups throughout the project (Newell, 2020).

First, stakeholders and their roles were identified. Their influence and interest in the project were assigned a score between 1 and 10 using *Table 3.1*. Additionally, the goals and motivations of each stakeholder are discussed.

Stakeholder	Role	Interest	Influence

Table 3.1: Table used for the identification and ranking of stakeholders

These scores will be used to classify them along the influence-interest matrix, as depicted in *Figure 3.2*, and will classify them into four quadrants. **High-power, high-interest** stakeholders are the most important stakeholders and should be managed closely, involved in projects and decisions, engaged with on a regular basis, and the maintenance of the relationship should be prioritized. **High-power, low-interest** stakeholders should be engaged semi-regularly to have their needs met and be kept satisfied. Their level of interest should either be increased or maintained. **Low-power,**

high-interest stakeholders need to be kept informed and checked in with to ensure they are not experiencing problems with the project. These stakeholders can act as supporters or ambassadors, as their interest can be used by involving and consulting them. Finally, **low-power, low-interest** stakeholders are a lower priority. They can be monitored and informed periodically to keep them updated. Preferably, their level of interest should be increased (Newell, 2020).

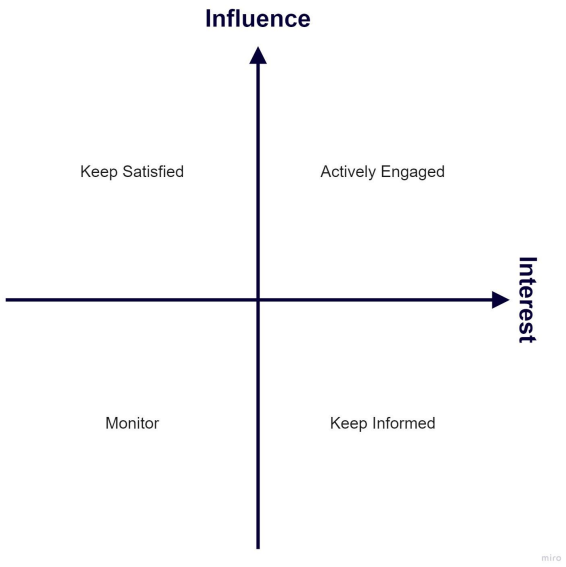


Figure 3.2: Stakeholder Influence-Interest Matrix (Newell, 2020)

3.2.2 User Domain Research

The target audience for the product design is general practitioners who speak Dutch and live in the Netherlands. Two interviews with Dutch general practitioners were conducted with the goal of understanding the needs, behaviors, and motivations of the target user group. The interviews are conducted in a semi-structured and open-minded manner. This means that while questions are prepared beforehand, the researcher also lets the interview run its natural course. This opens the possibility of asking spontaneous questions and exploring topics that the researcher may not have considered beforehand. Additionally, this form of interviewing allows the researcher to gain a deeper understanding of the user's thought process. Naturally, two interviewees are a very small sample size, and their results shouldn't be generalized across the entire target audience. Still, the reason that two in-depth interviews were chosen as opposed to a larger number of surveys is that I am very unfamiliar with this demographic. In this case, it is more beneficial to gain an in-depth understanding of the target users through meaningful and insightful conversations, as opposed to

receiving a larger number of more shallow answers. Finally, the results from the target user interviews are used to perform an analysis of the target user group.

3.2.3 Preliminary Requirements

The project requirements found using the client problem description, background research, state-of-the-art research, and user domain research are categorized into preliminary requirements and prioritized using the MoSCoW method. The purpose of this is to distinguish between important and less important requirements to ensure that the correct priority is given in the development of the project given the time span. Every requirement is categorized in one of the MoSCoW categories: '**Must Have**' requirements *must* be included in the final product and are the minimal requirements of the system. '**Should Have**' requirements are important and should be included if possible, but they are not vital requirements of the system. '**Could Have**' requirements are desirable but less important and could be included without incurring too much effort or cost. Finally, '**Won't Have**' requirements are wanted but not viable for the time frame of the system's development (Ahmad et al., 2018).

3.2.4 Concept Ideation

Using inspiration and information gathered in the background research and the previous stages of the ideation phase, brainstorming can be performed. Preliminary concepts are conceived, and for each concept, its general design and usage are described. The ideation phase is finalized with the generation of a final concept.

3.3 Specification

Throughout the specification phase, the exact requirements for the final concept are specified through the help of personas, scenarios, and by converting all information gathered from the background research and stakeholder analysis into concise design guidelines.

3.3.1 Persona(s)

Personas are characters created based on user-domain research in order to represent the different user types that might use the thesis product. Creating personas helps to understand user needs, experiences, behaviors, and goals (Interaction Design Foundation, 2016).

3.3.2 Scenario

A scenario is created to analyze the operation of the concept in its intended environment. A scenario illustrates how the system is used from the perspective of possible personas. It includes all contexts and situations revolving around the system, so all events that affect the persona before, during, and after the use of the system (Rosson et al., 2002). They consist of a setting, one or more actors with personal motivations, knowledge, and capabilities, and various tools and objects that the actors encounter and manipulate. The scenario describes a sequence of actions and events that lead to an outcome. These actions and events are related in a usage context that includes the goals, plans, and reactions of the people taking part (Rosson et al., 2002).

3.3.3 Design Specifications

In this step, design guidelines are generated by combining all the results from the background research and stakeholder analysis. Guidelines for graphic design elements are also generated, such as color schemes, fonts, and the use of graphical elements. Additionally, a coherent structure for the course contents is created.

3.3.4 Requirements

Final requirements are specified and distinguished between functional and non-functional requirements. Functional requirements are related to the functionality of the system, whereas non-functional requirements are related to the performance and usability of the system (Ahmad et al., 2018). Additionally, they are prioritized using the MoSCoW method.

3.4 Realization

In the realization phase, the requirements from the specification phase are realized. This section describes the creation process, how various components are implemented, and which tools were used. Additionally, it explains the design choices and considerations that were made throughout

the process. The realization phase of this assignment also includes two preliminary user evaluations to uncover any usability errors and further enhance the depth and quality of feedback in the official user evaluations. Prior to the evaluation, each participant read the information letter and signed an informed consent form.

3.5 Evaluation

Ultimately, in the evaluation phase, the final prototype is evaluated. The goal of the evaluation is to determine the effectiveness, usability, and user experience of the system and to contribute to answering the research questions. The evaluation phase contains several components. Firstly, a functional requirements test is performed, where the functional requirements developed during the specification phase are tested. In multiple user tests, participants from the target group test the usability and user experience of the system. These results are used to determine the fulfillment of the non-functional requirements of the prototype.

3.5.1 *Functional Requirements Test*

The main goal of the functional requirements is to determine whether the prototype meets the functional requirements developed during the specification phase. This test is performed by the researcher.

3.5.2 *User Evaluations*

Dutch General Practitioners are gathered as participants to test the prototype. The goal of the user tests is to determine the effectiveness, usability, and user experience of the design. Recruitment was done via the personal networks of both the researcher and the client, and the evaluations were held via online meetings. The evaluations consisted of an interaction session with the prototype, where observations were recorded by the researcher, and the participants were assigned a small task regarding the usability of the system. Additionally, semi-structured interviews were performed, to gain a deeper understanding of the user experience, as described in Chapter 3.2.2. Prior to the evaluation, each participant read the information letter and signed an informed consent form.

3.5.3 *Non-functional Requirements Test*

Using the results from the user evaluations, the researcher is able to determine whether the developed prototype meets the non-functional requirements.

4 Ideation

This chapter describes the ideation phase, where the project idea and its preliminary requirements are formulated. It contains the analysis of stakeholders and the results from the user-domain research interviews. Then, stakeholder requirements are formulated, and a brainstorming process is completed. Preliminary concepts are developed, and ultimately a final concept is generated.

4.1 Stakeholder Analysis

4.1.1 Stakeholder Identification

First, stakeholders and their roles were identified. Their influence on the project and interest in the project were assigned a score between 1 and 10, as depicted in *Table 4.1*.

Stakeholder	Role	Interest	Influence
Pim	Client	10	10
Tibbe	Business partner of the client	9	7
Kasia & Maro	Supervisors	8	8
General practitioners active in the Netherlands	Target audience	4	5
Patients	Subjected to the new practices taught to GPs	1	1

Table 4.1: Identification and ranking of stakeholders

Client

Pim is the project client. The course is given via the organization The Forest Movement, of which Tibbe is the representative. Pim and Tibbe are both co-founders and co-creators of the course, and together they compose its contents. As Pim is the client and main contact person, he has the highest rating of interest and influence. Tibbe also has high interest and influence but is more focused on the course contents, and less on the thesis design.

Kasia & Maro

As this project's supervisor, Kasia has a large amount of influence. Maro provides commentary and feedback as a critical observer. Through weekly meetings, both influence the direction and contents of the project. Although they do not belong to the target user group and are not affected by the thesis product, their interest in the success of the project is high.

Target Audience

The target audience consists of general practitioners active in the Netherlands. They have a medium influence on this project, as design choices consider their needs, and their feedback and participation in user tests will shape the development of the project. Their interest is low-medium, as the project has not yet had a clear influence on their lives.

Patients

Ultimately, patients will also be affected by this project due to being prescribed the interventions taught to general practitioners during the course. Their influence is low, and they are not involved in the development of the project. Their interest in the development of the project is also low, as they are not yet aware of its existence.

4.1.2 Stakeholder Analysis

In *Figure 4.1*, a categorization of the different stakeholders involved is depicted. Pim is in the actively engaged group, which means they must be contacted on a regular basis and involved in projects and decisions. Kasia and Maro are also actively engaged, and are involved in project decisions through their weekly feedback and suggestions. Tibbe is also highly interested, although any requests he has for the project will most likely be communicated via Pim. Finally, GPs and their

patients must be monitored. Hopefully, after the development of this project is complete and the course is launched, their interest will increase.

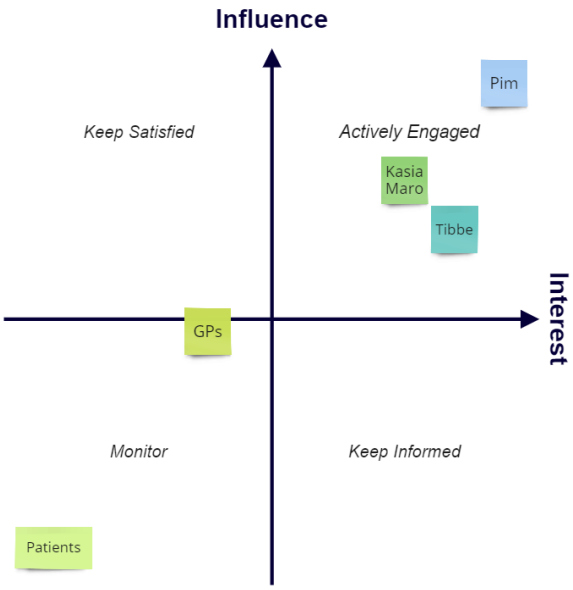


Figure 4.1: Stakeholders categorized along the Influence-Interest Matrix

4.2 User Domain Research

As part of the user domain research, two semi-structured interviews with two members of the target audience were conducted, with the goal of understanding the needs, behaviors, and motivations of the target user group.

Prior to the interviews, both participants were asked to read the information letter and sign the consent form. The participants involved in the interviews include two general practitioners, Pim and Jonathan. Pim is the project client, and interviewing him about the project is questionable as he is involved in the project and therefore biased; however, due to Pim being a general practitioner, he offers valuable insight regarding the needs of general practitioners. Throughout the interview, it was purposefully ensured that the interview topics were kept solely related to general practitioner needs and behaviors regarding general theoretical courses, and not about the medical course that Pim created. Therefore, the client was interviewed in his role as a general practitioner.

In both interviews, a clear consensus was reached regarding user needs and obstacles. Both agreed that general practitioners are extremely pressed for time and will not easily allocate additional time outside of work to study the course material. This implies several things: Firstly, the tool should immediately provide a clear overview of the course material, and what the bottom line of the contents is. It should be easy and intuitive to use, provide fast access to materials, and be to the point. Secondly, the use of the tool should not take up too much time. Users should be able to get through information or exercises quickly if they need to. The target user group can also be exposed to a relatively high tempo or volume of information exposure, as general practitioners are trained to absorb and process information at a high speed.

Contrastingly, there is still a need and appreciation for offering the course material in a fun, aesthetic, and interactive way that captures the user's attention. Furthermore, as general practitioners experience high stress levels in their daily lives, there is an appreciation for the possibility of the reader creating an opportunity to relax. Incorporating exercises related to mindfulness also gives general practitioners more reason to revisit the reader after the course has ended, as they learn skills that they can immediately apply to both themselves and their patients.

A convenient aspect of the target audience is that they are well-practiced in using technology. They work with computers daily and have intuition regarding the use of computer systems and software. This means that although the system should still be easy and intuitive to use, it does not need to be designed for users who are completely inexperienced with using computer programs.

Regarding the mental stance towards nature and mindfulness, one of the interviewees mentioned that the type of person to enroll in the course in the first place is most likely someone who already has some experience with nature and mindfulness and has an open stance towards them. This indicates that, generally, the target audience will be more likely to accept the project design. Also, the design does not have to factor in a large amount of skepticism or resistance from the target audience. It is important to note that although the general practitioners enrolled in the course have an open stance towards the topic, they are still part of a very scientific and logically thinking target audience. This means that the tool contents should still be clearly scientific and

evidence-based, and there should be an emphasis on what parts of the contents are practically applicable to them.

4.3 Preliminary Requirements

After conducting research on background information, the state-of-the-art, and the user domain, preliminary requirements can be formulated. They are prioritized using the MoSCoW method, as depicted in *Table 4.2*.

	Preliminary Requirements
Must Have	• Contain the theory from the course • Transferable to a non-digital version • Allow user to use the product with ease and little to no explanation • Include links to sources used for course content for follow-up research • Incorporate the psychological effects of nature on the user
Should Have	• Audiovisual stimuli with a connection to nature • A consistent graphic style related to enhancing company branding
Could Have	• Mindfulness exercises • Features that encourage introspection and body awareness • Should not take up too much time or at least have an option that takes less time • Pleasing aesthetics and audio • Be appealing to use for the user • Convey a sense of credibility and professionalism
Won't have	• Full VR • A design that takes up too much time to use, e.g. a long video game • Voice-over of the information

Table 4.2: Preliminary Requirements

4.4 Preliminary Concepts

4.4.1 Brainstorming

By creating the mindmap shown in *Figure 4.2*, a number of preliminary concept ideas were generated. Each concept idea is worked out in more detail below.

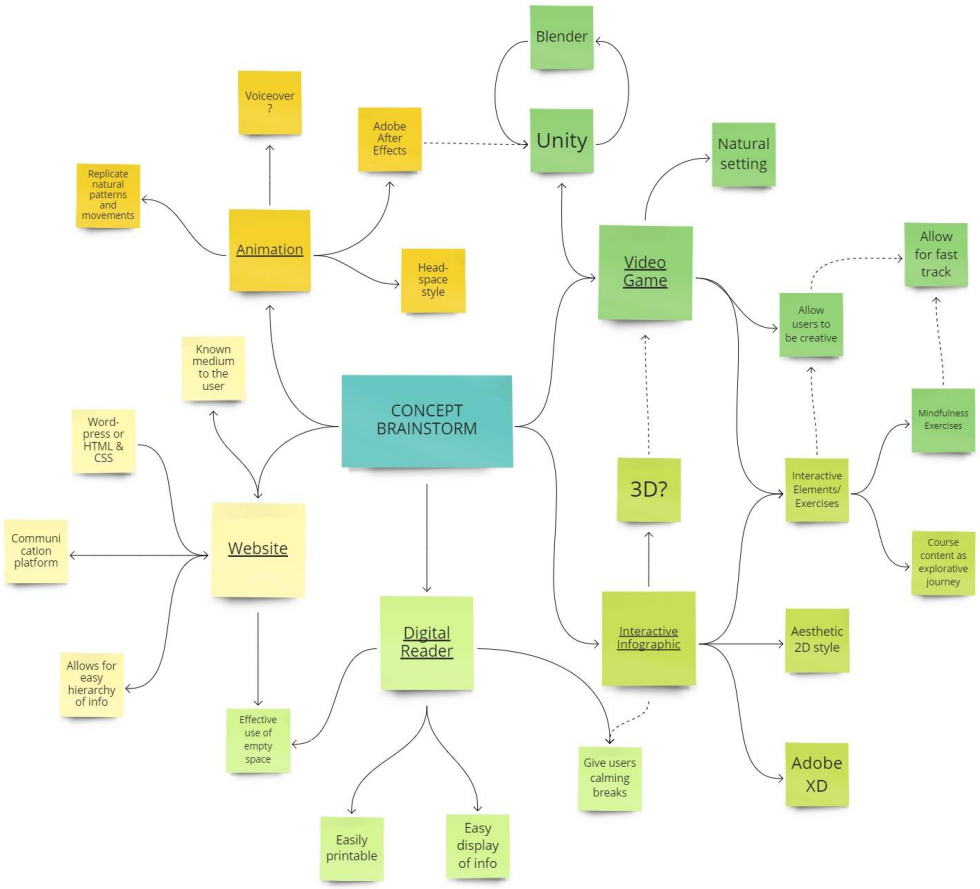


Figure 4.2: Mindmap of generated preliminary concepts

4.4.2 Digital Reader

A digital reader would basically be a digital form of a standard reader, containing all the information from the course. It could either be a continuous scrolling experience, or a 'page-flipping' experience. It would make it incredibly easy to convert this design to a paper version, as the digital pages can simply be printed out. Although the design is simple, it could still

be created with an aesthetic, calming, and technobiophilic design, as depicted in *Figure 4.3*. For example, it could incorporate many aesthetic natural images, and make effective use of empty space. Furthermore, although readers would go through the contents at their own pace, they could still be encouraged to perform some mindful activities or take calming breaks after every chapter. The reader could additionally provide recommendations for what to do during such a break.

Furthermore, the digital reader could still include some level of interaction. For example, hyperlinks to the sources that the contents are derived from, or hyperlinks to sources that provide additional information. The table of contents could also be interactive for ease of use.

Figure 4.3: Lo-fi prototype of a digital reader

4.4.3 Animation

Animation can be an effective way to guide users through exercises, provide pleasing natural stimuli, and even explain certain concepts. To achieve this, the program Adobe After Effects can be used. To explain concepts or guide the user through exercises, 2D animation can be used. Natural stimuli should be kept realistic, in order to maximize the restorative effect. One thing to keep in mind is that the course does contains a large amount of theoretical information, so there may need to be 'pauses' in the animation where the user has time to read. Then, when the user is ready to proceed, they can click and continue with the animation. A voice-over option could be relaxing and guiding, but is also time-consuming for both the user and the developer. Also, this will not be possible because large quantities of information still need to be read. Below in *Figure 4.4* is a

depiction of how animation can be used to depict realistic natural stimuli, in combination with a restorative mindfulness exercise.

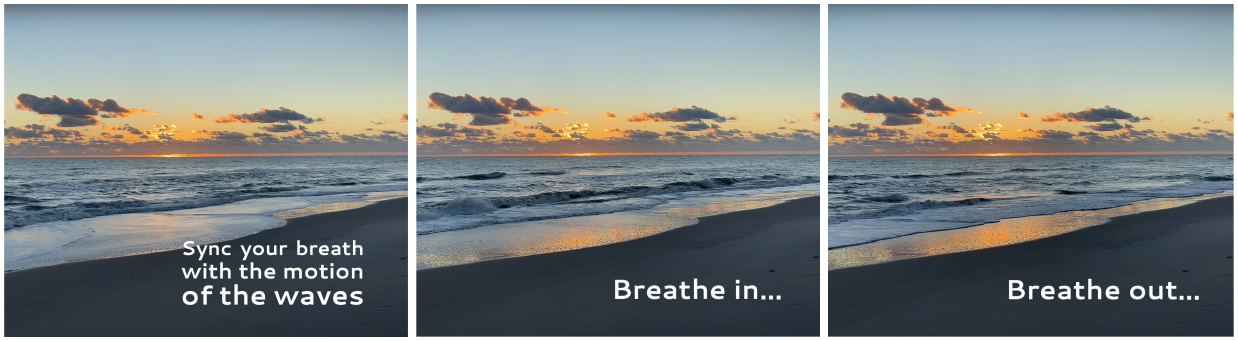


Figure 4.4: Lofi prototype of an animation

4.4.4 Website

A website is intuitive and easy to use for the target audience. Information can be displayed in a way that gives a clear overview. Furthermore, a website could even serve as a platform to connect like-minded practitioners, organizations, and resources that support the vision and allow course participants to keep in contact with each other. This can be achieved by two methods: A web-building engine is simpler and faster to use, but it gives a limited opportunity for aesthetic and interactive elements. Coding from scratch using HTML, CSS, and Javascript allows for creative freedom, but is time-consuming and has a steep learning curve. *Figure 4.5* is a depiction of what a website could look like.

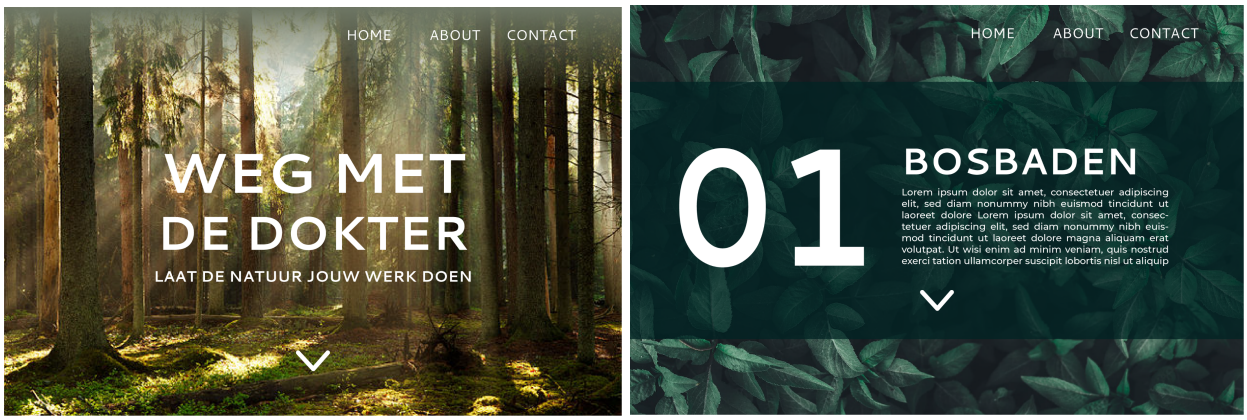


Figure 4.5: Lofi prototype of a website

4.4.5 Interactive Infographic

An interactive infographic allows the user to explore the information on their own terms in a non-linear fashion. Furthermore, it allows for the easy incorporation of a 'fast track', for users who are particularly short on time. For example, the slow track includes many animations and calming visuals or stimuli between each information segment, mindfulness exercises, etc. In contrast, the fast track could simply display the information efficiently while combining the minimum of natural imagery and audio. Adobe XD is a useful software that allows for interface design and can incorporate animation, but it does not easily allow for user interactions. *Figure 4.6* displays what a potential interactive infographic may look like.

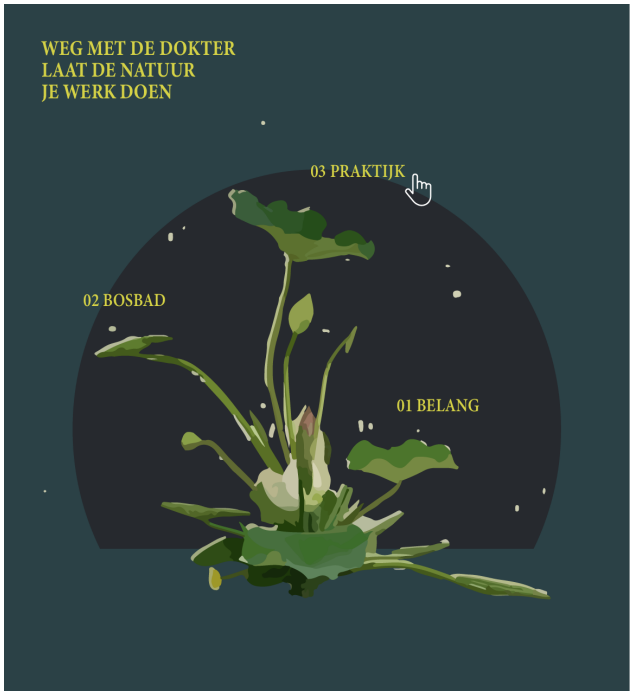


Figure 4.6: Lofi prototype of an interactive infographic

4.4.6 Educational Video Game

This preliminary concept entails a simple and quick-to-use video game; similar to an interactive infographic that contains additional user interaction. The video game would take place in a small natural setting to enhance feelings of restoration and exploration. For example, the user finds themselves in a forest, traversing different paths to explore different topics. Elements within the

environment could be interacted with to display different information. The additional interaction could also allow users to interact with the environment or be creative. Between chapters, the program could allow them to play around with the natural stimuli by creating art or plants with the mouse. This could potentially induce additional engagement and/or soft fascination.

The software Unity offers a lot of freedom and opportunity for control and user actions and allows for both 2D and 3D environments. However, the software can be time-consuming and complicated to use. The software Blender can be used to create aesthetic 3D environments. However, a challenge is that, for optimal restoration for the user, the natural environment should be as realistic and convincing as possible. My laptop can only handle a certain amount of geometry, so the environment would be relatively low poly. which decreases its authenticity and credibility because it is further removed from realism. *Figure 4.7* depicts how such a video game could look with ideal realistic graphics.

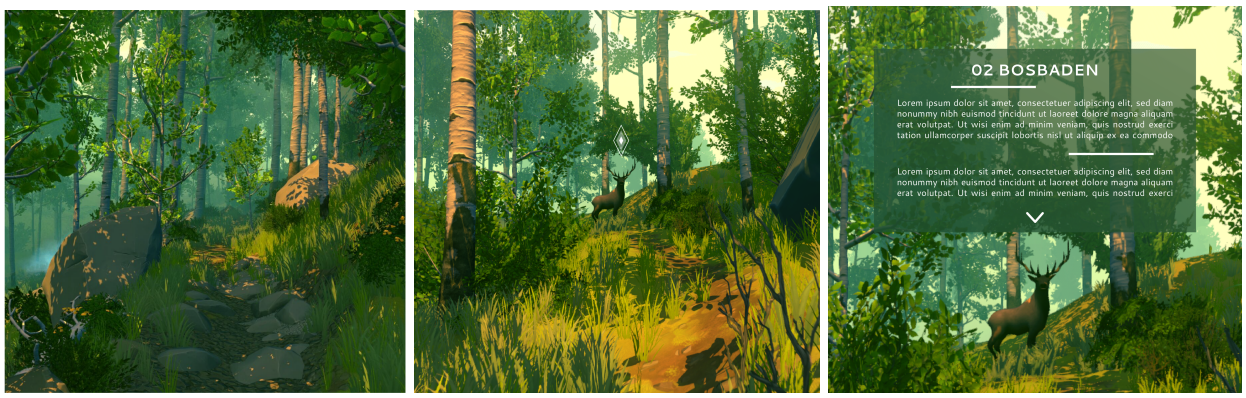


Figure 4.7: Lofi prototype of a video game
(Screenshots taken from the game 'Firewatch')

4.5 Final Concept

The design chosen as the final concept is an interactive infographic. Multiple reasons led to this decision. As stated earlier, an inforgraphic allows for a clear structure and overview of all course contents. It allows the user to explore topics in a non-linear fashion, and also allows for a 'fast track', where user can skip less important topics or segments. The layout design could take on multiple forms, such as a plant or tree that the user navigates, and each topic is located on a tree

branch or in a forest that the user must navigate. This way, there is a clear structure to the course contents, and users can navigate the information at their own tempo and in a non-linear fashion. An interactive infographic also has the potential to be an engaging product, as it can incorporate a large amount of user interactivity, such as interactive buttons and animations. Furthermore, it can also incorporate a large amount of natural imagery and video containing gentle attention-drawing stimuli, calming and aesthetic animations, audio containing natural sounds, and mindfulness exercises. These exercises have the goal of either de-stressing the user, bringing them into a mindful state, and increasing their bodily awareness.

The interfaces created in the infographic are also releatively easy to print out and bind into a book, allowing for an easy transfer to a non-digital medium (as opposed to a video game or a video). Furthermore, a house style will be graphically designed, containing professional and minimal fonts, blue and green colors, and a logo. Throughout the infographic, a sleek, uncluttered, and calm design will be adhered. *Figure 4.8* displays the lo-fi prototype of the interactive infographic, with an additional page for more elaboration on the final concept.

Figure 4.8: Lo-fi prototype of an interactive infographic

5 Specification

This chapter describes the specification phase of the design process. Here, the exact components and features of the final concept generated in the ideation phase are further specified. This is done by identifying and prioritizing visualization requirements, and describing design specifications. Additionally, a persona is created and used to describe an interaction scenario.

5.1 Persona

As mentioned in Chapter 3, personas are characters created based on user domain research in order to represent the different user types that might use a design. The purpose of creating personas is to understand user needs, experiences, behaviors, and goals (Interaction Design Foundation, 2016). From the user domain research, it can be concluded that only one persona is needed to analyze possible user interactions. The reason for this is that the target audience is extremely specific: General practitioners that speak Dutch and are active in the Netherlands, who lead a relatively stressful and busy life, are highly-educated and academic, and who adopt an open mindset to mindfulness and holistic medicine. Below is the description of the persona: Daan Vermeer.

Daan is a general practitioner based in the Netherlands. He leads a busy and stressful life, working long hours, treating a high number of patients, dealing with administrative tasks, and creating enough time for his own personal life. Daan is open-minded and curious, with a desire to learn and grow both personally and professionally. He is passionate about his work and committed to providing the best possible care to his patients. At the same time, he recognizes the importance of work-life balance and takes steps to ensure that he is taking care of himself in order to be a better practitioner. Daan has an interest in holistic medicine and exploring non-traditional treatment options, and he recently took part in a 3-day course focused on incorporating nature-based interventions into medical practices. Daan's busy schedule makes it difficult for him to devote a lot of time to learning new things and revising information. He needs resources that are concise and easy to digest so that he can quickly integrate them into his practice.

5.2 Scenario

After a long day at the clinic, Daan returns home feeling tired but satisfied with his work. He sits down, wanting to take some time to unwind and recharge. He remembers that he recently participated in a medical course about incorporating nature-based interventions into medical practices. The contents excited him, and he was convinced of the scientific proof of their effectiveness and their potential to help patients. However, the exact interventions that he could offer his patients and the theory behind them seem to have faded from his memory. He remembers that the course also provided a digital learning tool. Curious, he decides to use this as an opportunity to refresh his memory of the course contents, or learn something new and interesting.

He opens his laptop, navigates to his email, and downloads the file. He appreciates the fact that the download takes a matter of seconds (assuming he has a stable wifi connection), that he can access the content from anywhere and at any time, and that he doesn't need to download any kind of software to make use of the digital learning tool.

Upon opening the file, a welcoming home screen containing a relaxing video of nature fills his entire laptop screen. Some text appears, welcoming him to the digital learning tool, explaining the purpose of the tool, and providing him instructions on how to use it. Furthermore, it is explained to him that the digital learning tool is not only used for education, but also provides an opportunity to relax. Daan is encouraged to move to a spot in his house where he cannot be distracted by external stimuli, such as his children running around the living room. He decides to move to his office.

Daan navigates through the home page, where a clear overview of all course topics is displayed. He understands the metaphor of a forest path for the course contents, and that small paths that branch off from the main path represent subtopics. Seeing the gently animated buttons, he notices that he does not need to explore the topics linearly, but can click on any topic that he is interested in exploring at that point in time. Still, he decided to start from the beginning, which consists of an introductory section. He is engaged by the variety of content available, including articles, images, and interactive tests and questionnaires.

He then navigates to the first chapter and takes his time reading through the content, choosing to pause when he pleases at the short mindfulness intermissions scattered through the contents. He appreciates the fact that he can learn at his own pace, without feeling rushed or pressured by external factors, and also be able to skim or skip past sections when pressed for time. He notices that he can easily navigate to the references used to support the information he reads, which reassures him and enhances his trust in the contents.

After roughly an hour of interacting with the digital learning tool, Daan feels relaxed by the calming stimuli and exercises, and inspired by the new insights that he has gained. He appreciates the opportunity to develop himself professionally in a way that is convenient and restorative, and he is excited to apply his new knowledge in his practice.

5.3 Design Specifications

5.3.1 Design Guidelines

Based on the findings from the background research, certain guidelines must be followed in order to create a restorative, calming, and effective digital learning environment. *Table 5.1* provides an overview of the guidelines.

Technobiophilic Guidelines
• The reader must contain images and videos of natural environments. • Where possible, audio of natural environments should be incorporated (e.g., birdsong, trickling of a creek). • Another option is to create multi-layered soundscapes, that balance natural sounds, ambiance, and gentle music.
Mindful/Introspective guidelines

- The design could incorporate exercises that enhance interoceptive awareness (e.g. focus on breathing, muscle tension, emotion, touch, etc)
- These exercises can incorporate calming animations, video, and audio
- Effective use of feedback should be incorporated to guide the user through the exercise (e.g., changes in motion, color, sounds,etc.).

Restorative Guidelines

- The design should encourage the user to engage with it in a calm environment, away from distractions or sources of stress (*being away* component of attention restoration)
- Videos of natural environments must contain gentle attention-drawing stimuli, such as slow movement through the environment, or the swaying of tree tops. *(soft fascination* component of attention restoration)
- Images of natural elements have the option of containing fractal properties (*soft fascination* component of attention restoration)
- The design should be used in full screen, to maximize immersion (*extent* component of attention restoration)
- The product should incorporate images and videos of realistic natural environments, instead of drawn pictures, to enhance the credibility of the natural stimuli.
- The design should be effortless to use, and not distract users from restorative or introspective processes (*compatibility* component of attention restoration)

Design for emotion guidelines

- Graphic design choices should be made with the goal of inducing calmness and slight positive emotions to enhance cognitive processes.
- Colors should be associated with calmness, healing, growth, professionalism, trust, and slight positivity (e.g. light colors, pastels, neutral colors, green and blue colors)
- Shapes should be calm and slightly positive (e.g. no jagged or sharp edges)
- Animations should contain a movement that conveys calmness (e.g. smooth, fluid motion)

- Images and videos should be carefully chosen to be aesthetically pleasing to help create a sense of awe and wonder.

Cognitive Load guidelines

- The design should align with the individual's goals and motivation. So, regardless of whether the user opens the design specifically for the exercises, or for one specific segment of the contents, they should be able to carry out both tasks equally easily. Therefore, navigation around the product should be non-linear and easy to do.
- The product should not be distracting or highly stimulating. So, for example, when the user is in the process of absorbing content, there should not be distracting stimuli.
- The product should not overwhelm the user with too much information at a time. For example, the contents should be separated into small bite-sized segments, and not contain too much text on one page.
- The product should not contain too many images and too little information, which may cause boredom or impatience in the user.
- Pictures, diagrams, infographics, or graphs could be incorporated to support the theoretical contents, thereby reducing the cognitive load need to absorb the information
- The user should be encouraged to take breaks while absorbing information to help reduce cognitive fatigue. (e.g., guided meditation, looking at natural imagery, standing up and walking around, etc.).
- Information should be placed in the periphery of attention where possible. E.g., the user should be aware that there is a 'help' function available, but the presence of the function should not take up attention (e.g., by placing the button inconveniently, too obviously, or animating it).
- Graphic design and placement of information should be aesthetic. Inadequate graphic designs draw attention and generate emotion.
- Texts should be easily readable and should not require additional attention to read (e.g., appropriate font size, justification, and line spacing).
- The overall size of the product should not become too large, as sitting in front of a screen for too long leads to eye strain and fatigue. Breaks may also help with this issue.
- The user should not encounter distractions from using technology itself (e.g., while the user interacts with the product, they receive WhatsApp or email notifications).

Target Audience Guidelines
• The product should not have an 'entrance barrier' to use (e.g. users should not have to learn new skills or read an excessive amount of instructions to start using the product) • The product should have an option for faster use (E.g., all videos or mindfulness intermissions should have a 'skip' button). • The user should be able to skip to the sections that they want to read, and not have to start from the beginning. • The progress of the user should not be obstructed (e.g., the user loses their position if they click on a reference, and have to navigate back to where they were) • Emphasis should be placed on reducing stress, and the user should be aware that the product can be used as a de-stressing tool as well as an educational tool.

Table 5.1: Overview of design guidelines based on background research

5.3.2 Graphic Design Elements

5.3.2.1 Color Scheme

As mentioned in the background research in Chapter 2, specific colors will be chosen based on their psychological effects on the user. Light, less saturated, and blue/green colors are associated with feelings of calmness. More vibrant or saturated colors are associated with stronger emotions and can be used to enhance a feeling of engagement or positivity. The color scheme of the infographic will mostly be comprised of green due to its affiliation with nature. A small amount of blue will be mixed into the color scheme, and the background colors and component colors (e.g., buttons) will be unsaturated and neutral. This is to enhance feelings of calmness and professionalism. *Figure 5.1* depicts the chosen color scheme.

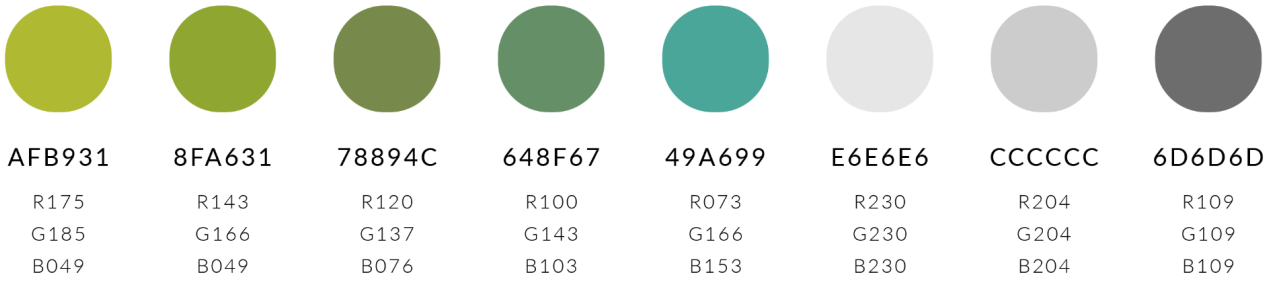


Figure 5.1: Color Scheme

5.3.2.2 Fonts

The digital learning tool will utilize two different fonts: a header font and a body text font. For the body text font, it is important to choose a minimalistic sans-serif font. This is due to multiple reasons, based on the results from the user domain research. The first is readability; sans-serif fonts don't have decorative strokes or serifs. They have a clean and uncluttered appearance that makes them easier to read, especially when used in more voluminous texts. Furthermore, they have a modern and professional look that conveys a sense of authority and trustworthiness. This is especially important for an accredited medical course, where credibility, accuracy, and attention to detail are essential. Lastly, they have a neutral design that allows them to be paired with other fonts, graphics, and images without clashing or creating a cluttered appearance. This makes it easier to create a visually appealing and cohesive layout. An additional benefit to minimalistic fonts is that they are a more accessible choice, as they are easier to read, particularly for those with dyslexia. The lack of serifs can reduce visual noise and make the text easier to scan and comprehend. For the body text font, the font *Lato* has been selected, as depicted in *Figure 5.2*.

Header fonts are generally used to convey the overall tone and theme of the contents, and can therefore have a more distinct design. However, it is important to note that the font should still be easy to read, as a font that is too ornate can be distracting and take away from the content of the course. For this project, the minimalistic font *Cronos* has been deemed the optimal choice, as depicted in *Figure 5.3*. It is a font that portrays warmth and readability, as it is minimalistic yet inspired by handwritten letters.

Figure 5.2: The body-font 'Lato'

Figure 5.3: The header-font 'Cronos'

The choice for a minimalistic header font is due to the large amount of imagery being used in the final design, and the fact that decorative headers may decrease a sense of professionalism. A clear, bold font is a good choice for headers, as it will stand out and be easy to read. The comparison shown in *Figure 5.4* explains how a sleek, minimalistic header font enhances readability and a sense of credibility.

Figure 5.4: Depiction of different fonts against an image background

5.3.3 Content Organization

After a brainstorming session with the client, the content organization structure depicted in *Figure 5.5* was constructed.

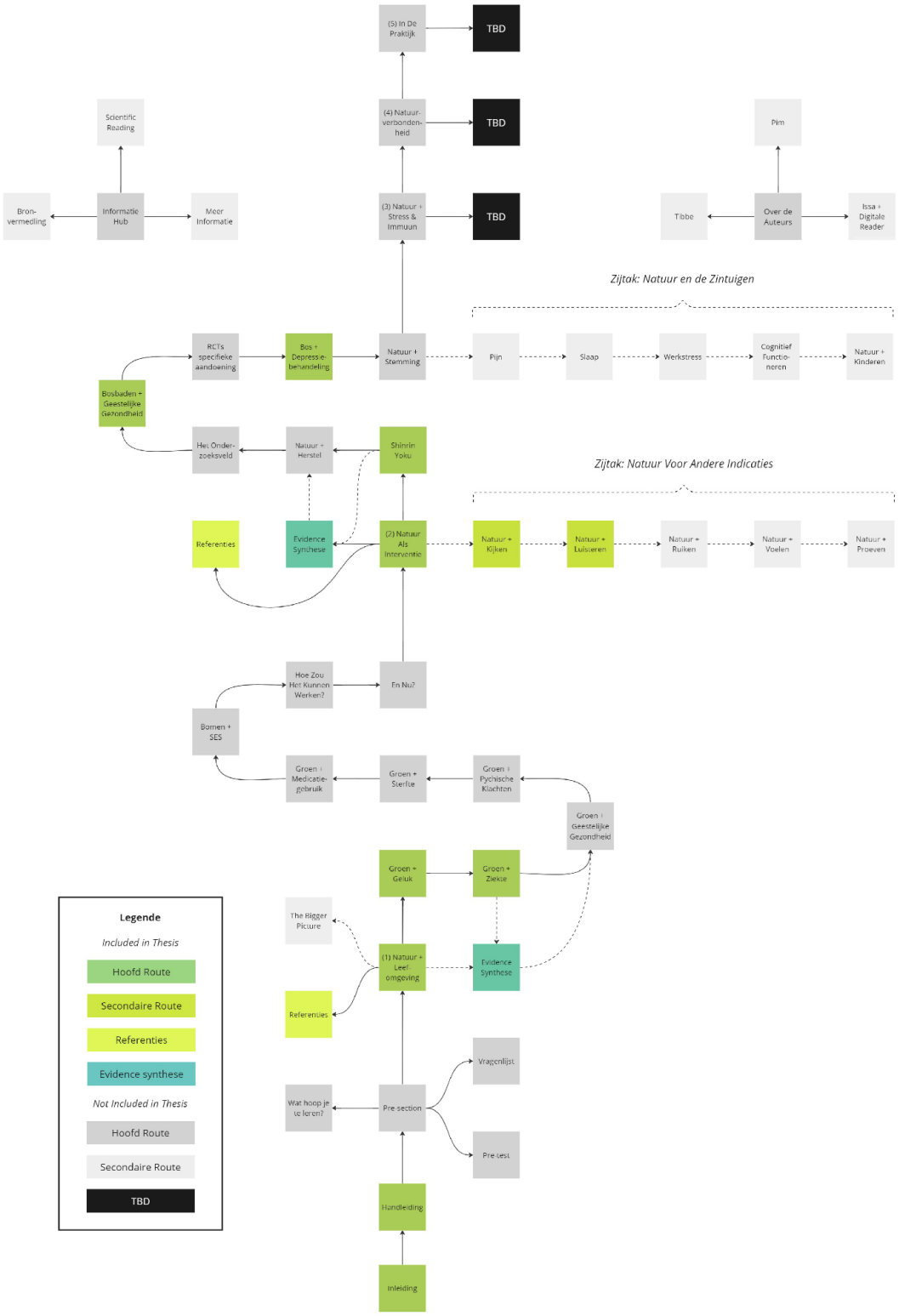


Figure 5.5: Organization of contents

The reader starts with an introductory section, which contains a welcome video, a pre-test, and a questionnaire. The main body of the course consists of five chapters: Nature in Your Surroundings, Nature as an Intervention, Nature and the Immune System, Nature- Connectedness, and Nature in Practice. Each chapter splits off into secondary pathways, which allow the user to explore more elaborate knowledge of the topic. Furthermore, every chapter contains an 'evidence synthesis' section, which contains all the research and evidence gathered to support the contents of each chapter.

Separate from the main chapters is the 'information hub', which contains all sources used to compose the course contents, suggested readings, and other relevant information. Lastly, there is a small section describing the creators of the course, along with a short description of the design choices behind this learning tool. Although all contents are copyrighted and only accessible after users have paid for the course, some sections will be made public before the course takes place. These will be distributed across various social media platforms by the client in order to advertise the course to potential customers.

For this thesis project, it was decided that only specific sections of the tool would be created. These include the introductory section, half of the first chapter, and half of the second chapter. The reason for this is that the course contains an extremely large amount of information, and the client had not yet worked out the details of all chapters. Furthermore, for the purpose of this thesis, it is not necessary to have all content created. The chosen sections for the thesis are an adequate representation of the final product, and the functional and non-functional requirements will be tested for these sections. The design principles that result from the evaluations will be applied to the rest of the content. The rest of the tool will be created for the client after the deadline of the thesis, in the months of July, August, and September.

Below is an overview of the chosen sections for the thesis:

- **Welcome Video**
- **Instruction Video**
- **Chapter 1:** Evidence Synthesis | 1.1 Groen en Geluk | 1.2 Groen en Ziekte | References

- **Chapter 2:** Evidence Synthesis | 2.1 Shinrin Yoku | Kijken naar Natuur | Luisteren naar Natuur | 2.4 Bosbaden en Geestelijke Gezondheid | 2.6 Bos en Depressiebehandeling | References
- **Mindful breaks and exercises.** These are scattered across the contents, using digital natural stimuli to bring the user into a calm and mindful state.

5.4 Requirements

After specifying the components and features of the final concept, a final set of requirements can be generated.

5.4.1 Functional Requirements

Table 5.2 depicts the final set of functional requirements.

	Functional Requirements
Must Have	• The system shows the user an overview of all topics on the navigation page • The system includes a button that allows the user to return to the home page at any point • When clicking on a topic, the correct information is displayed to the user • The system allows the user to explore individual topics non-linearly • The system contains a section with links to sources used for course content and follow-up research • The system is transferable to a non-digital version • The system must enable the user to use it without requiring additional help
Should Have	• Each topic contains an option to view additional information • The system contains meditative exercises • The system allows the user to navigate to the references page from any point • The system should be quick to access (e.g. no long (down)loading times or complicated downloading processes) • The system is available in full-screen on a laptop and accommodates for different laptop screen sizes.

Could Have	
Won't have	• Incorporated tests or questionnaires • Personalized experiences based on user's emotional state, attention spans, cognitive capacity, learning styles, or preferences • Options for social media and communication between other participants of the course

Table 5.2: Functional Requirements

5.4.2 Non-functional Requirements

Table 5.3 depicts the final set of non-functional requirements.

	Non-Functional Requirements
Must Have	• The system allows the user to understand how to use the product within 2 minutes. • Navigating the system feels natural and intuitive • The system contains natural audiovisual stimuli • The system has a professional graphic design • The system elicits feelings of calmness and/or slight positivity • Graphic elements are made using the predetermined color scheme • Images and videos of nature are realistic and of high quality • The system ensures that the user does not unintentionally lose their position in navigation • The rate at which theoretical content is displayed should not overwhelm or underwhelm the user's cognitive capacity. • The rate at which information is displayed in videos and animations should not overwhelm or underwhelm the user's cognitive capacity. • The system does not display stimuli that draws attention simultaneously with theoretical course content. • All text is easily readable

	• The system allows the user to skip over 'slow' parts, such as breaks or mindfulness intermissions. • The navigation page is an aesthetic page representing a natural environment or element
Should Have	• Upon opening the system, an explanation of how to use the program is shown. • The system offers a variety of mindful intermissions that serve as small breaks between information sections • The mindful breaks enhance interoceptive awareness (e.g. focus on breathing, muscle tension, emotion, touch, etc) • The system contains pleasing aesthetics and audio • Exercises contain fluid movement, calm shapes, and appropriate audio • The system tells the user to use it in a calm setting • The system tells the user to activate full-screen mode while using it • Components such as buttons are placed in the periphery and do not draw attention • Interactive elements should clearly be indicated to the user that they are interactive
Could Have	• The navigation page contains gentle animations • Multi-layered soundscapes that combine natural sounds, ambiance, and music • Natural images incorporate fractal elements
Won't have	• Spoken content • Compositive music • Self-recorded audio • Stimuli that engage senses beyond sight and hearing • Graphs, infographics, or diagrams explaining contents • Too many multimedia elements that may overload cognitive resources • A way for the technology through which the user interacts with the product to eliminate distractions (e.g. email, whatsapp notifications).

Table 5.3: Non-Functional Requirements

6 Realization

This section describes the realization phase of the assignment. It explains the tools that were used and what components and features were made using them. The results of the user interfaces and animations are displayed, and the final prototype design is presented. Finally, the realization phase is concluded by two preliminary user evaluations.

6.1 Tools

6.1.1 Adobe Illustrator

Using Adobe Illustrator, the individual screens that are displayed to the user are created. These screens contain the course contents, combined with natural imagery. Graphic design principles regarding elements such as spacing, margins, composition, colors, and fonts are adhered to. *Figure 6.1* is a screenshot of the middle of the creation process within the software.

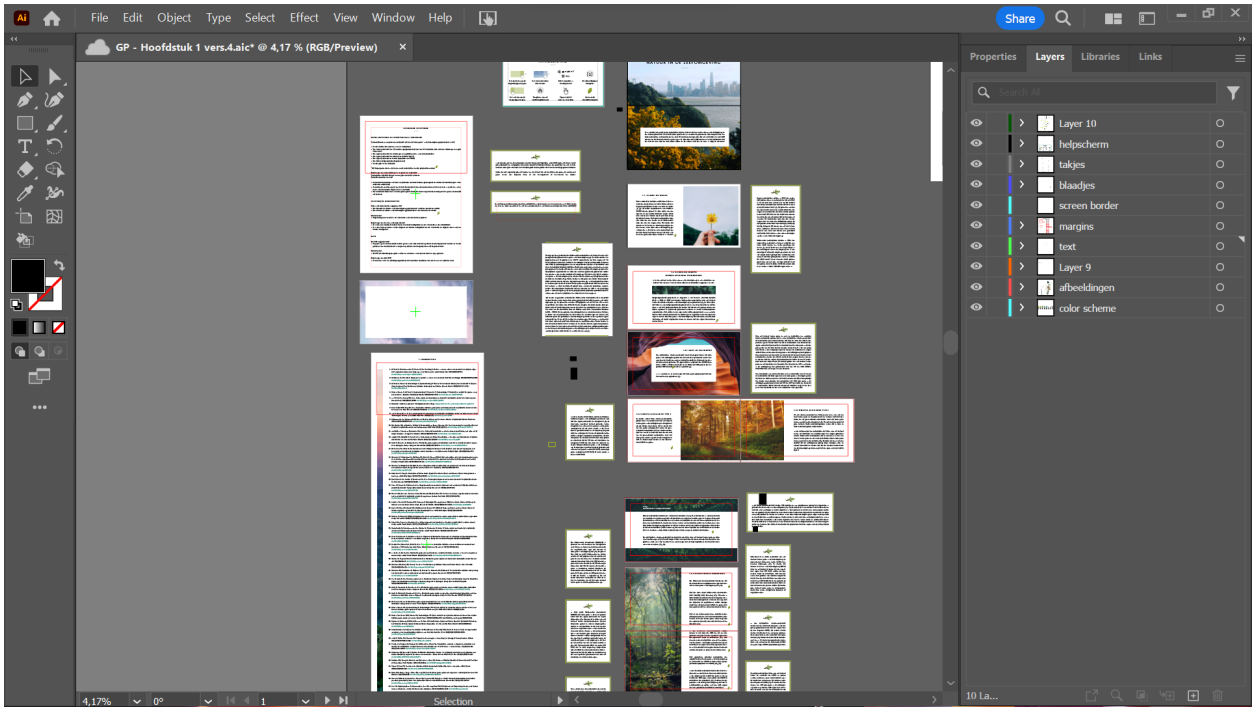


Figure 6.1: Screenshot depicting the creation process of interfaces in Adobe Illustrator

6.1.2 Adobe After Effects

In Adobe After Effects, all video content is created. The welcome page, instructions, mindful breaks and exercises are a combination of 2D animation, stock video, stock audio, and animated text. Thorough care was made to ensure that all movements were smooth and organic, by making use of the graph editor. *Figure 6.2* shows an example of the creation of an animation.

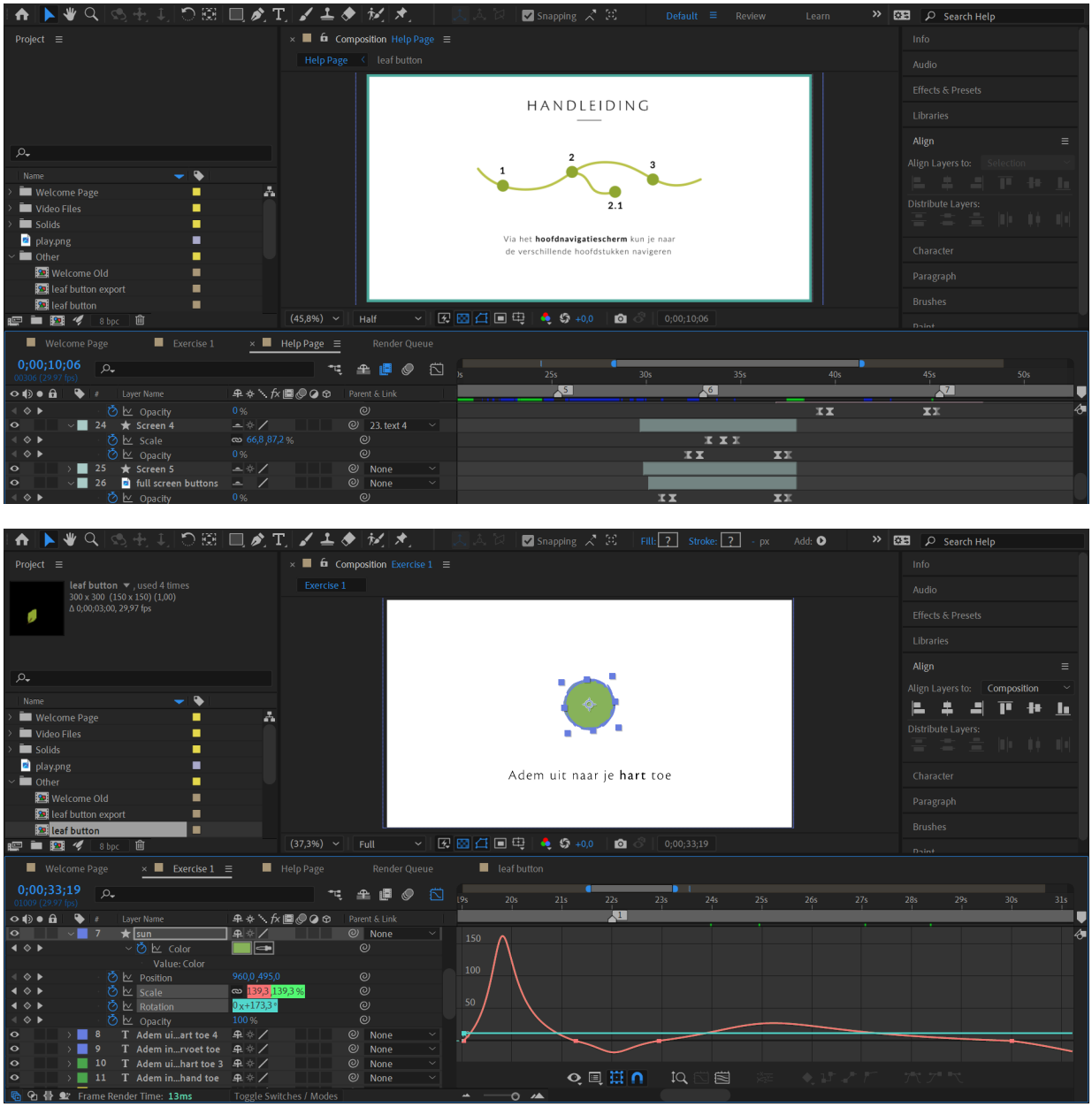


Figure 6.2: Screenshot depicting the creation process of animations in Adobe After Effects

6.1.4 Adobe XD

The separate components created in Adobe Illustrator and Adobe After Effects are combined into a functional product in Adobe XD. The choice for this software was based on the fact that it is a relatively easy-to-use, vector-based platform used for designing and prototyping. Other front-end design platforms were researched and tried out, but Adobe XD appeared to be the most powerful and provide the most creative opportunities. Back-end methods, such as programming from scratch or programming a website, were also considered to increase the amount of freedom and user interactions possible. However, the project consists of a tremendous amount of front-end design, and having to learn how to make the system work technically would be incredibly time-consuming. This reduces opportunities for elements that I find more important, such as having the time to create animations. Furthermore, using solely Adobe software speeds up workflow, as individual designs and creations can easily be transferred and edited across different software. *Figure 6.3* depicts a screenshot of Adobe XD in the middle of the realization process.

Figure 6.3: Screenshot depicting the creation process of combining user interfaces in Adobe XD

Unfortunately, throughout the realization process, it was discovered that Adobe XD has far more limitations than initially thought. Each limitation resulted in extra work as it led to having to find a workaround or other solution to achieve the intended outcome. Adobe XD's limitations are summarized below.

- The initial navigation idea was to make one long scrolling experience, as it is the most natural interaction for users to do. However, it is impossible to scroll to specific points of the page from other screens (e.g., being able to go to chapter 1.3 from the navigation page). The user can only be directed to the start of Chapter 1. Because of this, the system can never retain the user's position, and each chapter had to be split up into many screens.
- Adobe XD can't automatically redirect a user to a different section on a time basis of longer than 30 seconds.
- Initially, the navigation page was a vertical scrolling experience. Adobe XD does not support a function where users can start scrolling from the bottom to the top. Because it feels unnatural to start scrolling from top to bottom of the navigation page, and users are also not able to drag across the navigation page with the mouse, the navigation page is now a horizontal clicking experience. This issue also largely shaped the navigation style of the rest of the prototype.
- Adobe XD does not support videos/animations with a transparent background. This means that all animations (such as the leaf button) have a white background, and this needs to be accommodated. This also inhibits the possibility of adding texture to the screens, such as a paper texture, and must remain one color.
- Adobe XD will only allow videos with a maximum size of 25 MB. This means that all videos longer than roughly 10 seconds need to be rendered in lower quality. The welcome video and exercise video are especially low quality, rendered at a rate of roughly 2 bits/s.
- Adobe XD has an 'auto-animate' feature to smoothly shift between pages. However, the possibility of editing this is minimal.
- The registration of the mouse position is lagged. So, for example, if the user hovers over a button, it will take approximately one second for the hover state to activate instead of an instantaneous system reaction. This can lead to confusion for the user, as the button does not instantly react to mouse activity.
- Adobe XD only allows for images of up to 4096 x 4096 pixels. This led to the navigation pages being cut up into multiple images. This inhibited the possibility of being able to smoothly navigate between them.
- Adobe XD does not allow for audio across the whole application, and only permits audio tracks on separate screens. This makes constant background audio impossible. Having the

audio change or restart every screen is not an option, as this causes a very distracting and annoying experience. Therefore, only a select number of slides have been assigned audio.

- Audio XD cannot play multiple videos at the same time. Because of this, the main navigation page cannot contain animated buttons.
- Users cannot view the prototype completely on full screen. The prototype is shared via a web link, which causes internet toolbars and search bars to still be visible. This takes away from the immersive experience.
    - A semi-solution was found for Windows computers, which is to activate the second function of the f11 key. However, if the user brings their mouse to the top of the screen, the full-screen mode automatically disappears. Furthermore, this option is not available for Mac computers.
- Pop-up screens containing additional information have to be clicked away before any other user interaction is possible. This requires extra clicking from the user in order to use the system.
- Adobe XD does not support a 'search' function.

6.2 Media

The contents of the digital tool incorporate many royalty-free digital stock images, videos, and audio of nature. *Table 6.1* provides an overview of the sources used.

Stock Photos	**Stock Video**	**Stock Audio**
Unsplash.com	Pexels.com	Uppbeat.io
Pexels.com	Istockphoto.com	Mixkit.co
Burst.shopify.com		

Table 6.1: Sources used for stock photos and videos

6.3 User Interface

This section describes the components that make up the user interface. These consist of the main navigation screen, topic screens containing images, video, and additional pop-up overlay screens, interactive components, and animations to connect the screens.

6.3.1 Screens

Below, an overview of all screens made for the prototype is shown. These consist of the welcome screen, help screen, chapter 1 and 2 screens, references screens, and mindful break screens.

6.3.1.1 Welcome Screen

When the user opens the program, they are shown a one-minute 'welcome' animation. It contains a video of a forest including natural sounds. Text appears that welcomes the user, explains what the digital tool is, and what the tool contains. *Figure 6.4* contains screenshots of the welcome video.

Figure 6.4: Screenshots of the welcome video

6.3.1.2 Help Screen

After the welcome animation ends, a one-minute explanation video is presented to the user. It explains to the user how to navigate, how to enter full-screen mode, how to return to the home page, how to view references, and how to view additional information. *Figure 6.5* is a screenshot of the help animation and help screen.

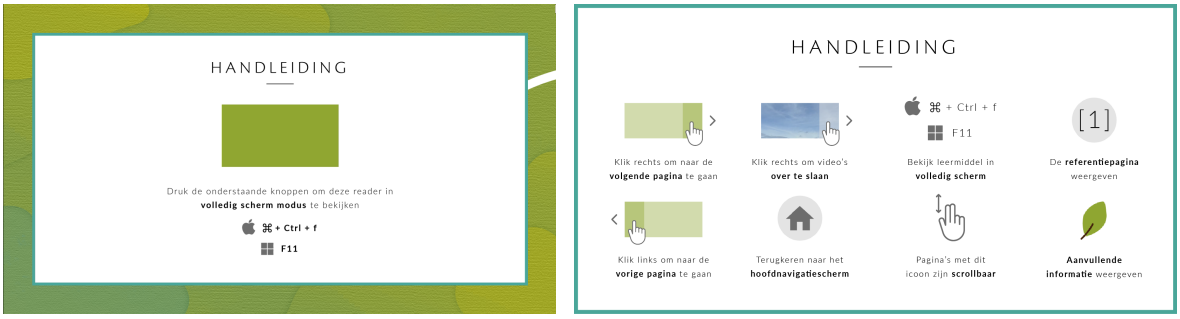


Figure 6.5: Screenshot of help animation and help guide

6.3.1.3 Navigation Page

The flowchart depicted in *Figure 5.5* has been converted into an aesthetic path that the user can navigate. Ideas such as paths along a plant, a river, and a forest path were experimented with. *Figure 6.6* shows the process of creating this image.

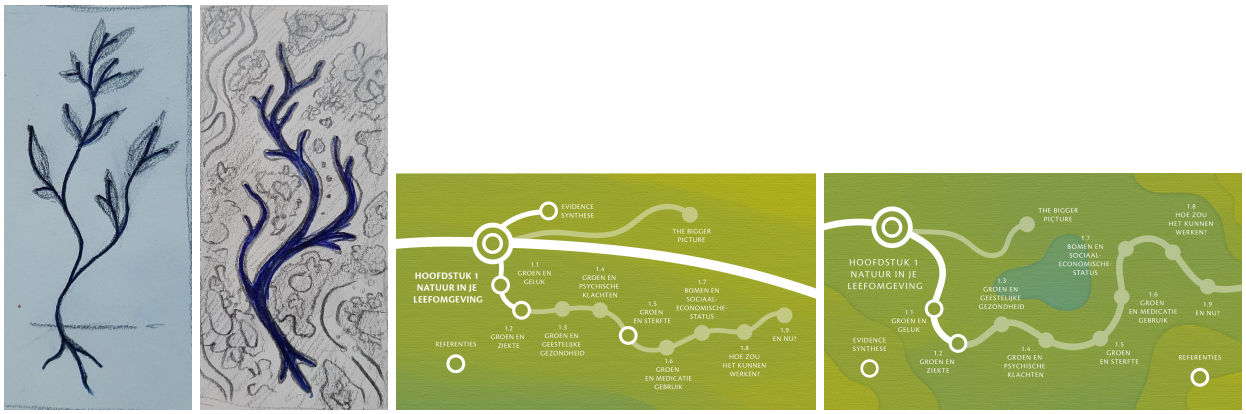


Figure 6.6: Process of creating the home navigation image

From the navigation page, users can access all topics in a non-linear fashion. The main path through the forest represents the main topics, which the user is automatically directed along as they click through the screens. The paths that branch off from the main path contain side topics, that the user can click on if they want to gain more elaborate knowledge on a certain topic. Areas on the map that are clickable are indicated to the user through a hover effect. Finally, there are separate spots on the map that don't have a specific chronological place within the contents, such as the reference pages and the evidence syntheses. *Figure 6.7* shows the navigation pages.

Figure 6.7: Navigation Pages containing an overview of topics

6.3.1.4 Chapter 1 Screens

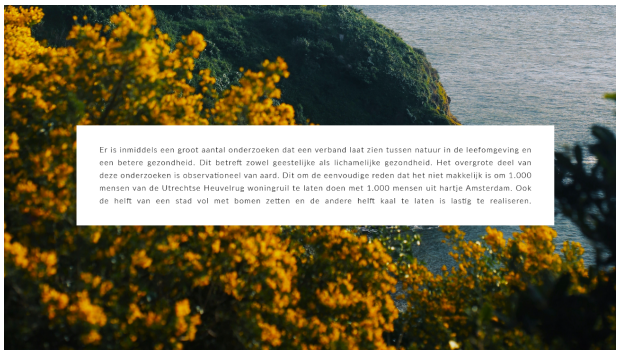
Figure 6.8 provides an overview of all screens created for Chapter 1. Note that a large amount of information is hidden, due to the additional information feature explained in Chapter 6.3.1.6.

HOOFDSTUK 01

NATUUR IN DE LEEFOMGEVING

1.1 GROEN EN GELUK

Zoals niemand zal verbazen, heeft waar je bent invloed op hoe gelukkig je je voelt. Nederlandse en Engelse onderzoekers wilden hier meer van weten [1] [2]. Ze wisten respectievelijk ruim 4.000 en 20.000 mensen gebruik te laten maken van een app die hen op random momenten vragen steilde over hoe ze zich voelden op de plek waar ze op dat moment waren. De Engelse onderzoekers oogsten meer dan een miljoen en de Nederlanders meer dan een ton vragenlijsten. Ze vonden dat mensen als ze buiten zijn sowieso gelukkiger zijn dan binnen, in een meer natuurlijke omgeving gelukkiger dan in de stad en het allergelukkigst aan de kust. Na de kust voelen we ons het best in de buurt van graslanden (zoals heide) en in het bos.



Er is inmiddels een groot aantal onderzoeken dat een verband laat zien tussen natuur in de leefomgeving en een betere gezondheid. Dit betreft zowel geestelijke als lichamelijke gezondheid. Het overgrote deel van deze onderzoeken is observationeel van aard. Dit om de eenvoudige reden dat het niet makkelijk is om 1.000 mensen van de Utrechtse Heuvelrug woningruil te laten doen met 1.000 mensen uit hartje Amsterdam. Ook de helft van een stad vol met bomen zetten en de andere helft kaal te laten is lastig te realiseren.

1.2 GROEN EN ZIEKTE
OBSERVATIONEEL ONDERZOEK

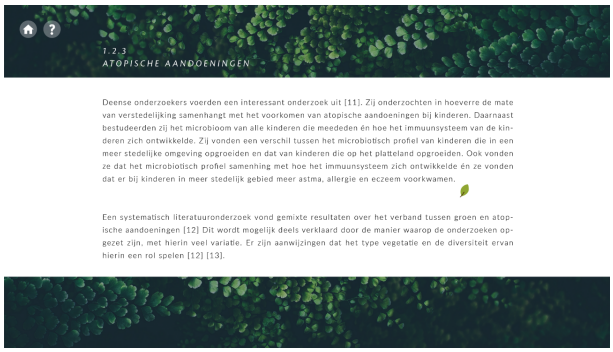
Is er een verband tussen meer natuur in de leefomgeving en het voorkomen van ziekten? Een aanzienlijk aantal observationele onderzoeken suggereert van wel.

Zelfgerapporteerde gezondheid en diagnoses in het Huisarts Informatie Systeem (HIS). In 2003 en 2009 publiceerden Nederlandse onderzoekers over het verband tussen de hoeveelheid groen in de woonomgeving en gezondheid [3] [4]. Meer specifiek keken zij naar zelfgerapporteerde gezondheid en naar de prevalentie van ziekten zoals in het HIS gedocumenteerd. Ze vonden dat mensen die groener wonen een betere algemene en geestelijke gezondheid ervoeren en minder ziektesymptomen rapporteerden. Ook hadden zij een lager aantal ziekten geregistreerd in hun huisartsdossier. Met name de prevalentie van stemmings- en angststoornissen was opvallend lager bij mensen met meer groen in de woonomgeving. Wat ook opviel, was dat deze verbanden het meest uitgesproken waren bij mensen met een lagere sociaaleconomische status.

1.2.1 HART- EN VAATZIEKTEN

Een systematisch literatuuronderzoek vond overtuigend bewijs dat meer groen in de leefomgeving zowel een kleinere kans op beroerte als een kleinere kans op sterfte aan hart- en vaatziekten geeft [5]. Uitgaande van de in de meta-analyse gevonden 2% lagere odds en uitgaande van 40.000 beroertes in 2021 in Nederland, zouden er als Nederland 10% groener zou zijn geweest 800 beroertes minder zijn geweest [6].

In lijn hiermee zijn er aanwijzingen dat meer groen gepaard gaat met een kleinere kans op hypertensie [7].



1.2.3 ATOPISCHE AANDOENINGEN

Deense onderzoekers voerden een interessant onderzoek uit [11]. Zij onderzochten in hoeverre de mate van verstedelijking samenhangt met het voorkomen van atopische aandoeningen bij kinderen. Daarnaast bestudeerden zij het microbioom van alle kinderen die meededen én hoe het immuunsysteem van de kinderen zich ontwikkelde. Zij vonden een verschil tussen het microbiotisch profiel van kinderen die in een meer stedelijke omgeving opgroeiden en dat van kinderen die op het platteland opgroeiden. Ook vonden ze dat het microbiotisch profiel samenhing met hoe het immuunsysteem zich ontwikkelde én ze vonden dat er bij kinderen in meer stedelijk gebied meer astma, allergie en eczeem voorkwamen.

Een systematisch literatuuronderzoek vond gemixte resultaten over het verband tussen groen en atopische aandoeningen [12] Dit wordt mogelijk deels verklaard door de manier waarop de onderzoeken opgezet zijn, met hierin veel variatie. Er zijn aanwijzingen dat het type vegetatie en de diversiteit ervan hierin een rol spelen [12] [13].

1.2.2 OBESITAS EN DIABETES TYPE 2

Er werden recent twee literatuuronderzoeken gedaan waarin er aandacht was voor het verband tussen groen in de leefomgeving en overgewicht [8] [9]. Beiden concluderen dat er sprake was van een grote heterogeniteit tussen de geïncludeerde onderzoeken. Uit het literatuuronderzoek van Luo et al. bleek dat meer dan de helft van de geïncludeerde onderzoeken vond dat meer groen samenhing met minder overgewicht. Ook bij meta-analyse vonden zij een beschermend effect van groen.

1.2.2 OBESITAS EN DIABETES TYPE 2

Uit het literatuuronderzoek van Fyfe-Johnson et al. naar het verband tussen groen en de gezondheid van kinderen bleek dat eenderde van de geïncludeerde onderzoeken vond dat meer groen samenhing met minder overgewicht [9]. De rest vond een gemixt of geen verband. Beide onderzoeksgroepen vinden dat er meer en beter onderzoek gedaan moet worden.

In een meta-analyse van onderzoeken die keken naar het verband tussen het vóórkomen van diabetes type 2 en omgevingsfactoren vonden Nederlandse onderzoekers dat er waarschijnlijk een verband is tussen groen en het risico op diabetes, waarbij meer groen samenhangt met minder diabetes [10]. Ze deden dit vanuit het perspectief dat de leefomgeving gedrag (zoals bewegen, eten en slapen) beïnvloedt en vonden ook dat de 'wandelvriendelijkheid' van de woonomgeving samenhangt met een lager risico op diabetes type 2.

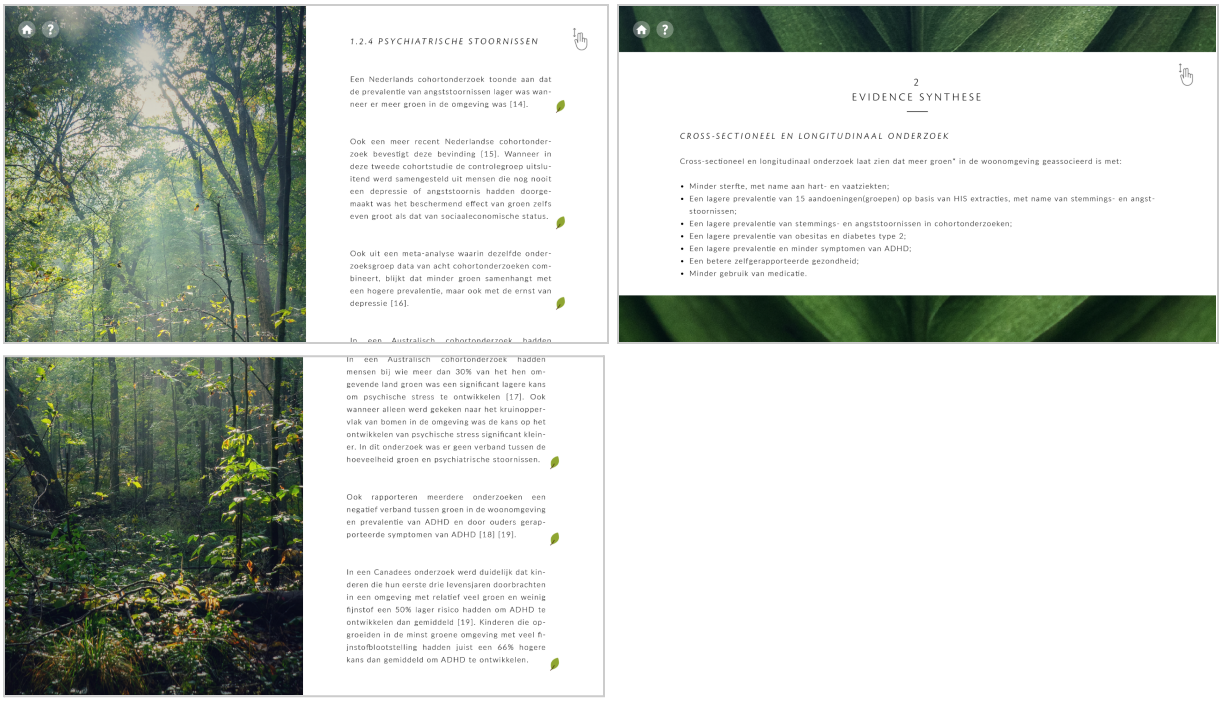
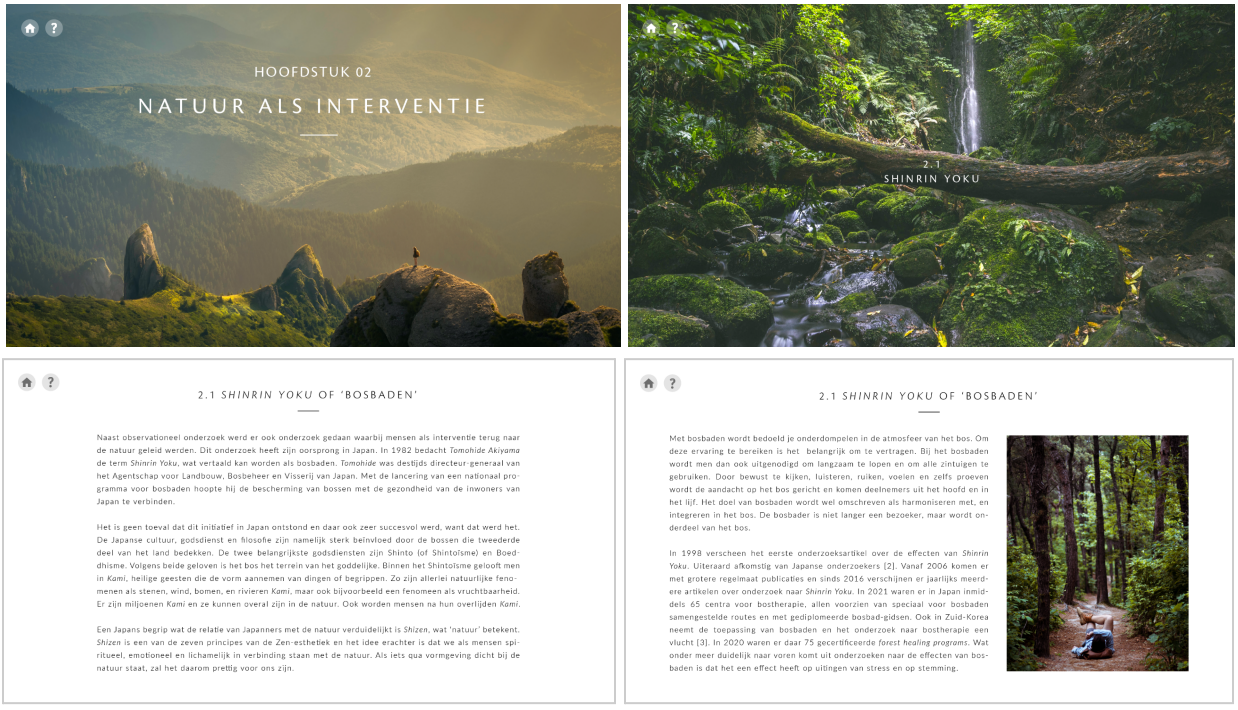


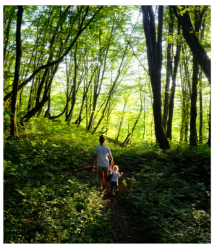
Figure 6.8: Overview of all screens for Chapter 1

6.3.1.5 Chapter 2 Screens

Figure 6.9 provides an overview of all screens created for Chapter 2.

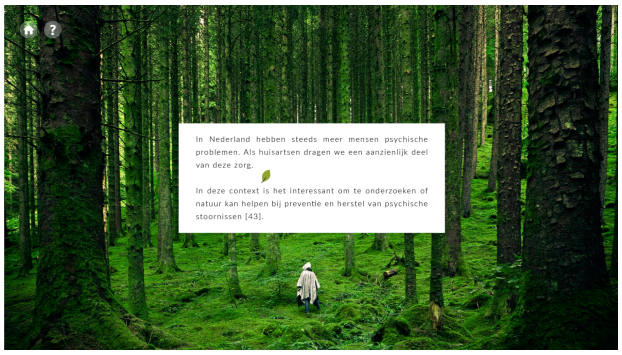


2.6 BOS ONDERSTEUNT DEPRESSIEBEHANDELING



Hoe het bos zou kunnen bijdragen aan herstel moet verder onderzocht worden. Er zijn echter aanwijzingen dat een dag wandelen in het bos gepaard gaat met voor de stemming gunstige hormonale veranderingen. In Japans onderzoek vond men dat de serotoninespiegels van gezonde mannelijke proefpersonen na een ochtend- en een middagwandeling in het bos significant hoger (gemiddeld 11%) waren dan ervoor [50]. Na een ochtend- en middagwandeling in de stad vond men een lichte niet significante stijging. De serotoninestijging die het gevolg was van de boswandelingen was significant groter dan de serotoninestijging door de stadswandelingen.

Ook tuinieren is onderzocht als ondersteunende acitiviteit voor mensen met psychische klachten. Een recent literatuuronderzoek laat zien dat therapeutisch tuinieren depressieve klachten bij ouderen (verschillende patiëntengroepen) vermindert en dus mogelijk zinvol kan zijn ter ondersteuning van een stemmingsbehandeling [51]. Bij veteranen met suïcide ideaties en/of een tentamen suïcide in de voorgeschiedenis bleek tuintherapie een gunstig effect te hebben op stress, pijn, stemming en eenzaamheid [52]. Deze effecten hielden 2-4 weken aan na de therapie.



In Nederland hebben steeds meer mensen psychische problemen. Als huisartsen dragen we een aanzienlijk deel van deze zorg.

In deze context is het interessant om te onderzoeken of natuur kan helpen bij preventie en herstel van psychische stoornissen [43].

2.6 BOS ONDERSTEUNT DEPRESSIEBEHANDELING

Waar medicatie alleen in het geval van angststoornissen soms goed kan helpen, is er bij depressie vaak ook psychotherapie nodig. Kim et al. onderzochten of het effect van cognitieve gedragstherapie (CGT) voor depressie beïnvloed werd door de setting waarin de therapie werd gegeven. Ze vergeleken CGT in het bos met CGT in het ziekenhuis en met een controlegroep die gebruikelijke poliklinische zorg onderging [45]. In de bosgroep werden het bos en de bomen betrokken in de therapie. Zij includeerden mensen met een ernstige depressie die ook medicamenteus behandeld werden.

Naast afname van depressievragenlijsten werden cortisol en hartritmevariabiliteit gemeten. Zij vonden dat de mensen die de CGT in het bos ondergingen een sterkere afname vertoonden van depressie symptomen. Van de mensen die CGT in het bos ondergingen kwam 61% in remissie, van de mensen die CGT kregen in het ziekenhuis 21% en van de controlegroep 5%.

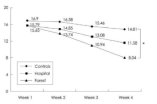


Figure 1

The change of HRSD scores in forest group, hospital group, and controls during 4 week program. The repeated measure ANOVA showed a significant time effect (F=43.16, p<0.001) and

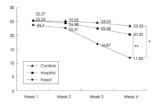
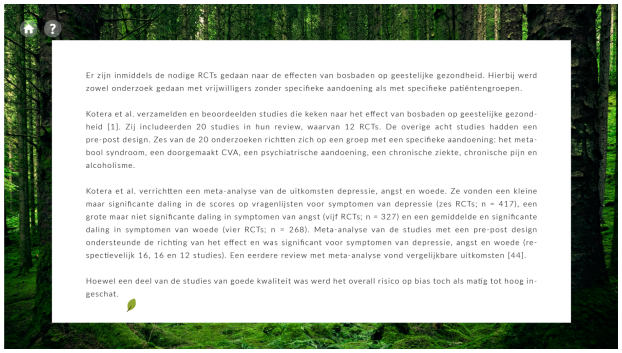


Figure 2

The change of MADRS scores in forest group, hospital group, and controls during 4 week program. The repeated measure ANOVA showed a significant time effect (F=43.25, p<0.001) and a

Tot slot vonden Kim et al. dat de bosgroep gunstige resultaten liet zien op het gebied van hartritmevariabiliteit, hartfrequentie en cortisol, hetgeen zij in verband brengen met een beter gebalanceerd zenuwstelsel en minder stress.



Er zijn inmiddels de nodige RCTs gedaan naar de effecten van bosbaden op geestelijke gezondheid. Hierbij werd zowel onderzoek gedaan met vrijwilligers zonder specifieke aandoening als met specifieke patiëntengroepen.

Kotera et al. verzamelden en beoordeelden studies die keken naar het effect van bosbaden op geestelijke gezondheid [1]. Zij includeerden 20 studies in hun review, waarvan 12 RCTs. De overige acht studies hadden een pre-post design. Zes van de 20 onderzoeken richtten zich op een groep met een specifieke aandoening: het metabool syndroom, een doorgemaakt CVA, een psychiatrische aandoening, een chronische ziekte, chronische pijn en alcoholisme.

Kotera et al. verrichtten een meta-analyse van de uitkomsten depressie, angst en woede. Ze vonden een kleine maar significante daling in de scores op vragenlijsten voor symptomen van depressie (zes RCTs; n = 417), een grote maar niet significante daling in symptomen van angst (vijf RCTs; n = 327) en een gemiddelde en significante daling in symptomen van woede (vier RCTs; n = 268). Meta-analyse van de studies met een pre-post design ondersteunde de richting van het effect en was significant voor symptomen van depressie, angst en woede (respectievelijk 16, 16 en 12 studies). Een eerdere review met meta-analyse vond vergelijkbare uitkomsten [44].

Hoewel een deel van de studies van goede kwaliteit was werd het overall risico op bias toch als matig tot hoog ingeschat.

EVIDENCE SYNTHESE

Onderzoek naar natuur als interventie is relatief jong en kenmerkt zich door een grote mate van heterogeniteit.

KLINISCH ONDERZOEK

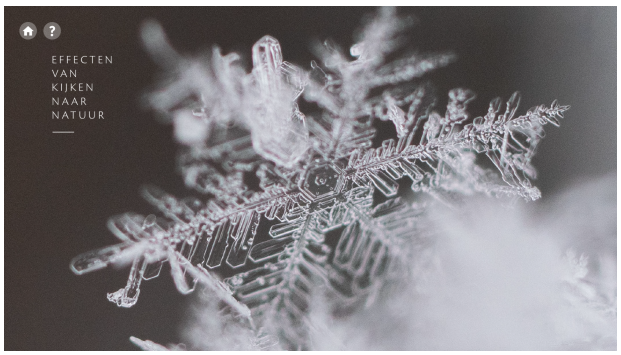
Klinisch onderzoek (RCTs) suggereert dat diverse natuurinterventies zowel bij gezonde deelnemers als bij mensen met een specifieke aandoening op korte termijn een gunstig effect hebben op stemming en gevoelens van woede. Er is nog nauwelijks onderzoek gedaan naar lange termijn effecten van dit soort interventies.

Beperkingen van genoemde RCTs:
Ondanks dat er ook onderzoeken van goede kwaliteit zijn, werd het overall risico op bias als matig tot hoog beoordeeld [1].

PRE-POST DESIGN

Onderzoeken met een pre-post design bevestigen de in RCTs gevonden effecten op stemming en woede en suggereren daarnaast een gunstig effect op angst.

- Beperkingen van de onderzoeken met een pre-post design:
- Geen onderzoek gedaan naar representativiteit van de steekproef (8/8)
- Geen non-interventie cohort (6/8)
- Geen of korte follow-up (8/8)



EFFECTEN VAN KIJKEN NAAR DE NATUUR

Misschien heb je weleens gemerkt dat kijken naar wolken of boomkruinen een ontspannend effect heeft? Dit heeft te maken met de kleuren en vormen die rustgevend zijn voor ons brein.

In de jaren '60 van de vorige eeuw ontdekte een Pools wiskundige (Benoit Mandelbrot) dat een bepaalde structuur in de natuur overvloedig aanwezig is. Hij raakte zeer gefascineerd door dit fenomeen en besteedde vele jaren aan het bestuderen van wat hij *Fractals* noemde. Een fractal is dus een wiskundige benadering van een in de natuur veel voorkomende structuur. Een fractal bestaat uit vormen, die opgebouwd zijn uit delen die weer lijken op de eerdere vorm, die weer opgebouwd zijn uit delen die lijken op de eerdere vorm, en zo verder. Enkele voorbeelden zijn varenbladen, de vertakkingen van bomen, het vaatbed van mensen en dieren. sneeuwvlokken, wolken en bliksemschichten.

Effect van fractalen op mensen

Het effect van Fractals op mensen is uitgebreid onderzocht. Er is overtuigend aangetoond dat fractals stressverlagend werken en helpen het concentratievermogen te herstellen [8].

Hägerhäll, een Zweedse omgevingspsycholoog, vond in 2008 significante verschillen in hersenactiviteit (EEG) wanneer hij proefpersonen liet kijken naar fractals die verschilden qua complexiteit [9]. Fractale patronen met een gemiddelde complexiteit (fractale dimensie D = 1.32) gaven de grootste activiteit van alpha golven in de frontale cortex. Alpha golven worden gezien bij een ontspannen alerte staat van zijn, waarbij de aandacht naar binnen gericht is. Later toonde Hägerhäll nog aan dat fractalen zoals die in de natuur aangetroffen worden een groter effect hebben op alphagolven dan niet natuurlijke fractalen [6].

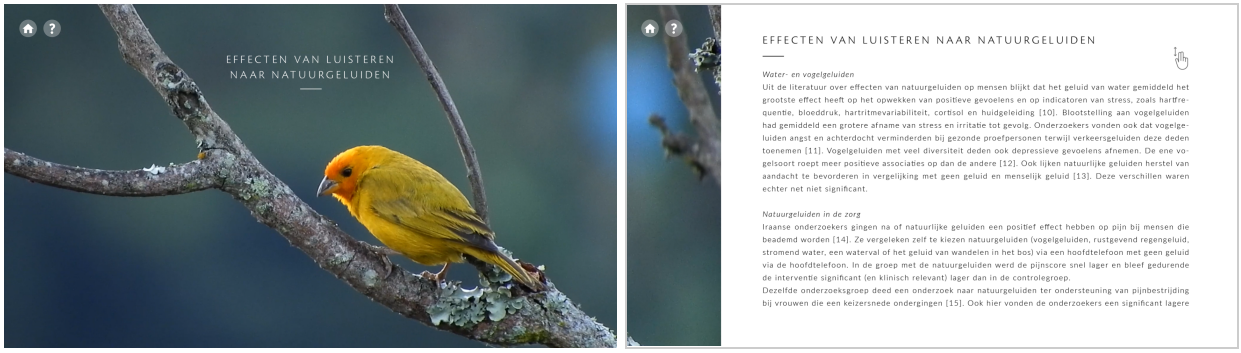


Figure 6.9: Overview of all screens for Chapter 2

6.3.1.6 Additional Information Screens

All topics in the contents are organized in such a way that the user is first exposed to the general concept, and can then opt to delve deeper into additional information on the topic. This is to prevent too much information from being displayed on a page at once, adhering to the guidelines related to cognitive load. When the user hovers over one of the small leaf buttons, the leaves turn into a small branch, signaling a metaphor for more content. When the user clicks on the button, an overlay screen pops up on the screen, containing additional information. Most pages contain at least one leaf button. *Figure 6.10* depicts screenshots of two examples where the button can be used.

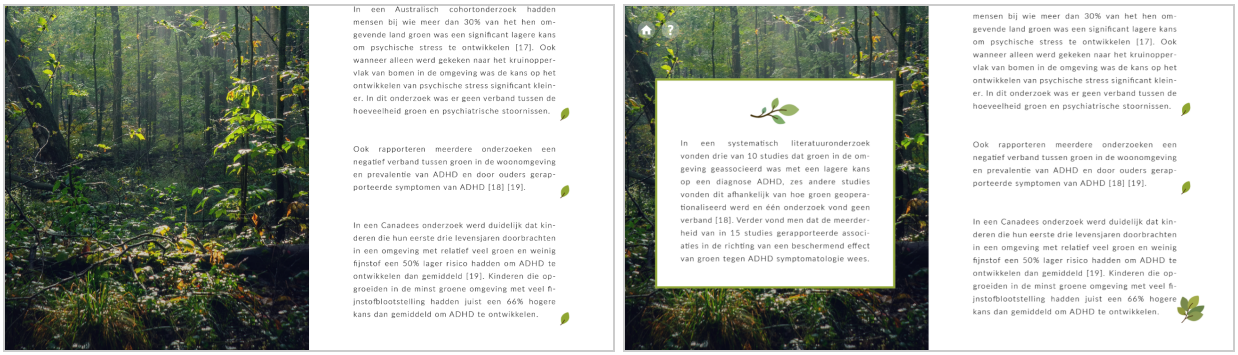


Figure 6.10: Screenshot of two examples of additional information options

6.3.1.7 References Screen

The reference screen contains all references used to create the contents of the course. The reference screen is available to the user at any point, as they are directed to it when they click on an in-text reference. From the reference page, the user can easily navigate to the original web sources by clicking on the URLs. *Figure 6.11* contains screenshots of the reference pages of chapters 1 and 2.

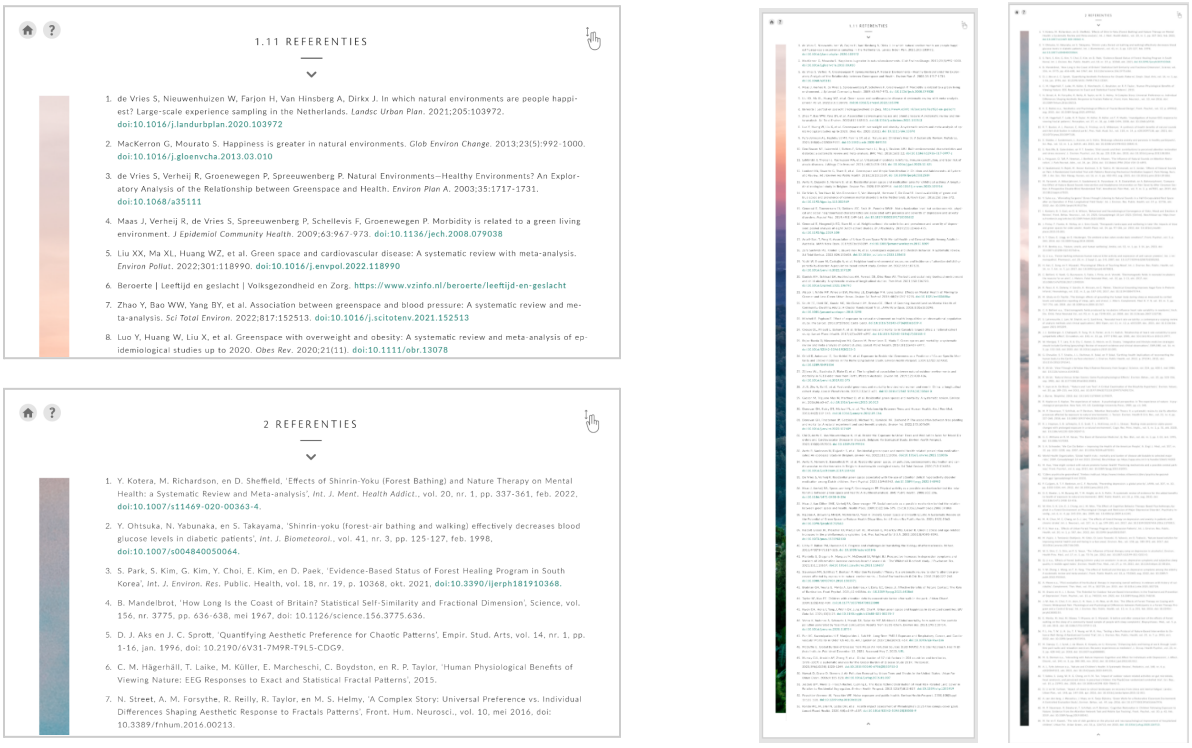


Figure 6.11: Screenshot of references pages

6.3.1.8 Mindfulness Intermissions

Figure 6.12 provides an overview of the mindful breaks scattered around the contents of the tool. Chapter 2 contains a breathing exercise. The user's breathing is guided by a smoothly animated circle using the 5-second-in-5-second-out rule.

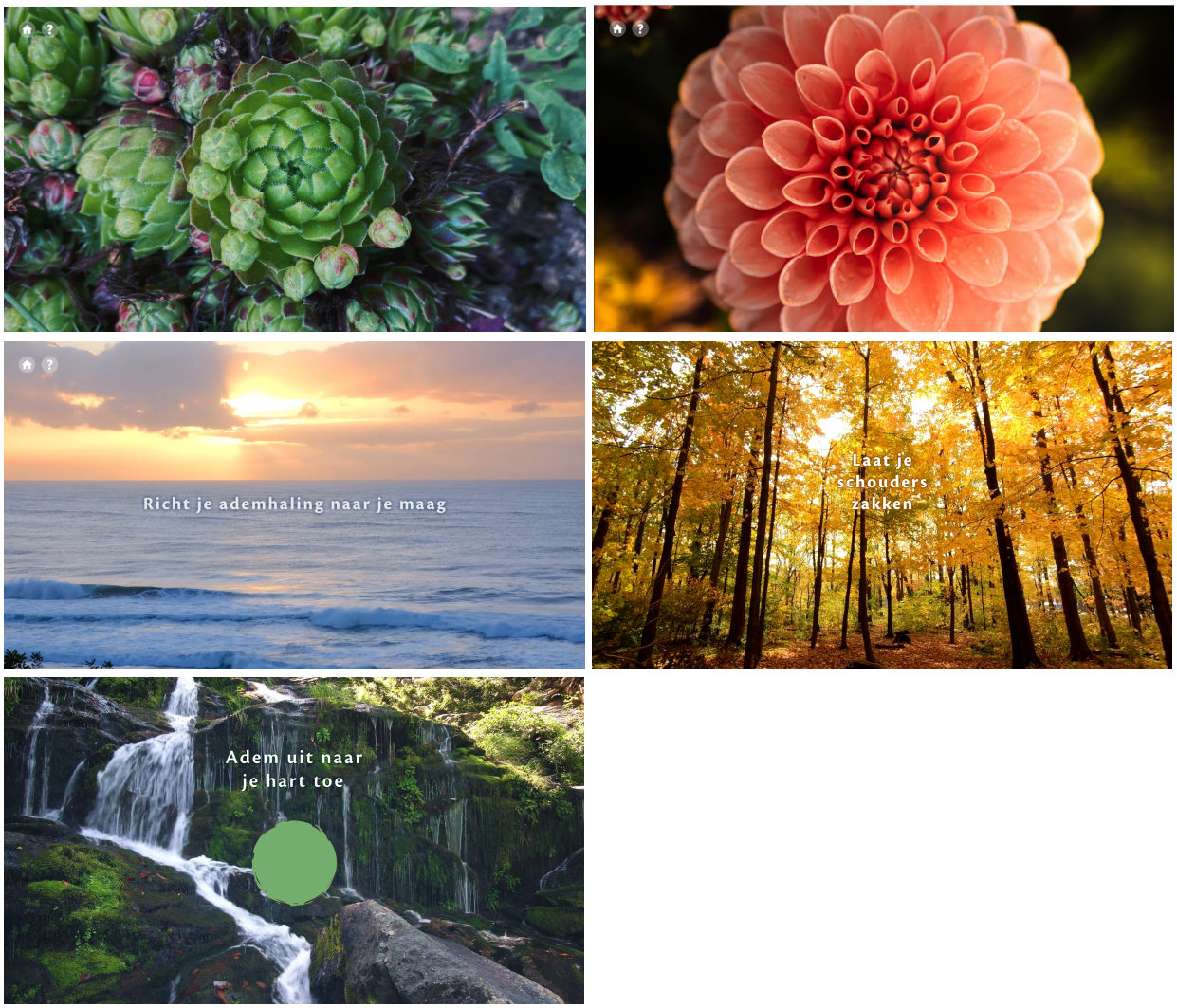


Figure 6.12: Overview of mindful breaks spread across contents

6.3.3 Navigation Flow

To achieve smooth transitions between artboards, animations were included in every user interaction. When users click to navigate to different topics, the respective screen is displayed using a smooth and slow 'ease-in, ease-out' animation. *Figure 6.13* depicts the user navigation flow

across all artboards. The lines represent overlay screens (dashed lines), connections between screens (solid lines), and interactive elements (dots).

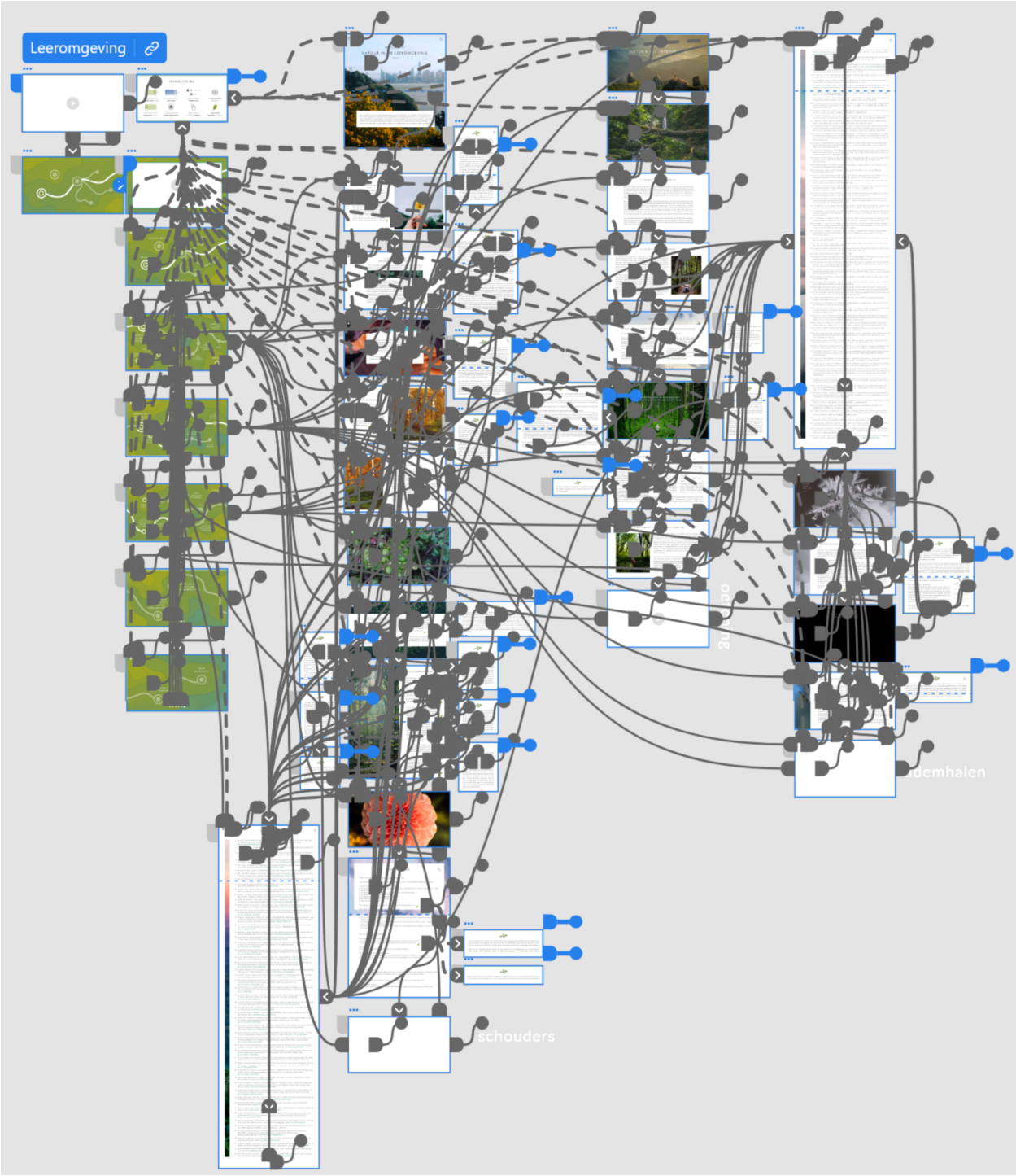


Figure 6.13: Navigation flow between screens

6.4 Preliminary User Evaluations

Prior to the official evaluation phase of the project, a preliminary user test was performed to assess the usability of the early prototype.

6.4.1 Method

Because the focus of this preliminary test was to test the core functional requirements of the prototype, it was not crucial at this point to use general practitioners as participants. Instead, two participants were found that closely resembled the target audience; they are Dutch, come from an academic background, make daily (but not overly technical) use of computers, and are within the age range of 40-50 years. The preliminary evaluations consisted of an interaction session with the prototype of roughly 15 minutes, followed by a semi-structured interview of approximately 20 minutes. During the interaction session, observations of facial expressions, body language, and commentary were recorded. The full notes containing the recorded observations and summary of the interviews can be found in Appendix Item 6. Below is a summary of the results.

6.4.2 Preliminary User Test 1

6.4.2.1 Results

Program Start

The web-link in combination with a password worked very well. After the participant was given the link, they had access to the program in a matter of seconds. The program took roughly 5-7 seconds to load, due to the long animation having to be downloaded over the internet. Furthermore, sometimes animations between screens weren't very smooth, which may be caused by an inadequate internet connection. Therefore, in order to make easy use of the program, the user needs to be connected to a stable internet connection. It may also be desirable to create an aesthetic loading screen, if possible.

Navigation

For the participant, it was not clear that they had to click on the screen after the welcome animation ended. Additionally, the participant did not understand that they could click on the buttons at the bottom of the screen to move around the navigation page. They mentioned that they did not realize the small circles were clickable, and would have preferred a big arrow indicating there is another page to go to. In the mindfulness intermission of Chapter 1.2, the participant tried to skip the video by clicking on the screen, instead of clicking on the home page button. Better instructions or animated buttons should be incorporated to help the user understand how to navigate.

A lot of confusion was generated due to scrolling and clicking inconsistencies. The participant's first instinct was to scroll instead of click. On some pages, the participant can scroll, such as the reference page, while others should be clicked. The participant mentioned that it's confusing to switch back and forth. For example, if they can't scroll on one page, they won't try to scroll to a different page where it might be possible. Notably, the scroll bar on scrollable pages disappears when the program is exported. Additionally, by clicking and having the slides be pushed up from the bottom, the participant stated that it felt like an unnatural experience. They further mentioned that having the screens come in from the right would feel more natural, as it then feels like they're flipping through a digital book. Lastly, the participant mentioned it may help to have multiple modes of navigation (e.g., scrolling, dragging, clicking, keyboard arrows). This way, regardless of what the user tries first, it works. Additionally, it is possible to accommodate all possible navigation methods that users are used to, creating a more personalized experience.

Usage

The participant did not click on the help button before trying to navigate. They mentioned they noticed the button, but decided beforehand it was probably not helpful and therefore purposefully did not click on it. Contrastingly, the participant enthusiastically clicked on the leaf button, while indicating verbally that they recognized it from the instruction in the welcome animation. It was also noted that it is not possible to perform another user interaction directly when having an 'additional information' page open. They have to be clicked away first, creating a lot of extra actions for the user to make use of the program.

Furthermore, the program does not open in full screen automatically but stays within the page of the internet browser. When the program is not in full screen and the internet taskbar is visible, the entire program becomes smaller. Then, white side margins are placed at the sides, and because the background of the program is also white, the area that is scrollable for the user becomes unclear. Furthermore, when the user brings the mouse to the top border of the screen, the fullscreen mode automatically deactivates. This could happen often when bringing the mouse to the home, help, and previous page buttons located at the top of the screen.

Aesthetics

Overall, the participant enjoyed the graphic design, although they mentioned that the whiteness of empty pages was a bit intense at times.

6.4.2.2 Implemented Improvements

Many improvements were implemented after the first preliminary user test.

- A different navigation method was implemented. Instead of the next screen being pushed up, creating an unnatural 'half-scrolling' experience, the next screen now appears by sliding in from the right, or by dissolving into view. This creates more of a 'digital reader' experience.
- The welcome animation now includes that the user should 1) have a stable internet connection and 2) press f11 to enter full-screen mode. The latter is important in order to get a more immersive experience.
- After the welcome animation ends, an animated mouse is shown clicking on the right side of the screen. This helps the user move to the next segment.
- An animated help page was created, that is shown to the user after the welcome screen. It contains instructions for how to navigate, how to view references, how to return to the home screen, how to enter full-page mode, and how to view additional information.
- Some pages are necessary to be scrollable, as opposed to being split up into different pages, for a better reading experience. These pages were given a 'scroll' icon, indicating to the user that these pages are scrollable.
- A solution was attempted to be found for having to click the additional information screen away first before engaging in another user interaction, but unfortunately, this is not

possible without leaving the additional information in view, and potentially obscuring the primary information.

- Different neutral background colors were experimented with, to find a solution for the 'intenseness' of the white background. However, it resulted in the pages looking a lot less aesthetic.
- The navigation screen was edited to indicate which chapter sections are viewable, and which are still inaccessible.
- Responsive resizing was incorporated into the prototype.
- A very thin line to mark the borders of the program was incorporated, which is only visible when the program is not in full screen.

6.4.3 Preliminary User Test 2

6.4.3.1 Results

Program Start

Upon opening the program, the participant was shown a popup that read: 'Press escape to exit full-screen mode'. However, this is quite confusing because the program is not completely full-screen (the internet search bar and tabs are still visible). Furthermore, when the participant presses escape, they are redirected to an overview of all screens in a grid view. This should not be allowed to happen.

Navigation

The scrolling icon and new navigation mode incorporated after the first preliminary user test seemed to work effectively. There was no confusion about how to navigate.

The appearance of the help animation takes slightly too long. There is a danger of the user clicking on the screen while it loads, and therefore unintentionally skipping the animation. Starting from the navigation screen, the participant clicked on Chapter 1.1 instead of the start of Chapter 1. They mentioned that it didn't look like they were able to click on the Chapter 1 button.

The participant mentioned that the contents page displaying the different topics in Chapter 1 is aesthetic and useful but is redundant when combined with the main navigation page. They also mentioned that it would be useful to know when it is actually possible to navigate left and right. E.g., on navigation page 1, you can only go right, but on navigation page 2, you can go left *and* right.

The participant mentioned it would make more sense to go from chapter 1.1 to chapter 1.2, not direct the user back to the navigation page after pressing 'next' on chapter 1.1. The participant mentioned it could be useful to have very small text at the bottom of the screen indicating the contents of the next page. E.g., Place a very small text in the bottom right of Chapter 1.1.1 that reads: 'Next: Chapter 1.1.2'

Usage

The registration of the mouse hovering over a button is a bit too slow. While it registered and the participant clicked, nothing would happen. This would be confusing and indicate to the participant that what they were clicking on was apparently not a button. Also, the hyperlinks in the reference page should look clickable by, for example, underlining them.

Aesthetics

The participant's screen is larger than the screen of the developer and Participant 1. This allowed for the testing of the responsive resize feature, which worked well. The mindfulness intermission video in Chapter 1.2 was too pixelated to be aesthetically pleasing. This may be due to the participant's screen being larger and the video not having an appropriate resolution to be scaled up. On some pages where text was placed directly on top of an image, the participant felt that the text box could be slightly better integrated into the background image.

Adaptability

As a test, the developer made changes to the program's software. When the participant refreshed the prototype on their laptop, the program was automatically updated. This indicates that the developer does not need to send users new links to the program every time changes are made, and the changes are updated for users automatically without them having to do anything.

6.4.3.2 Implemented Improvements

- Research on how to disable the user from entering the grid view of the pages was performed. However, it is impossible to fix this issue at this point in time. The only solution is to export the entire prototype to an offline file or to HTML documents using other software.
- The appearance of the instructions animation was sped up
- The buttons on the navigation page now look more clickable.
- The contents page of Chapter 1 was removed.
- Downward scrolling and missing scroll icon on chapter 1 were fixed
- The user now navigates from chapter 1.1 to chapter 1.2, instead of being redirected to the navigation page.
- Full-screen instructions on the welcome page were edited
- Hyperlinks in the references page were edited to look more clickable
- Fixed pixelation of mindfulness intermission video in chapter 1.2
- Better integration of texts overlayed on images
- The hyperlinks in the references page now look more 'clickable'

7 Evaluation

This report section discusses the method and results from the evaluation phase. It includes a functional requirements test, user evaluations with an iteration of the prototype, and a non-functional requirements test. These evaluations provide insights into the system's usability and user experience, and its fulfillment of both functional and non-functional requirements.

7.2 Functional Requirements Test

In this section, the functional requirements of the prototype are assessed by the researcher. The degree of fulfillment is classified into none/half/almost/full categories. *Table 7.1* displays all functional requirements, with an indication as to whether the requirement was fulfilled.

Functional Requirements	Fulfilled
Must Have	
The system shows the user an overview of all topics on the navigation page	Full
The system includes a button that allows the user to return to the home page at any point	Full
When clicking on a topic, the correct information is displayed to the user	Full
The system allows the user to explore individual topics non-linearly	Full
The system contains a section with links to sources used for course content and follow-up research	Full
The system is transferable to a non-digital version	Full
The system must enable the user to use it without requiring additional help	Half
Should Have	
Each topic contains an option to view additional information	Full
The system contains meditative exercises	Full
The system allows the user to navigate to the references page from any point	Full
The system should be quick to access (e.g. no long loading times or complicated downloading processes)	Half
The system is available in full-screen on a laptop and accommodates for different laptop screen sizes.	Full
Could Have	
-	-

Table 7.1: Functional requirements and degree of their fulfillment

Most functional requirements have been fulfilled, indicating the basic functions of the system are working adequately. Aside from the working components, the system has indeed been made in such a way that it is easily transferable to a non-digital version. There is a general chronological

order to the contents of the system, and the screens can simply be printed out and bound into a landscape-formatted book.

Whether the system allows the user to use it autonomously is uncertain, as this is not testable by the researcher. Furthermore, whether the system is quickly accessible has been found to be largely dependent on internet speed. For the researcher, the loading times were short, but this is not generalizable for the user group.

7.3 User Evaluation

7.3.1 Method

7.3.1.1 Recruitment

The recruitment of participants was done using the personal connections of both the researcher and the thesis client. A number of general practitioners were approached using both WhatsApp and email, where the research project, the goal of the evaluation, and the procedure were described. A total of six participants were gathered, which consisted of Dutch general practitioners of different genders and ages active in different locations across the Netherlands.

The goal was to gather at least five participants, as they are able to find approximately 80% of usability flaws (Nielsen, 2000). More participants will offer a larger quantity and a more diverse range of insights into the evaluation of the prototype. However, multiple reasons factored into the choice to use a small sample size for this thesis.

Firstly, the prototype consists mostly of classified information. The thesis client requested that the number of participants who are allowed access to the course contents be kept to a minimum. Secondly, the evaluation is largely qualitative in nature. Usability will be tested, but an analysis of the emotions the prototype elicits must also be performed. Knowing that there are shortcomings in the learning tool is valuable, but it is more valuable to know what exactly they are and why the participant believes they are a flaw. Therefore, the decision was made to perform more elaborate and qualitative user evaluations with a small number of participants, as opposed to a more quantitative study with a larger number of participants. This leads to the last reason for a small

sample size of participants, which involves time constraints. Analyzing qualitative data is time-consuming, and the time span for the evaluation phase of this thesis assignment is relatively short.

Prior to the evaluation, each participant received an information letter (available in Appendix Item 5) describing the evaluation goal and procedure. Additionally, they were asked to sign an informed consent form (available in Appendix Item 6).

7.3.1.2 Location

Although the researcher offered both online and offline alternatives, all but one participant expressed a preference for an online evaluation. Online evaluations are also beneficial for the researchers in terms of time and resources, as the participants live in various locations across the Netherlands. For this reason, all evaluations took place online, from the participants' homes. One disadvantage of online user testing is that digital mediums may not allow the researcher to pick up on more nuanced nonverbal or interpersonal cues.

Allowing participants to test from their own homes brings certain benefits. It is less hassle and less time-consuming for participants. Furthermore, allowing participants to use the product at home makes for a more realistic testing environment, as the finalized product will also be used in their home environment. Furthermore, the participant is exposed to the usual space, noise, and distractions while testing. They will feel more comfortable in their familiar environment, which will allow them to relax more. Lastly, there is also a lesser influence from observation by the researcher, as sitting next to them physically while they engage with the prototype may make them uncomfortable or influence their behavior (Lazar et al., 2017).

7.3.1.3 Procedure

At the start of the meeting, a small time window of roughly 5 minutes was allocated for welcoming the participant, expressing gratitude for their participation, and giving a short summary of the research goal and the evaluation procedure. Additionally, the participant was encouraged to speak honestly and not hold back on criticism. The researcher asked once more whether the participant

was comfortable with being audio recorded, and after receiving approval, started the audio recording.

Next, a web link was shared with the participant, which can be used to instantly access the prototype. The researcher purposefully provided no instructions on how to use the prototype in order to evaluate whether the participant was able to understand the use of the system without additional help. The participant had roughly 15 minutes to interact with the prototype. During the prior explanation, they were encouraged to voice any feelings, frustrations, or commentary out loud during the interaction. It was also explained to them that although this may seem strange at first, it allows the researcher to better understand them. The researcher made notes of any commentary, behaviors, facial expressions, and body language that the participant displayed.

Participants interacted with the prototype at their own pace and explored topics on the basis of their own curiosity without being rushed or guided by the researcher. Participants could also choose to end the interaction session earlier in the 15-minute time span. The researcher records the time the participants spend voluntarily interacting with the prototype. Toward the end of the interaction session, the researcher gave the participant the following task, which will be analyzed on the basis of whether the task was successfully completed and how easily it was achieved.

Please try to navigate to the home navigation screen, navigate to chapter 1.1, navigate to the references page and back, then navigate directly to chapter 2.1.

After the interaction session, the participant was interviewed about the experience using a semi-structured interview. All participant interviews include the same set of questions, but if participants add any additional topics or insights or their answers require additional questioning, semi-structured interviews allow room for additional questions. The reason why both observations and interviews are used is that observations provide additional information (facial expressions, body language, mouse movement) that may not become apparent in the interviews.

The user evaluations are concluded by an expression of gratitude toward the participant and a polite reminder that they are not permitted to share the link or prototype contents with anyone

else. Throughout all user evaluations, obvious usability flaws may be improved that cause distraction or obstacles to the user. However, additional changes should be kept to a minimum in order to increase the comparability and reliability of the total user evaluation.

7.3.1.4 Interview Questions

The interview questions were composed with the intention of reaching a number of different insights. Firstly, it is relevant to know the general stance of the participant towards mindfulness and nature-based interventions, as this makes them more or less open to the different features of the prototype and therefore influence their experience. Preferably, the mindfulness exercises within the prototype should be enjoyable for both mindful people and people less familiar with mindful practices. This also indicates how well the participant fits the target user audience: the general practitioners making use of the finalized product voluntarily signed up for the medical course and are therefore already somewhat interested in mindfulness and nature-based interventions. The following two questions were asked:

- *What do you think about nature-based interventions?*
- *What do you think about mindfulness?*

Secondly, it is relevant to understand how the prototype exerts influence on the mental state of the participant. The goal of the prototype is to elicit a calm, relaxed, and potentially positive state in its users. To understand this, the following questions were asked:

- *Has your emotional state in any way been affected by the prototype?*
    - *If yes: in what way?*
- *How did the short mindfulness intermissions and exercises make you feel?*
- *What did you think about the integration of natural imagery and mindfulness into a learning environment?*
- *What did you think about the aesthetics of the prototype?*
- *What did you think about the rate at which information was exposed to you?*

Thirdly, the usability of the system should be evaluated, which consists of finding flaws in the interface that need improvement and finding out which features work well. System interface flaws are some aspect, component, or widget that is confusing, misleading, or suboptimal (Lazar et al., 2017). The following open interview questions were derived from the System Usability Scale (Bangor et al., 2008), which is a framework commonly used to test system usability.

- *How difficult did you find it to understand how to make use of the system?*
    - *Why?*
- *Do you see yourself making use of the finalized version of this prototype in your free time?*
    - *Why or why not?*

Furthermore, the prototype must convey a sense of professionalism and appropriately represent the medical course. To evaluate this, the following questions were asked:

- *How suitable is the tool in the context of a medical course? Why?*
- *After seeing the prototype of the digital learning tool, how interested are you in participating in the medical course?*
    - *Why?*

Lastly, the following two questions aim to address any additional flaws or missing features and allow the participant to provide any additional comments.

- *Were there any components of the system that you would like to change?*
- *Was the system lacking any features that you would like to see?*

7.3.2 Evaluations 1 - 3

In this section, the results from the first three evaluations are discussed. All observations and interviews can be found in Appendix Item 7. The first evaluation was done with two participants, so the first three evaluations included four participants in total.

All participants had an open stance toward mindfulness and nature-based interventions. This ranged from being open towards it but not knowing much about it, to actively practicing it in their own office. All participants believed nature-based interventions can have a positive effect on medical practices. This is beneficial, as the target audience for the system has some basic interest in and/or openness towards mindfulness and nature-based interventions.

In all participants, a certain emotion was elicited by the use of the prototype. These included feelings of calmness, curiosity, and pleasantness and were evoked by the natural stimuli, colors, shapes, and sounds. Furthermore, all participants expressed a general appreciation for the short mindfulness interventions. Several points for improvement were mentioned:

- The breathing exercise should be concluded better, instead of using a simple fade out.
- For participants 1, 2, and 3, the speed of the breathing exercise was slightly too fast, although all three participants were partly distracted while following the instructions. Participant 4 said the speed was perfect and was fully focused.

All participants were enthusiastic about the integration of natural stimuli into a learning environment. There was also an appreciation for the instruction to make use of the system in a calm environment with no distractions. All participants reacted positively to the graphic design of the prototype, namely the natural imagery, colors, and organic shapes. Some points for improvement were mentioned:

- There is a hard contrast between the white screens and the natural imagery, and this could possibly be better integrated.

Participants mentioned that the amount of information on a page was good and that the concept of allowing the leaf buttons to showcase more information was effective. Points for improvement include:

- It would be beneficial to make the videos pausable in case they were distracted by their environment.
- The speed of the instructions was a bit too fast for one participant

Once participants understood how to navigate the system, they could all easily do so, and all participants mentioned that the navigation was mostly intuitive. However, there was some confusion regarding the initial learning of how to use the system. Participants 1, 2, and 3 were distracted while watching the instructions. This caused them to not understand clearly how to navigate. Points for improvement include:

- There should be an indication when it is actually possible to click left and right, such as an arrow. This also shows the user more effectively where the boundaries of the clickable area start.
- It was unclear to participants that they had to click to the right after the instructions video ended, even though it was explained in the instructions.
- It was unclear to one participant that they had to click to the right after the welcome video ended because they missed the instructional prompt.
- On certain scrollable pages that didn't initially look like they were scrollable (even though they contained a scrollable icon), it was unclear to participants whether they were able to scroll. On pages where text was clearly cut off at the bottom, this was not the case, however.
- One participant mentioned it would be nice to know how many more pages they can expect while they click through them.
- 2 participants were a bit confused about how to navigate initially after the instruction video ended. It may be beneficial to add an animated initial button.
- Participants 1 and 2 mentioned it would be good to think about how to make the navigation on the pages more intuitive by itself. They said that, ideally, you do not need the instruction video.

The responses to whether participants would use the system in their free time were mixed. Participants mentioned that the main reasons for coming back to the environment would be to teach others about topics they learned in the course and to revise practical tools that could be implemented in the treatment of the patient. Furthermore, it was mentioned that it may also depend on whether the participant is intrinsically or extrinsically motivated to learn the contents of the course. Points of improvement include:

- It may give users more reason to revisit the system after the course ends if there is a clear section containing practical tools to use for patient treatment.
- It may give users more reason to revisit the system after the course ends if there is some sort of interactivity in the system.

The reactions to how suitable the tool is to support a medical course were positive. Participants mentioned that it came across as high quality, effectively combines theory with aesthetics, the contents came across as credible and well supported by scientific evidence, and that it looked more beautifully made than other medical course environments. One participant mentioned that the tool effectively draws in the exact target group that would be interested in joining the medical course.

Participants mentioned that the prototype indeed increases motivation to join the medical course, due to evoking feelings of interest and curiosity. Furthermore, two participants mentioned that the system is an effective marketing tool. One participant mentioned that their participation in the course largely depends on the course contents themselves and the time investment, but judging from what they have seen so far, the prototype does indeed increase interest.

The time spent interacting with the prototype varied. Participants 1 and 2 spent roughly 27 minutes, participant 3 spent 8 minutes, and participant 4 spent 11 minutes. All participants successfully completed the task, although the ease of completion varied a bit. Participants 1, 2, and 3 achieved it smoothly, participant 4 wasn't quite sure how to navigate to the reference page and confused the real home button with the button on the instruction guide.

Other points of improvement that became apparent through the user evaluations include:

- Adding a search function makes it easy to quickly find specific topics.
- All participants mentioned that it would be nice to see their progress and position on the map.
- The loading times of the videos were quite long at times. One participant had an unstable wifi-connection at the start of the evaluation, and the prototype was quite unusable. It may be beneficial to export the system to a non-web format.

- There were a few very small technical errors present, such as a button not functioning properly or an image being pixelated
- One participant clicked on the right side of the screen after the instruction video explained how to navigate, thereby accidentally skipping the instruction video.
- The prototype cannot be fully viewed in full-screen, due to being accessed from the internet.
- A participant mentioned it would be nice to be able to go from navigation page 1 immediately to page 5, instead of clicking through 2, 3, and 4 first.

7.3.3 Implemented Improvements

Some points of improvement were clear and unanimous among all participants. These were implemented in the middle of the evaluation phase after the third participant was interviewed. This adds an iteration to the creation process and also prevents future participants from using valuable evaluation time to point out usability flaws that were already pointed out by other participants. The following improvements were implemented:

- All videos were made to be pausable. Furthermore, all videos were edited to include an initial 'play' icon for the user to click on.
- The instruction video and exercise video were edited to include a prompt for the user to click to the right to continue to the next page.
- The prompt to click to the right at the end of the welcome video was edited to stay indefinitely, in case the participant wasn't paying attention.
- Fixed all technical bugs
- There was an attempt to figure out how to implement a search bar, but the software does not support this feature.
- Research was done on whether it is possible to remember previous user locations, but the software does not allow this.
- The breathing exercise was edited to have a clearer and more definitive conclusion.
- Left and right arrows now indicate to the user when it is possible to navigate left or right, and appear once the user hovers over the clickable area.

7.3.4 Evaluations 4 - 6

Both participants had a positive attitude towards mindfulness and nature-based interventions. Participant 5 mentioned the prototype had a calming effect, but Participant 6 stated the prototype did not elicit any emotion. Participant 5 enjoyed the mindful breaks and exercises, and Participant 6 mentioned that although it appeals to her, the following point for improvement could be beneficial:

- It may be nice to introduce the mindfulness exercises better. For example: Now follows a short mindfulness exercise of 1 minute. This way, people won't be confused or startled when it suddenly appears and can have a better grasp of whether they want to skip it or not.

Regarding the integration of natural imagery and mindfulness into a learning environment, both participants reacted differently. Participant 5 mentioned they had a greater appreciation for the 2-D art on the navigation page, and that the imagery of the natural environments is a bit cliche. Participant 6 states that it is pleasing to see the natural imagery, as GPs are not used to this kind of learning environment.

Both participants mentioned an interesting aspect of the aesthetics. Participant 5 mentioned that the system contains a lot of text and a few interactive elements that are related to the actual content. A point of improvement:

- If certain parts of the theory are explained in a video or diagram, you can reduce the amount of text. Furthermore, it could be nice to have more interactive elements that relate to the text, such as asking a quiz question after a section. This keeps the user more engaged.

Participant 6 found the shapes and colors very fitting, along with the metaphor of the branching path. She mentioned that it does reduce the clarity of the hierarchy and organization a little bit, but this effect is minimized due to the clean graphic design and organization. A possible point of improvement is:

- Possibly adding one page that gives an overview of all contents. This should be added at the end of the navigation, however, as the participant stated, it would be a shame if people skipped over the beautiful navigation pages.

The rate at which information was displayed was good for Participant 5, and a bit slow in videos for Participant 6. There was an appreciation for the variety of the amount of information on the pages. A point of improvement:

- As a fast reader, participant 6 mentioned that it would be nice to be able to 'click' through the videos.

Both participants had no issues learning how to make use of the system. Regarding whether participants saw themselves making use of the system in their free time, it was stated that this would primarily be to revise practical tools needed to treat patients or to show someone else a certain part of the contents. Participant 6 said that although it does not really fit her style of learning, in a previous course she followed, she missed the presence of a learning environment containing all contents. It was mentioned that:

- Including more interactivity would give GPs more reason to revisit the learning environment
- Emphasizing and clearly offering practical tools would give GPs more reason to revisit the learning environment

However, it was still stated by Participant 5 that the environment is a suitable tool to support a medical course, and is more dynamic and aesthetic than a regular learning environment for medical courses. Both participants are interested in joining the medical course. Participant 5 stated it depends on how much time it takes, and Participant 6 is already enrolled.

The implementations after the first iteration of the user evaluations worked well. The new improvements were not mentioned in the feedback in the second iteration, indicating that these aspects of the system were no longer noticed by participants as flaws. Participant 5 spent 8 minutes on the prototype, and Participant 6 spent 6 minutes on the prototype. Both participants completed the task smoothly and quickly. Additional points for improvement include:

- The loading times were still quite long
- The instruction video should flow a bit more, preventing people from prematurely clicking to the right and skipping the rest of the video. Another solution would be to move the explanation of how to navigate to the end of the video.

- The very first time the user can start clicking to navigate, a button should be animated to aid them in making their first interaction.
- The initial play button should have a hover effect, to indicate to people that they can click on it.
- It could be nice to add an additional spot on the map just for the exercises.
- A few more technical bugs

7.4 Non-Functional Requirements Evaluation

Using the results from the recorded observations and interview answers from the user evaluation, an approximation can be made on how sufficiently each non-functional requirement has been fulfilled. The degree of fulfillment is classified into none/half/almost/full categories, dependent on how unanimous participant responses and behaviors were. *Table 7.2* depicts all non-functional requirements and their degree of fulfillment.

Non-functional Requirements	**Fulfilled**
Must Have	
The system allows the user to understand how to use the product within 2 minutes.	Almost
Navigating the system feels natural and intuitive	Half
The system contains natural audiovisual stimuli	Full
The system has a professional graphic design	Full
The system elicits feelings of calmness and/or slight positivity	Almost
Graphic elements are made using the predetermined color scheme	Full
Images and videos of nature are realistic and of high quality	Almost
The system ensures that the user does not unintentionally lose their position in navigation	Full

The rate at which theoretical content is displayed should not overwhelm or underwhelm the user's cognitive capacity.	Full
The rate at which information is displayed in videos and animations should not overwhelm or underwhelm the user's cognitive capacity.	Half
The system does not display stimuli that draw attention simultaneously with theoretical course content.	Full
All text is easily readable	Full
The system allows the user to skip over 'slow' parts, such as breaks or mindfulness intermissions.	Full
The navigation page is an aesthetic page representing a natural environment or element	Full
Should Have	
Upon opening the system, an explanation of how to use the program is shown.	Full
The system offers a variety of mindful intermissions that serve as small breaks between information sections	Full
The system contains pleasing audio	Almost
Exercises contain fluid movement, calm shapes, and appropriate audio	Full
The system tells the user to use it in a calm setting	Full
The system tells the user to activate full-screen mode while using it	Full
Components such as buttons are placed in the periphery and do not draw attention	Full
Interactive elements should clearly indicate to the user that they are interactive	Full
Could Have	
The navigation page contains gentle animations	None

Multi-layered soundscapes that combine natural sounds, ambiance, and music	Half
Natural images incorporate fractal elements	Full

Table 7.2: Non-functional Requirements and degree of their fulfillment

Most non-functional requirements have been adequately fulfilled. Almost all participants reacted positively to the professionalism and calmness of the graphic design, mindful breaks, and natural audio-visual stimuli. Regarding some non-functional requirements, participant responses were mixed. The instruction video explaining how to use the system is one minute long, which is indeed under two minutes. However, not all participants were effortlessly able to navigate the system after watching the video. Significant improvements were seen after the first iteration; however, there is still a large area for improvement.

The speed at which information was displayed in the animations also resulted in mixed reactions. For some participants, information was displayed at a too-fast rate; for others, it was too slow; and for others, the speed was adequate. Making the videos pausable did prove beneficial, however. It may be beneficial to make the videos 'clickable' where possible to accommodate different reading speeds. The amount of information displayed at a time on a page was pleasant, according to all participants unanimously, however.

All participants reacted positively to the natural audio. However, due to software constraints, only a few areas of the prototype contain audio. It is not possible to extend a continuous audio loop across the whole system, as the audio restarts every time a user navigates to another page. The same limitation holds for the lack of multi-layered soundscapes, which are presently only found in the breathing exercise.

Whether the system elicits feelings of calmness and/or slight positivity has been classified as a maybe. All but one participant mentioned that the prototype elicited feelings of calmness, and zero participants mentioned words related to positivity. Lastly, due to software constraints, it was unfortunately not possible to create multiple animations on the navigation page, which would have been beneficial both in terms of aesthetics and indicating which areas are clickable to the

user. As a semi-solution, interactive elements include a hover effect for users to indicate that they are clickable.

7.5 Discussion

In this section, the test procedures and their results are discussed, along with factors that may have influenced the reliability of the evaluation.

Overall, it is appropriate to assume that the prototype is a functioning system able to adequately achieve its intended goals, as most functional and non-functional requirements have been fulfilled. A few requirements were insufficient or only partly fulfilled, however. These include confusion regarding navigation, the speed at which information is displayed, and a couple of software limitations such as the prolonged use of audio, high-quality videos, and certain user interactions.

The user evaluations were a combination of generally positive responses to the prototype and a large amount of helpful and constructive feedback. However, a large number of limitations should be taken into account. The evaluation was conducted with a small sample size of only six participants, which may impact the generalizability of the findings. A large number of GPs were contacted, but fewer than expected enrolled as participants. Future studies should aim to reach a larger number of potential participants. Additionally, the short time span for interaction with the prototype prevented the participants from looking at the contents themselves, which could have had a significant impact on how they experienced the system and its features. The recruitment of participants through personal networks introduces the possibility of a biased sample, as individuals within these networks may share similar interests and perspectives or tend to speak less harshly or critically.

During the evaluation, environmental distractions were present (such as children, dogs, eating, drinking, and phone usage), affecting the participants' attention and engagement. This not only influenced their perception of the prototype but also caused multiple participants to miss important information from the instructions. This often led to confusion about how to navigate through the system. To mitigate these issues, pausable videos were implemented after the third

evaluation. Furthermore, the reading speed of participants varied greatly, so other improvements could incorporate videos where participants can click after reading a snippet of information to account for the different reading speeds of the users.

Another consideration is the potential for observer bias. The evaluation was performed by the designer and may have influenced participants' responses and behaviors. For example, this may have caused participants to respond more politely, or change the speed and way they interact with the prototype due to the fact that they were being observed. This bias can affect the accuracy of the evaluation and introduce potential limitations to the data collected, as in a realistic usage scenario, participants interact with the system alone or with each other.

Furthermore, it is worth noting that although all participants were open-minded toward mindfulness and nature-based interventions, they still had differing levels of interest. Not all participants considered enrolling in the medical course, creating a variety among participants in how well they fit the target audience. Especially participants that had a lower interest in mindfulness tended to have a more negative view of the short mindful breaks included in the system. Lastly, due to the highly qualitative nature of the data gathered, the data gathered and analyzed by the researcher were interpreted subjectively, potentially altering the meaning of the data.

Lastly, a significant shortcoming of the evaluation process must be discussed. The prototype aims to induce the psychological effects of nature, which namely include emotion regulation, stress reduction, and attention restoration. However, testing these effects was not possible due to their subjective nature, the complexity of measuring them objectively, and the short time window of the one-hour evaluations. Future evaluations should incorporate the measurement of these effects. Stress reduction may be able to be measured through biological indicators such as cortisol levels or heart rate, and emotion regulation could be measured through perceived experience and indicators such as facial expression. Attention restoration, however, is particularly challenging. It involves measuring cognitive processes such as focus, concentration, and mental fatigue. Previous studies that have aimed to measure attention restoration involved participants completing mentally-fatiguing tasks before and after interacting with the prototype. However, these studies

also report challenges related to the subjectivity and ambiguity of testing attention restoration (Cassarino, 2019; Crossan et al., 2021). A systematic review of Attention Restoration Theory stated that we currently lack an effective measurement tool used for all ART studies and that there must be a better understanding of the workings of attention restoration theory and the most objective way to measure its effects (Ohly et al., 2016). Therefore, although part of the research question of this thesis assignment involved creating a prototype that evokes the psychological effects of nature, the project lacked the necessary resources, time, and method to thoroughly test this. Instead, the participants were asked to describe the emotions they experienced while interacting with the system. By capturing their subjective experiences, some insight was gained into the impact of the digital learning environment on users' emotional states.

The prototype would also certainly benefit from expert tests, which would allow for valuable feedback regarding pedagogical strategies, graphic design principles, and mindfulness techniques. Although I am confident that my client performed thorough and proper research, it is also important to employ an expert in the field of nature-based interventions. Their expertise could be used to critically analyze the course contents, and ensure that all information is credible, accurate, unbiased, and clinically proven.

Despite these limitations, the user evaluation provided valuable insights into the prototype. Participants' feedback and responses uncovered a large number of areas for improvement and helpful suggestions for how to solve them. The small sample size also allowed for in-depth interviews and the exploration of individual experiences. The additional round of implementations after the third user evaluation also proved to be effective. The new improvements were not mentioned in the feedback in the second iteration, indicating that these aspects of the system were no longer noticed by participants as flaws.

Future evaluations should aim to increase the sample size and generalizability of the findings. Additionally, efforts should be made to recruit participants from outside of personal networks to avoid biases due to personal relationships with the creators of the project. Asking the participants to minimize environmental distractions during the evaluation can enhance their engagement and understanding of the system. Lastly, future evaluations should also include a longer time frame for

the usage of the prototype, along with having the participant read parts of the content, to replicate a more realistic usage scenario.

8 Discussion and Future Work

This section discusses the assessment of the final prototype and its limitations, the design process, and opportunities for future research and development.

8.1 Reflection on Prototype and Future Work

As concluded from the evaluation phase, it is safe to assume that the prototype meets the basics of the intended goals. Contrastingly, the results from the evaluation phase question the usefulness of the system as a whole. When asked to express their views on the need to revisit the environment once they have completed the course and gained its credits, participants had mixed responses. It was mentioned that there is a possibility that users only return to the environment if they are intrinsically motivated or deeply interested in the topic, only to revise specific practical tools directly applicable to a patient, or, particularly, to share their newfound knowledge with others. Regarding the last motivation, however, the client expresses the desire for control over the dissemination of the environment and to not make the full contents of the course public, as enrollment fees are necessary to finance the resources needed to host the medical course. This restriction, along with target audience motivations, causes a certain amount of arbitrariness in the system. For future versions, it is important to explore in greater depth what would motivate the user to make use of their system in their free time, incorporate these features, and ensure that the system is equally accessible and usable for every type of user motivation.

The technological nature of the system leads to certain points of reflection. Although the system encourages connection to nature in both users and their patients, it delivers the course contents through a digital medium. Ironically, usage of the system promotes additional time spent inside and interacting with a screen. The system aims for this interaction to bring mental health benefits by inducing nature's positive effects, but as the literature research in this report has concluded, this is only possible to a certain extent. Even state-of-the-art digital technologies contain many experiential limitations. Due to a lack of authenticity and sensory input, they are unable to capture the richness and depth of real-life nature-based interventions (Gonçalves, 2022). Because of this, users are deprived of firsthand encounters that have the opportunity to provide more effective health benefits. If this method is implemented further and into other environments, in the worst case, individuals may start relying on digital nature experiences to replace real natural experiences, as for many, they are more convenient and accessible.

From a well-being perspective, it would have been more beneficial to offer the course contents through a medium that allows users to experience nature firsthand, or at least through a non-digital medium. However, the needs of the client and the target audience led to the system taking on this form. The client already offers the course contents in a natural setting and needs an environment where an overview of the contents is accessible at all times. The target audience has limited time to explore the course contents and has a need for fast and easy access to the contents. Furthermore, a digital environment provided opportunities for audio and video content, which enhances feelings of restoration, while a non-digital format may not have been able to do so.

Appropriate use of the system brings many benefits and has the potential to be an effective complementary resource to the medical course. However, future versions of the system should aim to remove the possible negative effects of digital technology. For example, it could encourage users to take breaks from looking at a digital screen (which causes fatigue) after they spend a certain amount of time in the system or somehow remove possible distractions caused by the technology itself. For example, the system could block notifications from WhatsApp or Email while the user interacts with it. Lastly, a large benefit of an online environment is that users should be able to access content at any time, from any location, using any digital device. Future work should accommodate this and create designs fitting for various digital technologies. One notable feature

that needs improvement is the hugely internet-speed-reliant loading time, as user evaluations resulted in very long loading times. It would greatly inhibit users from using the environment if it was only usable in areas with an extremely high-speed internet connection.

The identification of the limitations of the prototype provides guidance for potential areas for future work. Firstly, the choice of using the software Adobe XD unexpectedly influenced a great number of design choices and caused many unintended limitations to the prototype. These limitations have been discussed at length in Chapter 6.1.4, and each limitation caused an increase in workload due to the attempt at finding a workaround or solution to the issue. The fact that the software is front-end helped speed up the graphic design component of the prototype. However, it greatly inhibited possibilities related to user interactions, user personalization, full-screen viewing, and the length and quality of media. For future work, it is crucial to transfer the project to more back-end software to be able to incorporate all components and features.

Other limitations were caused by the relatively short time frame of the thesis assignment. Only a select number of topics from the course contents were developed into a prototype, and it could have been beneficial to develop and test a larger number and variety of mindful exercises. An important feature that would have aided in enhancing a sense of credibility in the user included a section describing the creators of the course and their accreditations. However, this was not possible for both me and my thesis client due to a shortage of time. An area for improvement is the scheduling and communication between me and the research client. The course contents were available to me later in the realization phase than I preferred, and having earlier access could have allowed me to create more sections of the prototype.

Further limitations of the prototype that require improvement include graphic design aspects. As someone with relatively little experience in graphic design, there are many parts of the user interface that could be improved to be more aesthetically pleasing and effectively elicit desirable emotions. For future work, it would be beneficial to consult or hire an experienced graphic designer to help achieve the intended user experience. Additionally, the gathering of all photos, videos, and audio was confined to websites that offer free stock media. This greatly reduces the quality of the media, and for future work, a paid subscription to high-quality sources is needed.

Other areas for future development can be generated from the 'Won't Have' MoSCoW requirements. These are requirements that would have been beneficial to incorporate but did not fit into the scope and time span of the thesis assignment. Certain features that increase the level of immersion could strengthen the psychological effects of nature. These include further increasing the quality of the audio-visual stimuli, and possibly even incorporating features that engage senses beyond sight and hearing. Furthermore, the system should enable the user to view it in full screen. This could be taken further by introducing augmented or virtual reality.

More research should also be done on how to create calming, mindful, and instructional mindfulness exercises effectively. The exercises should also include spoken content to better guide the user through the instructions. The user evaluations also resulted in feedback regarding a more enhanced education experience, for example, by making use of graphs, infographics, diagrams, or videos explaining course contents. This could greatly reduce the cognitive load needed from the user, but given the time span, it was unattainable to achieve during this assignment. Furthermore, the system should offer personalized experiences based on the user's emotional state, attention span, cognitive capacity, learning styles, or preferences. The system could also offer more interactive elements to aid in user engagement and understanding, such as incorporated tests or interactive exercises. Lastly, options for collaborative learning and student interaction could improve learning outcomes and create a sense of community, as users would be connected with like-minded individuals and be able to learn from each other.

After finishing this thesis, over the course of the following months, this prototype will be realized into a finished product. Previously, many potential areas for improvement and future work were discussed. However, not all of these components and features are feasible, and a select few will be integrated into the finalized product. First of all, in order to achieve the improvements mentioned above, it is crucial to switch to more back-end development software. This makes it possible to incorporate interactive elements such as user questionnaires, quizzes, and higher-quality audio and animations. The finalized version will incorporate all contents from chapters 1 through 5, and contain a much larger number of mindful exercises. A paid subscription to a high-quality media source will be acquired to enhance the effectiveness of the natural stimuli and better relate them

to nature found specifically in the Netherlands. More audio will be found or recorded and spanned across the whole system instead of on a select number of pages. Diagrams or graphs will be created to better support the contents and ease the process of absorbing information. Lastly, a user feedback system will be put in place to continually gain insight into user experiences, and improve the features of the final product.

8.2 Reflection on Design Process

This thesis was created using the Creative Technology design process. Following this process led to insights and lessons that have helped shape me into a better researcher, designer, and creative technologist.

By conducting the background research for this assignment, my ability to gather and critically analyze scientific sources has improved, as have my academic writing abilities. The ideation phase required me to explore different concepts and possibilities and, therefore, practice my creativity and critical thinking skills. In the specification phase, the outcomes from the earlier phases were narrowed down and used to define specific features, functions, and objectives of the learning environment. This phase required careful planning as it laid the groundwork for the realization phase. Here, it also became clear how crucial the findings from the user domain research were since they allowed me to gain valuable insights and an understanding of user needs and expectations.

The realization phase involved turning the conceptual design into a functional and interactive prototype. Many difficulties were encountered, which showed me how important adaptability and problem-solving skills are. I gained more proficiency with Adobe Illustrator and After Effects, as well as valuable graphic design principles. In retrospect, though, I would have chosen a different software than Adobe XD, which would have allowed me more freedom and possibilities when incorporating the different components I designed into a prototype.

Finally, the evaluation phase provided an opportunity to gather user feedback and assess the effectiveness of the digital learning environment prototype. This phase further highlighted the value of user perspectives, as it resulted in many points of improvement that weren't previously considered in the design process. In the future, I intend to include a larger sample size during evaluations to enhance the reliability and generalizability of the findings, and further test the effectiveness of the integration of natural stimuli in digital learning environments.

Furthermore, working closely with a client also provided new insights. It added a practical element to the project, as it helped me better understand real-world requirements and limitations. Through contact with the client, I gained a clearer understanding of the client's expectations and was able to improve my problem-solving abilities and develop an effective communication strategy. One aspect of the collaboration that was very beneficial was the opportunity to receive direct feedback and guidance on design choices. The client's input offered an insightful viewpoint on the real-world use of the digital learning environment in the medical field. This feedback helped shape the project's direction and ensured that the project stayed in line with the client's goals and vision. However, there were areas that could have been improved during the client collaboration. Clearer communication and expectations management would have been beneficial to create a shared understanding of the project scope and deliverables. I realized that it is important to establish clear and open communication right away, in order to guarantee that everyone is aware of the project goals, timelines, and deliverables.

In future projects, I will continue to allow the creative technology design process to direct me and prioritize utilizing user-centered design principles, actively seeking user feedback, and using continuous iterations to increase both the quality and effectiveness of my projects. I am confident that by adopting a multidisciplinary approach and continuously refining my skills, I will continue to evolve as a more capable and innovative designer in the field of creative technology.

9 Conclusion

In conclusion, this thesis aimed to develop a digital learning tool for general practitioners that effectively conveys course information while utilizing the psychological effects of nature. Through a process involving background research, ideation, realization, and evaluation phases, this thesis assignment has attempted to answer the research question: *How to develop a digital learning tool that conveys course information for general practitioners, which evokes the psychological effects of nature in the user?*

A digital environment has been created that effectively conveys course contents, and provides a calming experience for general practitioners. Through research, an in-depth understanding has been reached of how to induce nature's psychological effects digitally. Whether the prototype manages to achieve this, however, cannot be said for certain, and should be investigated in more depth. Even so, considering the success of the prototype and advancements in knowledge, this bachelor's thesis managed to address the research question to the researcher's satisfaction. This thesis assignment has also successfully managed to satisfy the client, who gave the following (translated) closing statement:

"The collaboration with Issa not only resulted in a beautiful online learning environment but also stimulated the development of course content. Issa is good at structuring and managing a development process. The current version of the online reader already looks remarkably inviting. Issa has succeeded well in incorporating natural elements that support the content and help the 'student' take a moment to relax while learning. The utilization of user testing in the development process certainly contributed to the relevance and usability of the reader. I look forward to finishing the reader and am very curious about the final result."

Although the prototype currently still contains areas for improvement, it has provided a solid foundation for the creation of a finalized product, which will be realized in October 2023. Its creation has also led to many insights regarding how to professionally and competently complete each phase of the Creative Technology Design Process. Hopefully, the finalized product will provide general practitioners with an enhanced learning experience that promotes their well-being and will be an effective complementary resource in the mission to shift Dutch medical practices to utilize nature-based interventions.

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Appendix

Appendix Item 1 - Information Letter User Domain Interview

Information Letter

Purpose of the research:

This graduation project consists of creating a digital reader for a medical course that educates general practitioners on how they can utilize nature and mindfulness to heal their patients. The reader must appropriately reflect on its contents, and guide the user through the information in a mindful manner. To achieve this, more background information on the target user group is needed. The purpose of this research is to gather information about general practitioners active in the Netherlands regarding their habits, routines, needs regarding learning, obstacles faced while learning, and use of digital learning environments. Please note that by the time this document is shared with you, the research project has been reviewed and approved by the CIS Ethics Committee of the University of Twente.

Procedure:

The session consists of a semi-structured interview, which lasts approximately 30 minutes. The interview can take place either online or at a physical location, and the researcher will adjust to the time and location/medium requested by the participant.

Benefits of participating:

Supporting a project that educates general practitioners on the health benefits of nature, and supporting the introduction of novel ways of healing patients in the Netherlands. Additionally, you will be supporting a student in writing their bachelor's thesis.

Procedures for withdrawal from the study:

- Writing an informal email to the researcher
- Ending the interview at any point in time by leaving the (online) meeting
- Orally informing the researcher about your wish to withdraw

Personal data collection:

Preferably, solely the name and the occupation of the participant will be recorded. However, if the participant wishes, they can opt to remain entirely anonymous. Throughout the interview, an audio recording will be made to aid the researcher in transcribing the interview. The researcher may also record notes on paper. The interviewee can request the deletion of their collected data at any point in time (even in retrospect).

Usage of data:

Any data will be treated anonymously if the participant requests it, and confidential information will not be shared publicly. After the transcription of the interview is completed, which will be within 3 days of the interview, the audio recording will be deleted.

Retention period for the research data:

The findings based on collected information during the interview will be published online indefinitely in the thesis repository of the University of Twente.

Contact details of the researcher:

Issa Margherita | i.n.margherita@student.utwente.nl

Contact details of the CIS Ethics committee to file a complaint:
ethicscommittee-cis@utwente.nl

Appendix Item 2 - Ethical Consent Form User Domain Interview

Consent Form for Developing a digital tool for the medical course

'Weg Met de Dokter - Laat de Natuur Jouw Werk Doen'.

You will be given a copy of this informed consent form

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the information letter dated 02/03/2023, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	□	□
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	□	□
I understand that taking part in the study involves participating in an audio-recorded interview for approximately 30 minutes. The audio recording will be transcribed as text and deleted within 3 days of the interview.	□	□
Use of the information in the study		
I understand that the information I provide will be used for a published graduation project, available in the thesis repository of the University of Twente.	□	□
I understand that **if** my personal information is collected, such as [e.g. my name or occupation], it will not be shared beyond the graduation project.	□	□
I consent to share my name and occupation. **Please note that this is not obligatory in order to be able to participate in the interview.*	□	□
I agree that my information can be quoted in research outputs **Please note that this is not obligatory in order to be able to participate in the interview.*	□	□
I agree that my real name can be used for quotes **Please note that this is not obligatory in order to be able to participate in the interview.*	□	□
Consent to be audio recorded I agree to be audio recorded.	□	□

Future use and reuse of the information by others

I give permission for the transcripted interview to be archived in the thesis repository of the University of Twente so it can be used for future research and learning. □ □

I give the researchers permission to keep my contact information and to contact me for future research projects. □ □

Signatures

_____ _____ _____

Name of participant Signature Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Issa Margherita ../../..

Researcher name Signature Date

Study contact details for further information:

Issa Margherita

i.n.margherita@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee Information & Computer Science: ethicscommittee-CIS@utwente.nl

Appendix Item 3 - User Domain Research Interviews

Interview 1

This appendix item contains the questions and recorded answers in the user domain research interview with Pim van den Dungen, a general practitioner and the thesis client.

Wanneer je zelf een nascholing volgt, hoeveel tijd per dag of week besteedt je er dan typisch gezien aan?
Meestal zijn nascholingen in een fysieke vorm, en ben je alleen op locatie bezig met de nascholing. Ik moest vorig jaar bijvoorbeeld voor een nascholing naar de waddeneilanden met de boot, en ik zag andere huisartsen op de boot de voorafgaande toetsen maken en informatie lezen. Mensen kwamen er dan onderweg pas aan toe om iets te lezen of iets voor te bereiden.

Heb je ooit de inhoud van een nascholing nog eens bekeken, of ergens verder over ingelezen, nadat de training had plaatsgevonden?
Nee, ik heb zelf eigenlijk nog nooit iets gelezen na de nascholing. Ik heb zelf bijvoorbeeld een cursus Mindfulness gedaan (ook voor dokters), en daar zaten een aantal huiswerkopdrachten bij. Dat hielp wel om er iets aan te doen, maar meestal is het zo dat je er niet zo makkelijk aan toe komt. Tenzij het hele praktische implicaties heeft, en er zitten gevolgen aan. Bijvoorbeeld, met een bepaalde nascholing moesten we denken over hoe we onze praktijk anders zouden kunnen inrichten of over hoe we ons werk anders zouden kunnen doen, en toen hadden we wel wat gevolg acties gedaan. Maar meestal kom je er niet zo makkelijk aan toe om echt iets te gaan lezen.

Dus tijdstekort is echt een groot obstakel voor huisartsen. Zijn er nog andere obstakels die huisartsen tegen komen wanneer het komt tot het studeren voor nascholingen? Bijvoorbeeld, mentale stress, hectische omstandigheden?
Ja, tijdstekort is een groot probleem. ‘S avonds zijn huisartsen ook nog bezig met vergarderingnen of patienten zorg. Dus de dingen die echt moeten, of juist even bijkomen komen voor en vragen veel tijd. En ja, de dingen die je noemt, mentale stress, hectische omstandigheden ook. Er is vooral een behoefte om even ergens anders mee bezig te zijn of om te ontspannen.

Denk je dat het dan door huisartsen op prijs zou worden gesteld als studeren voor een nascholing ook een gelegenheid voor rust of ontspanning werd? Of dnek je dat huisartsen liever zo snel mogelijk door het stof heen willen kunnen?

Ik denk wel dat het heel erg gewaardeerd wordt als informatie op een leuke en spelse en makkelijke manier wordt aangeboden. Bijvoorbeeld dat je de reader niet helemaal hoeft te gaan lezen maar dat achter een scherm kan doen (wat je eignelijk aan de andere kant ook niet echt zou willen bevorderen). Maar als je op die manier mensen kan inspireren, en dat het makkelijk tot ze komt in de vorm van een filmpje ofzo, of dat je kan klikken door kleine stukjes info, dat het dan meer aantrekkelijk wordt om er mee bezig wordt. Als het ontspannings element heeft zou dat zeker helpen. Ik weet niet of mensen meteen de rust kunnen pakken om gelijk met hun ogen dicht te kunnen zitten. Meer met geluid, of ergens naar kijken, of dat je ergens mee kan spelen, of interactie, of hé ik kom in een soort bos, of iets waarmee ik alle kanten op kan, dat dat wel gewaardeerd wordt. En de aandacht een beetje kan vast pakken.

Welke mediums voor kennisoverdracht kom jij meestal tegen bij andere nascholingen? (website, reader, boek, hoorcollege, etc)

Meestal zijn het powerpoint presentaties, en die krijg je toegestuurt. Soms zijn er spelsere vormen, zoals groepswerk, of een dialoog, of dat er geen gebruik wordt gemaakt van powerpoints.

Wat vind je wel en niet fijn aan deze mediums?

Zonder powerpoint is het leukst. Het is fijn als er een mix van informatie en reflectie daarop. Dus dat mensen er zelf over na gaan denken, en op zichzelf toepassen, en daarover elkaar bevragen. Het is fijn als je niet alleen aan het ziten bent met info info info en dan pauze met een koffietje en koekje. Dat vind ik een saai en vermoeidend format. Het is leuk als het dynamischer is, of een beetje buiten, en discussieren, zelf nadenken over dingen. Het is ook leuk als iemand er echt verstand van heeft en interssante informatie ervoor aanrijkt.

Hoe ziet je routine er uit wanneer je voor een nascholing studeert?

Dat doe ik altijd thuis, op de praktijk ben ik alleen bezig met praktijk-gerelateerde dingen. Dit geldt voor de meeste huisartsen volgens mij.

Denkt je dat er over het algemeen nog andere behoeftes zijn van huisartsen wanneer het komt tot het volgen van een opleiding? Ten opzichten van een ander soort student?
Huisartsen houden van compacte informatie. Een soort evidence-synthesse, dat je gewoon meeten ziet wat de bottom line is. Ze vinden het ook leuk als er een beschouwing wordt gedaan, bijvoorbeeld in editorials wordt gereflecteerd over hoe dingen werken. Dus een beetje een mix van compacte data en reflectie daarop. Beetje in- en uitzoomen. Niet te wollig in ieder geval. Huisartsen zijn gewend snel te werken en snel info te verwerken, en dan is het fijn als dat lekker overzichtelijk is.

Zoals je eerder zij, leek het je zelf grappig als er interactie is of een speelse omgeving om te exploreren. Hoe behendig ben je met technologie en computers denk je? Bijvoorbeeld, een reader is makkelijk om doorheen te scrollen, maar denk je dat het makkelijk voor je om intuitief en gemakkelijk en wat meer gamified versie te kunnen gebruiken? Of zou je daar dan uitleg voor nodig hebben?
De meeste huisartsen durven rond te klikken. Veel huisartsen zijn 30ers 40ers en die zijn wel handig met technologie. Huisartsen werken ook de hele dag met computers. Zolang het begin makkeljk is, kan het daarna wat moeilijker worden. Als het begin te moeilijk is, dan kunnen mensen afhaken. Het moet een beetje ‘easy entrance’ zijn, en je moet mensen een beetje helpen.

Interview 2

This appendix item contains the questions and recorded answers in the user domain research interview with Jonathan, a general practitioner who participated in the pilot run of the course.

Wanneer je zelf een nascholing volgt, hoeveel tijd per dag of week besteedt je er dan typisch gezien aan?
Meestal ligt het aan de soort nascholing. Bij een korte nascholing 1 a 2 uur op een vrije middag, en dan meestal online. Hoeveel tijd ik daarvoor vrij maak wisselt, ook of ik daarvoor moet registreren en of ik daar punten bij kan halen, dan besteedt ik wat meer tijd aan. Gemiddeld is het denk ik iedere maand 2 uurtjes. Maar er zijn momenten waar ik er heel veel aan werk en moment waar ik er helemaal niet aan werk, maar uiteindelijk moet je 40 uren per jaar er aan besteden.

Je noemde dat de nascholingen meestal online zijn. Op welke manier wordt het lesmateriaal dan overgebracht? (website, reader, boek, hoorcollege, etc)
Veel gaat via een website, en tussendoor krijg je vragen gesteld, en dan achteraf een toets om te kijken of je hebt opgelet.

Besteedt je na het ontvangen van de informatie veel tijd aan het bijstuderen of inlezen voor de toets?
Nee niet echt, de tijd dat de cursus duurt is de tijd dat je er mee bezig bent. Vaak behandel je onderwerpen die door specialisten behandelt worden, en wordt je kennis opgevraagd en kan je het direct toepassen in de praktijk.

Heb je bepaalde gedachtes over de manier waarop dit lesmateriaal wordt aangeboden? Vind je de websites fijn of heb je een voorkeur voor andere methodes?
Het voordeel van een website is dat je alles overal kan opzoeken. Maar wanneer een nascholing is geweest, de kans dat je de materiaal nog gaat doorlezen of doornemen is heel klein. Als je een boekje hebt, is de kans veel groter dat je die doorbladert. Een boekje past ook beter in het thema waarmee pim aan het werken is natuurlijk. Het ligt echt aan de type nascholing. Als het een meerdaagse is waar er meer dingen worden besproken, dan is een kleine reader wel prettig die je door de cursus heen kan nemen. Om eerlijk te zijn verhindert de drukte van de allerdag dat je van

te voren of achteraf nog dingen gaat lezen of opzoeken. Meestal doe je dit 'on the fly' naar of tijdens je werk, en echt daar buiten zou ik daar niet heel veel uren in besteden.

Ga je denk je mee doen aan de officiele versie van Pim's cursus?
Ik denk het wel ja. Het is de vraag of ik kan, maar als ik kan lijkt het me heel leuk.

Stel ik zou een reader ontwerpen voor Pim's cursus, denk je dat hem uberhaupt open zou slaan nadat de cursus heeft plaats gevonden?
Ja, ik denk dat ik wel zou openslaan.

Je zei dat tijdstekort een groot obstakel is wanneer het komt tot extra inlezen. Zijn er nog andere obstakels die huisartsen ervaren wanneer het komt tot het leren van theorie, denk je?
Ja, tijd en of je zin hebt om altijd met je werk bezig te zijn. Ik doe liever andere dingen wanneer ik vrij ben. Dus het is een deel tijdstekort en deels ook energie in andere dingen willen steken. Wat een probleem tegenwoordig is is dat er via zo veel kanelen informatie binnen komrt. Mail boxen, systemen, er wordt zo veel informatie parallel verwerkt. Op een gegeven moment wordt je informatie moe. De hoeveel informatie en de verschillende hoeken waar het vandaan komt is gigantisch. Hierdoor zou je reader wel heel foolproof gemaakt moeten worden, makkelijk te vinden, makkelijk te gebruiken, en presenteerbaar moeten worden aangeboden. Bijvoorbeeld, als er in de reader zou staan dat je nog naar andere bronnen moet zoeken zou dat niet handig zijn.

Pims cursus ging veel onderanderen over de psychologisch effect van de natuur, en over mindfulness. Hij vroeg zich af in hoeverre de reader dit zou kunnen voort implementeren. Ik moet dus een soort balans vinden tussen een snelle, makkeijlijke, en tijdsefficiente manier van informatie weergeven, maar tegelijkertijd spelen gevoelens van mindfulness of calmte opwekken in de gebruiker en het een gelegenheid voor ontspanning maken. Wat zijn jou gedachtes hierover?
Ik denk dat het zeker wel gewaardeerd zou zijn. Ik denk dat je het ook hebt over bepaalde oefeningen, bepaalde ontspannignen, manieren om dichter bij jezelf te komen en om bepaalde rust te vinden? Ik denk juist dat dit heel praktisch en heel relevant is, omdat we dit voor onszelf kunnen toepassen maar ook naar onze patienten toe. Als we dit zelf kunnen ervaren, kun je dit ook goed

uitleggen en overbrangen aan je patienten. Ik denk dus dat juist praktische oefeningen heel fijn zullen zijn in de reader. Natuurlijk willen we ook de wetenschappelijk achtergrond hebben van de cursus, over de voordelen van de natuur op de gezondheid, maar het is juist fijn om een praktische handvat te hebben over ontspannen. Wel makkelijker gezegd dan gedaan, en ik vraag me af hoe je dit gaat bereiken. Ik denk dat het mooi is om een balans te vinden tussen beiden. Ik denk ook dat als je praktische oefeningen implementeerd, is dat ook juist een reden om terug te gaan naar de reader nadat de cursus is afgelopen. Niet voor de theoretisch achtergrond, zo van oja boswandelen verlaagt je bloeddruk, maar voor specifieke oefeningen en methodes zou ik juist voor terug komen.

Wat voor soort huisarts denk je dat over het algemeen wordt aangetrokken door de cursus? Stel ik implementeer oefeningen in de reader, denk je dat ik dan ontwerp voor mensen die al bezig zijn met mindfulness en daarvoor open staan, of moet ik kijken vanuit een beginners perspecitief, of moet ik ze eerste overhalen om mindful te zijn? Hoe sta jij daar zelf in, en hoe denk je dat andere huisartsen er in staan die mee doen aan de cursus?

Ik denk wel dat als je dit loslaat op de gemiddelde huisarts, zul je ze zeker eerste moeten overhalen. Maar de gemiddelde huisarts zal zich niet opgeven voor deze cursus. Dat zal sowieso een groep zijn die er al voor open staat en een basiskennis heeft over wat het is. Maar ik denk niet dat je dat daar vanuit moet gaan dat iedereen weet wat mindfulness is en dat iedereen het al heeft gedaan. Ik denk dat de groep of al ervaring heeft of er geinteresseerd in is, of er zelf al dingen mee doet. Ik denk ook dat in de oefeningen en in de uitleg je een onderscheid kan maken tussen hele basic oefeningen, en als je meer ervaring hebt, dat je dit deel kan overslaan en een meer gevorderde oefening kan doen. En ik denk dat heel veel beginners oefenignen voor mindfulness ook nog steeds handig zijn voor mensen die elke dag mindfulness beoefenen. Het maakt eigenlijk niet uit of je beginner bent of gevorderd, denk ik zelf. Kijk, als je gelijk vraagt van de gebruiker dat ze een uur lang mediteert in stilte dan is dat een beetje veel gevraagd. Ook, zelf ben ik redelijk sprituеel ingesteld, maar ik denk dat je over het algemeen voor huisartsen het recht-toe-recht-aan en wetenschappelijk moet houden. Ik weet niet precies vanuit welke kant je het wil belichten?

Ik weet nog niet precies hoe ik het ga doen, ik zit nu nog in de brainstorm fase. Wat ik nu probeer vast te stellen is stel dat ik de gebruiker vraag om een paar keer diep in en uit te ademen, of een body scan to doen, of dat met sketpisicme of met enthousiasme ontvangen wordt.
Dat kan prima, en voor mensen die zich hiervoor opgeven zeker. Wat ik zelf lastig vindt, en dat is meer uit gene, is zingen en chanting, en dat soort dingen, dan moet ik echt wel drie drempels over. Maar een body scan of ademhaling dat kan prima. Mensen die zich hiervoor opgeven zullen hier niet skeptisch over zijn.

Ik zit nu ook na te denken over hoe complex het eind resultaat wordt. Ik merk een groot verschil tussen de behendigheid in technologie tussen volwassenen. Een website is voor iedereen makkelijk en intuitief om te navigeren, maar een ander soort medium dat wat meer gamified of exploratief of speels is, is niet voor iedereen intuitief om gelijk mee te beginnen. Dit is misschien een lastige vraag om dat het generaliserend en speculaitef is, maar denk je dat jij zelf gelijk er in zou kunnen springen of dat je wat uitleg nodig zal hebben, en hoe denk jij dat andere huisartsen die mee doen aan de pilot hier over in staan?
Ligt eraan hoe de user interface is. Ik denk niet dat het te veel gevraagd is voor de meesten. Maar ik weet ook niet of dat is waarvoor de mensen naar de cursus zullen gaan, voor een echte hardcore digitale ervaring. Ik denk dat het niet de overhand moet hebben, en dat het vooral belangrijk is om zo veel mogelijk met je neus in de natuur te zitten en zo min mogelijk op je telefoon te zitten. Pim vroeg tijdens de cursus ook om de telefoon uit te zetten, en dat was heerlijk om dat te ervaren. Ik weet ook niet precies hoe je het voor je ziet, maar ik zou het zo veel mogelijk analoog houden. Als het gaat om een simpele user interface, kan iedereen ermee werken. Wij werken ook allemaal digitaal de hele dag door.

Tijdens de pilot hadden jullie nog geen werkboek toch? Pim wil voor tijdens de cursus een papieren werkboek hebben, waar informatie in staat en waarin je kan werken en schrijven en tekenen. Zou je zelf het liefst willen dat het boekje zo minimalistisch mogelijk is en zo veel mogelijk op de achtergrond zit, of zou je het leuk vinden of het boekje uitzichzelf ook al een ervaring is, zoals mooie afbeeldingen en veel interactie?
Ligt aan hoe de rest van de cursus is. Ik denk dat een boekje zeker prettig is voor de organisator om een bepaalde sturctuur te volgen, en dat het daar vooral voor gebruikt zal worden. Maar het is

altijd mooi als het mooi en artistiek wordt aangekleed. Maar ik denk niet dat het boekje super belangrijk is. Het moet er wel degelijk uit zien, en niet een soort in elkaar gestencild papiertje zijn.

Appendix Item 4 - Information Letter User Evaluation

Information Letter

Purpose of the research:

This user evaluation aims to test a prototype made for a thesis project by a bachelor's student of Creative Technology. The thesis project consists of creating a digital learning tool for the medical course 'Weg Met de Dokter, Laat de Natuur Jouw Werk Doen', which educates general practitioners on how they can utilize nature-based interventions in their medical practices.

A prototype of this reader has been made, and this research aims to test its core functions and uncover areas for improvement. Please note that due to the contents of the medical course not being available to the public, we ask the participants not to distribute any files that are shared with them throughout the test. By the time this document is shared with you, the research project will have been reviewed and approved by the CIS Ethics Committee of the University of Twente.

Procedure:

The session starts with a short explanation of the research and the prototype. Within a 15-minute timeframe, the participant explores the prototype design. Throughout this session, the participant may receive tasks concerning the navigation of the prototype. Afterward, a 20-minute semi-structured interview is performed. The total duration of the evaluation is approximately 45 minutes. The interview can take place online or at a physical location, and the researcher will adjust to the time and location/medium requested by the participant.

Benefits of participating:

The benefits of participating involve supporting a project that educates general practitioners on the health benefits of nature and supporting the introduction of novel ways of healing patients in the Netherlands. Additionally, you will be supporting a student in writing their bachelor's thesis.

Procedures for withdrawal from the study:

- Writing an informal email to the researcher
- Ending the interview at any point in time by leaving the (online) meeting
- Orally informing the researcher about your wish to withdraw

Personal data collection:

No personal data will be collected, including the identity of the participant. Throughout the interview, an audio recording will be made to aid the researcher in transcribing the interview. The researcher may also record notes on paper.

Usage of data:

Confidential information will not be shared publicly. After the transcription of the interview is completed, which is within 3 days of the interview, the audio recording will be deleted.

Retention period for the research data:

The findings based on the collected information during the interview will be published online indefinitely in the thesis repository of the University of Twente.

Contact details of the researcher:

Issa Margherita
i.n.margherita@student.utwente.nl

Contact details of the CIS Ethics Committee to file a complaint:

ethicscommittee-cis@utwente.nl

Appendix Item 5 - Consent Form User Evaluation

Consent Form for Developing a Digital Environment for the Medical Course 'Weg Met de Dokter - Laat de Natuur Jouw Werk Doen'.

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes	Yes	No
Taking part in the study		
I have read and understood the study information, or it has been read to me. I have been able to ask questions about the study, which have been answered to my satisfaction.	□	□
I consent voluntarily to being a participant in this study and understand that I can refuse to answer questions and withdraw from the study at any time, without having to give a reason.	□	□
I understand that taking part in the study involves testing a digital prototype of a product and participating in an audio-recorded interview, for approximately 45 minutes. The audio recording will be transcribed as text and deleted within 3 days of the interview.	□	□
I agree not to share the information I learn during the testing.	□	□
If I gain access to the prototype, I agree to delete it after testing and not share it with anyone.	□	□
Use of the information in the study		
I understand that the information I provide will be used for a published graduation project, available in the thesis repository of the University of Twente.	□	□
I understand that none of my personal information will be collected, including my identity, unless specifically requested or granted permission.	□	□
	□	□
Consent to be audio recorded		
I agree to have my voice recorded.		

Future use and reuse of the information by others

I give permission for the transcripted interview to be archived in the thesis repository of the University of Twente so it can be used for future research and learning.	□	□
I give the researchers permission to keep my contact information and to contact me for future research projects.	□	□

Signatures

_____	_____	_____
Name of participant	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands what they are freely consenting to.

Issa Margherita		05/06/23
Researcher name	Signature	Date

Study contact details for further information:

Issa Margherita

i.n.margherita@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee Information & Computer Science: ethicscommittee-CIS@utwente.nl

Appendix Item 6 - Preliminary User Evaluations

Preliminary Evaluation 1

Loading

- The link in combination with the password worked well, and the user had quick access to the program
- Loading of animations takes quite long.
- Loading is based on internet speed → slow internet speed leads to very long waiting times. Maybe useful to let the user know to access with a stable internet connection.
- The animation between screens is sometimes not very smooth.

Navigation

- It was not clear to the user that they should click on something after the welcome screen ends. The 'next page' button should be animated or attract attention somehow.
- It was not clear to the user how they should navigate around the navigation screen. The small buttons didn't work well. The user mentioned they would have preferred a big arrow to go from one screen to the next. They also didn't appreciate they could only navigate from one screen to the next, and not e.g. from screen 1 to screen 5.
- The mindfulness intermission in chapter 1.2 was missing a 'skip' button. Also, the user kept trying to click the screen itself to skip it.
- The user tried to scroll to the next page instead of clicking. Said that scrolling is a first instinct and feels a lot more natural to do. Also, by pushing up, it feels like you're scrolling without actually scrolling. Maybe pushing from the left feels like you're flipping through a book by clicking, which makes more sense.
- There is a lot of confusion regarding scrolling and clicking inconsistencies.
- On some pages, you can scroll, such as on the reference page. The user mentioned it's confusing to switch back and forth. For example, if you can't scroll on one page, you won't try to scroll to a different page where it might be possible.
- The screen with only a photo is missing a back button.

- The user mentioned they preferred multiple modes of navigating to different screens (e.g. scrolling, dragging, clicking, keyboard arrows). This way, whatever they try first, it works. Additionally, you can accommodate all possible navigation methods that users are used to.

Usage

- The user did not click on the help screen. The user mentioned they noticed the button but decided beforehand it was probably not helpful. Maybe show the user the help screen information from the start, like with the leaf button.
- The user enthusiastically clicked on the leaf button, because they recognized it because they were introduced to it on the welcome screen.
- The user didn't know that you can scroll on the additional information screens. The scroll bar seems to disappear in the exported prototype. Maybe relocate the buttons?
- It is not possible to go from leaf to leaf or from leaf to the next page immediately, you have to click away first.
- The top and bottom buttons on reference pages were appreciated.
- When the program is not in full screen and the internet taskbar is visible, the whole program becomes smaller. Then, white side margins are visible. Because the background of the program is also white, the area that is scrollable for the user becomes unclear. A solution may be to incorporate a very thin line to mark the borders of the program, which are only visible when the program is not in full screen.
- When the user brings the mouse to the top border of the screen, the fullscreen automatically disappears. This could happen often when bringing the mouse to the buttons at the top of the screen. A solution may be to bring the buttons to the bottom of the screen instead of the top.

Aesthetics

- The user mentioned that the whiteness of the empty pages was a bit intense.
- The user should be told that they should use the f11 button to make the program full-screen to get a more immersive experience.

Preliminary Evaluation 2

Opening

- Upon opening the program, the participant was shown a popup that reads: 'Press escape to exit full-screen mode'. However, this is quite confusing the program is not completely full-screen (the internet search bar and tabs are still visible).
- When the participant does press escape, the participant is redirected to an overview of all screens in a grid view. This should not be allowed to happen.

Navigation

- The appearance of the instructions animation takes slightly too long. There is a danger of the user clicking on the screen while it loads, and therefore unintentionally skipping the animation.
- Starting from the navigation screen, the participant clicked on Chapter 1.1 instead of the start of Chapter 1. They mentioned that it didn't look like they were able to click on the Chapter 1 button.
- The contents page displaying the different topics in Chapter 1 is aesthetic and useful but is redundant when combined with the main navigation page.
- Chapter 1 still contained one page with downward scrolling.
- The participant mentioned it would be useful to know when it is actually possible to navigate left and right. E.g., on navigation page 1, you can only go right, but on navigation page 2 you can go left *and* right.
- The participant mentioned it would make more sense to go from chapter 1.1 to chapter 1.2, not direct the user back to the navigation page after pressing 'next' on chapter 1.1.
- The participant mentioned it could be useful to have very small text at the bottom of the screen indicating the contents of the next page. E.g., place a very small text in the bottom right of Chapter 1.1 that reads: 'Chapter 1.2: ...'

Usage

- There is still some unclarity about the full-screen instructions. The welcome page says 'press f11', while the animation video says 'press cmd+ctrl+f'.
- Unlike Participant 1, participant 2 immediately pressed the help button

- The participant immediately understood that they could scroll on the references page
- The registration of the mouse hovering over a button is a bit too slow. While it registers and the participant clicked, nothing would happen. This would be confusing and indicate to the participant that what they were clicking on is apparently not a button.
- Chapter 1 is missing a scroll icon
- The hyperlinks in the reference page should look clickable, by for example underlining them.

Aesthetics

- The participant's screen is larger than the screen of the developer and Participant 1. This allowed for the testing of the responsive resize feature, which worked well.
- The mindfulness intermission video in chapter 1.2 was too pixelated to be aesthetically pleasing. This may be due to the participant's screen being larger, and the video didn't have an appropriate resolution to be scaled up.
- On some pages where text was placed directly on top of an image, the participant felt that the text box could be integrated into the background image slightly better.

Development

- As a test, the developer made changes in the program software. When the participant refreshed the prototype on their laptop, the program was automatically updated. This indicates that the developer does not need to send users new links to the program every time changes are made, and the changes are updated for users automatically without them having to do anything.

Appendix Item 7 - User Evaluations

Evaluation 1

Observations

- The home environment was quite hectic. The participants' dog was barking, the small child was distracting, etc
- The prototype had to be restarted several times because both participants were not paying attention and missed information. Learning how to use the prototype was therefore also a chaotic process. Both participants mentioned it would be nice to be able to pause the videos when something else requires their attention.
- Both participants displayed enthusiastic and positive body language.
- Speed is relatively fast in the user manual
- Instruction to click to the right after the welcome video wasn't clear to the participant
- Without stable wifi the prototype is really unusable
- The clicking to the left and right is a bit unclear. Especially where the bounding box starts
- They had the normal functions of the f keys.
- The pages themselves should be more intuitive, the user guide should not be necessary. You have to think a bit too
- It would be nice if, on the navigation page, you could immediately go back from page 5 to page 1.
- It feels unnatural that you scroll vertically and click horizontally in some sections
- Going back on 1.2 should bring you back to 1.1 instead of the home page
- Participant did not press on the leaves at all.
- Hard contrasts between images and texts. Better blending between images and texts.
- Remove some of the white spaces
- A search function should be incorporated so that you can search for topics
- In the pop-up screens it DOES feel intuitive to scroll
- You have no idea how many pages are still going to come.
- The short mindfulness intermission of 1.2 was very appreciated
- It would have been useful to know where on the navigation page you already visited.

- Show user progress
- When the participant wanted to go back, he wanted to press back on his actual browser
- The exercise in Chapter 2 is a little bit too fast. Also, it should redirect you back to the navigation screen
- Time spent in prototype: 27 minutes. Especially participant 1 was enthusiastic about the prototype and wanted to explore every detail.
- Task: Under one minute

Interview

Wat zijn jullie houdingen tegenover mindfulness en natuurinterventies?

Participant 1: ik vind het heel interessant, want ik geloof er mega veel in. Ik ben er zelf heel veel mee bezig, maar niet op deze manier, maar voor mezelf. Met mensen om me heen ben ik graag buiten. Dat bosbaden bijvoorbeeld, doe ik eigenlijk denk ik al heel lang, maar ik gebruik het dus totaal niet in mijn werk. Ik vind het heel leuk als ik patiënten tegen mij zeggen ja, ik hou heel erg van de natuur en ik ga heel graag naar het bos. En heel soms heb ik het kort met hen daarover. Maar eigenlijk ga ik daar nooit op in. Dus dat is wel interessant. Grappig he? Dat we er niet zelf over beginnen. Ik vind het heel leuk om te doen, maar ik zegen niet tegen patienten dat het heel helend en gezond is. Dat doe ik eigenlijk nooit. Jij wel?

Participant 2: Nee, nee, ik eigenlijk ook niet. En dat is echt een gemiste kans.

Participant 1: Feitelijk wel. Dat realiseer ik me nu.

Participant 2: Mindfulness is wel zeker iets waar ik ook in de praktijk wel regelmatig over begin tegenover patiënten. Meer in één met adem, mindfulness, yoga, meditatie, als mensen met spanningsklachten komen. Dat wel. Maar de natuur? En dan denk ik tegelijkertijd ook ja, er is nog maar zo weinig natuur in Nederland. Ik zit hier nu toevallig redelijk groen, onze omgeveing is eigenlijk zo'n verstedelijkte betonnen massa.

Participant 1: Maar wat Pim dus zegt, je zit in die groene omgeving, en dan kun je van alles vinden, van die kwaliteit van die omgeving. Maar het is natuurlijk niet te vergelijken met een soort van lineaire, door-mensen-bedachte, omgeving. Het is ook voor kinderen.

Participant 2: Het is ook zo dat als mensen de praktijk uit zouden stappen en direct de natuur in zouden stappen het wel weer heel anders zou zijn dan dat we de praktijk uit stappen en in de stad zijn. Maar ja, ik wil er absoluut meer mee gaan doen en ik denk dat zo'n cursus zeker helpt. Zeker ook als je de evidence achter je hebt zeg maar. Als je je verhaal daarmee kunt ondersteunen.

Participant 1: Ja, weet je wat ook het grappige is? In eerste instantie betrek ik het heel erg op mezelf, zo van oh zie je wel, daarom doe ik het zo graag, blablabla, daarom is het zo goed voor mij. En ik wil er eigenlijk meer mee gaan doen met mijn werk. Maar ik ben nog niet in de fase dat ik het kan uitdragen naar patiënten. Dus Ik ben heel benieuwd, ook naar de verschillende deelnemers van die cursus. Je kunt ook al die informatie in verschillende levels tot je nemen of er je voordeel mee doen.

Ja, ik denk dat de cursus echt precies bedoeld is voor mensen die er al een beetje een beginnende interesse in hebben, en dat deze cursus echt laat zien hoe onderbouw je het met wetenschappelijk onderzoek en hoe pas je het toe in de praktijk?

Participant 1: Ik weet dat Pim bijvoorbeeld met dat bosbaden echt uitreikt naar patiënten en mensen het aangeeft als tool, om tot ontspanning te komen. Dat doe ik dus nooit, maar ik zou er een pleidooi voor kunnen houden, want ik doe zelf niet anders, weet je wel. En hetzelfde geldt voor jou, dat doe jij wel. Dat doe ik niet zomaar, dat mindfulness meditatie. Ik ben zelf heel erg bezig met iets dat heet ‘focusing’. Daar heb ik het al heel veel over met mensen. Daar heb ik het wel echt veel over.

Zijn er tijden het gebruik van de prototype emoties opgewekt in jullie, op welke manier dan ook?

Participant 2: Ik voel wel een bepaalde mate van ontspanning als ik hierdoorheen ga. En ook nieuwsgierigheid, en het is zeker op een positieve manier beïnvloed.

Participant 1: Bij mij ook. Dat merk ik echt. Ik. Het komt omdat het onderwerp me erg geïnteresseerd. Die omgeving ondersteunt het zeker ook, maar ook de inhoud. Dat je denkt van oké, ik wil graag die tekst lezen, weet je wel. En wat leuk dat het onderbouwd is en dat je door kan klikken. Dat je erin kan.

Participant 2: Ja, en met de beelden dacht ik echt ook straks zet ik mijn baby in de auto en ik rij naar het bos zeg maar.

Participant 1: Dat is heel leuk, dat jullie dat doen. Dat je dat meteen toepast en dat je meteen ook voelt wanneer je de beelden van buiten ziet: Dit is zo belangrijk, het is zo waar. Dus dat is heel mooi dat je die ervaring in gooit.

Participant 2: En het stedelijke beeld erbij, dat vond ik ook heel goed, want daarmee had ik meteen een gevoel van wow oke, daar moeten we niet zijn. Dat is ook wel goed.

Ja grappig, ik heb veel onderzoek gedaan naar de psychologische effecten van de natuur, en het is heel interessant hoe veel er met je gebeurt mentaal wanneer in je in de natuur zit, maar ook dat zelfs digitale afbeeldingen en video's een heel sterk effect kunnen hebben.

Participant 1: Zeker. Pim en ik gaan vrijdag naar een symposium over het helende landschappen, dus Healing Landscapes. Dus dat heeft ook met dit soort dingen te maken. Ook wat jij zegt, he? Het is fascinerend dat er zo veel natuur in ziekenhuizen wordt ontwerpen, ook kleuren, vormen. Dit ook, die kaart die jij hebt gemaakt met verschillende groentinten, die papier structuur die erin verwerkt is, dat is gewoon fijn, weet je wel. Dat geeft de diepte. Dat is mooi.

Hoe voelden de korte mindfulness pauzes en oefeningen?

Participant 2: Ja fijn, zou ik er zeker in laten.

Participant 1: Er was dus een inleiding. Maar geen uitleiding. En ze zeggen wel een goed einde is net zo belangrijk als een goed begin, weet je wel? Dat zou ik zelf wel prettig vinden. Dit is ook nog een tip, en dit geld voor iedereen anders, dit is gewoon mijn persoonlijke ervaring. Eerst vond ik het heel vervelend dat je bij meditatie je het begrenst en dat je aangeeft we hebben maar één minuut bijvoorbeeld. Maar ik ben erachter gekomen dat het ook heel fijn kan zijn. Dan weet je waar je aan toe bent. Je lichaam weet dat ook en dan kan je toch in die beperking vrijheid ervaren. Terwijl als het in één keer voorbij is, dan is het van oh, dat stipje ging weg, oké.

Participant 2: Ja, was het ook voor mij. Het was een beetje overdonderend.

Participant 1: Ja, Het is een hele fijne oefening en dan verdwijnt die stip ineens voor je. Zonder dat je in de gaten hebt is alles weg. Van oh plop wit scherm, oh jammer. Want wat je zegt is best grappig, over hoe die kleuren, die vormen, die beelden dat digitaal kan ondersteunen - Dan past zo'n keihard wit scherm er dus eigenlijk helemaal niet bij, weet je wel? Haal je je dus helemaal weer uit die filosofie eigenlijk.

Participant 2: Ja, dan ben je weer terug in de kliniek.

Participant 1: Ja, ik denk dat je dat in al je schermen terug zou kunnen hebben. Op die kaart zie je die structuren, je hebt het idee dat je er in kan. Zo'n flat screen is gewoon niks, weet je wel. Al zou het maar een papier structuur hebben, in plaats van puur wit. Dat zou een super vette achtergrond zijn.

Wat vonden jullie van de integratie van natuurbeelden en mindfulness in een leeromgeving? Denken jullie dat ze elkaar aanvullen?

Participant 2: Zeker, absoluut.

Participant 2: Ja.

Hoe geïnteresseerd zijn jullie, na het zien van het prototype van het digitale leermiddel, in deelname aan de medische cursus?

Participant 2: Ja en graag, dit helpt zeker. Want als je het inderdaad in een mail leest of als je het ergens voorbij ziet komen, dan denk je nou oké, mijn interesse is gewekt. Maar dit kan zeker mensen het laatste zetje geven om zich in te schrijven ook. Het zit mooi in elkaar en je merkt gewoon meteen dat het inhoudelijk ook goed onderbouwd is. En ja, dit stimuleert absoluut.

Participant 1: Ja, ik vind ook een paar dingen. Je zet heel erg de tonen, dus je combineert theorie met ervaring en aesthetiek met wetenschap. Dat vind ik heel leuk. Dus de mensen die zich daar niet bij thuisvoelen, die wil je toch ook niet op de cursus hebben en andersom. Dus dat vind ik gewoon goed dat je dat doet. Meteen kleur bekennen, en het straalt echt een bepaalde kwaliteit uit, en daarmee raak je ook iets, snap je? Kijk, voor een deel van de mensen zou het zweverig of zo kunnen zijn, maar omdat je het zo gewoon strak presenteert, dat contrast vind ik wel heel mooi. Snap je? De kaart vind ik super vet omdat het heel veel natuurlijke en wat we net bespraken in zit. En er zit ook iets heel 'edge' achtigs in. Of 'to-the-point' achtig. Dat is een vette combi. En dat is precies volgens mij waar je met die cursus van Pim ook wil zitten, weet je wel. Je wil geen mensen kwijtraken, maar je wil ook geen mensen laten zweven ofzo. Of je wilt mensen aantrekken. Dat komt precies naar voren. Dus het is echt perfect. Supergoede marketing.

Zien jullie jezelf de uiteindelijke versie van dit prototype gebruiken in je vrije tijd? En waarom of niet?

Participant 2: Dat hangt er denk ik helemaal vanaf of je of je intrinsiek of extrinsiek gemotiveerd bent om de cursus te volgen. Als je extrinsiek de cursus volgt, dan ben je blij dat je er punten voor krijgt. Maar dan kan ik me zeker voorstellen dat je dit als naslagwerk zult gebruiken in de praktijk. Als je denkt oh ja, hoe zat het ook al weer inderdaad met met die evidence voor dit of dat. Als je zelf een praatje erover in de praktijk wil houden voor je collega's of voor je waarneming groep dan is het gewoon fijn dat je gewoon nog eens na kunt slaan. Dus ja, ik denk dat mensen die het puur voor de punten doen, die zullen misschien niet heel snel er bij terugkomen, maar als het jou echt geraakt heeft

en geboeid heeft, dan vind je het fijn om het nog eens terug te kunnen zien. Dat merk ik tenminste met nascholingen, dat ik de nascholingen die ik interessant vind, daar ben ik heel blij als ik de slides kan opslaan of als je nog iets toegestuurd krijgt, dan heb ik het hier op mijn MacBookje staan voor een later moment om het nog eens terug te zoeken.

Participant 1: Ik zat nog te denken, misschien kan je wat extra punten versleutelen? Als je mensen wil binden aan die omgeving of daar nog meer dingen in kwijt wil. Zo van, ja, je kan nog dit of dat doen en dan krijg je er nog een punt bij.

Participant 2: Is er ook een toets involved? Dat is nogal veel het geval in nascholingen, dat je dat moet doen om een punt te krijgen. Maar dit is natuurlijk een praktische nascholing, zeg maar.

Participant 1: Krijgen jullie accreditatie hiervoor?

Pim gaat het begin juli aanvragen.

Participant 1: Dat zou echt knap zijn, jongen. Wel een dure grap, he? Dat is een dure hobby, omdat voor elkaar te krijgen. Dat 'focusing', wat ik heel interessant vind, is iets dat psychologen en psychiaters allemaal doen met allerlei proeven en dat wordt allemaal goedgekeurd. Maar voor huisartsen is dat is lastiger blijkbaar. Voor mij is het echt onbegrijpelijk. Maar goed, het zou super tof zijn als zoiets als dit, eh ja, voor mij is dit een bijzaak, maar dat reken maar dat voor veel mensen dit ook echt een drempel is om het wel of niet te kopen. En ik weet niet of deze omgeving dan dan eindeloos beschikbaar blijft. Dat zou ik dus heel leuk vinden zelf, maar ik vind het dus echt wel interessant, weet je?

Participant 2: Of dat je de slides ervan in ieder geval zou kunnen opslaan. Misschien de omgeving niet, maar in ieder geval de platte informatie beschikbaar blijft en kan opslaan. Ik moet even billen verschonen (baby).

Participant 1: Of dat als je bepaalde dingen doet, dan kun je door naar een nieuw deel Dit geeft voor mij ook het gevoel van iets ontdekken. Ik zou wel benieuwd zijn, als er een next-level oefening, of als je dit en dat heb gedaan dan kun je de rivier oversteken. Ik zeg maar wat. En ik weet niet wat voor sequels er nog gaan komen, dat je de kaart ook niet hoeft te laten eindigen. Dat vind ik zelf ook altijd mooi van de natuur, er is een

rand van alles.Je kan heel integraal naar iets kijken, hele ingewikkelde zaken kun je ervaren in zijn totaliteit. En dan is er is altijd een rand. En na die rand is er altijd nog meer, snap je? Ja, dat is ook iets in de natuur. Het houdt nooit op hè? Dus je kan het zo designen, dat je ziet van oké, nu was er een eindpunt en nu kom je op een soort schiereiland.

Ik dacht dat is juist wel satisfying, maar jij zou het leuker vinden als het nog doorloopt?

Participant 1: Ja, dat is fijn, daar zit ook iets in. Als ik puur naar mijn gevoel luister, koppel ik dit echt aan een schiereiland, snap je? En dan denk ik oh, ik moet ik terugkeren.

Waren er onderdelen van het systeem die je zou willen veranderen of die je in het systeem zou willen zien?

Participant 1: Wat ik dus zei, die zoekfunctie is iets om over na te denken. Maar weet je wat ik me ook af te vragen? Het is ook gewoon iets wat nu in me opkomt en nog heel even stilstaan erbij. Die oefeningen zijn heel fijn om te doen. Die zitten natuurlijk gefixeerd, die komen niet zomaar. Ik kan me nog twee dingen voorstellen. Ik weet niet of je die op die kaart terugvindt. Ik kan me ook voorstellen je een plek zou kunnen maken dat je zegt van oh ik, ik wil nu mijn schouders even laten zakken, weet je wel, ik wil nu even verbonden, dat je even terug kan naar die plek in de kaart. Maar dat gaat misschien al te ver. Ik heb wel eens oefeningen gedaan dat zeg maar mensen op zo'n klankschaal slaan dat je van alles aan het doen bent, dat je opeens oké, en een andere modus komt ook om weer, ook om weer die staat zeg maar zoveel mogelijk te doorbreken. Snap je? Op een geven moment ben je zelf ook lineair bezig. En die mix ben je volgens mij aan het zoeken, van hoe lineair wil je zijn?

Ja precies. Het is erg een balans zoeken. Als mensen dingen aan het leren zijn en theoretische informatie aan het absorberen zijn, dan wil je ze alert en engaged hebben. Maar aan de andere kant wil ik ook dat de gebruiker in een kalme staat gebracht wordt en op een mindful manier door het de contents heen gaat.

Participant 1: Ja. En dat kan heel erg in een oefening zijn, en of jij verticaal gefocust bent of horizontaal gefocust bent. En je kan het versterken zeg maar, ook in dit soort

tweedimensionale omgevingen, kan je die ervaringen toch meegeven met dat soort trucjes. Maar dat is misschien wel een beetje beyond. Maar een plek op de kaart waar je heen zou kunnen gaan zou een idee kunnen zijn.

Additional questions that were not explicitly asked due to time constraints, but answers can be summarized through observations from the interaction session:

What did you think about the aesthetics of the prototype?

- Participants 1 and 2 agreed both enjoyed the videos and natural imagery and often complemented the graphic style on its colors and organic shapes.
- Both participants agreed that sometimes the images and white screen were too contrasting. They said that preferably, the white would be better integrated, by for example giving it a paper texture.
    - Participant 1: De kleur naast het plaatje is nu wit. Je hebt hele harde contrasten. Wat ik in het landschap heel erg jammer vind in Nederland bijvoorbeeld is een hele grote contrast tussen natuur en cultuur. De trends zijn altijd heel hard en dat heb ik nu ook. Je hebt dan een plaatje en dan je teksten. Als je een kleur zou geven of een vaagheid of een structuur zou geven die uit dat plaatje komt, dan blend je die dingen misschien meer.

What did you think about the rate at which information was exposed to you?

- Participants 1 and 2 both agreed that the videos should be pausable
    - Participant 1: “Ik heb de neiging om, als er iets gebeurt, even op pauze te kunnen drukken. Want ik denk oh, er komt iemand binnen, en dan denk ik oh fuck, ik wil niks missen”
    - Participant 2: “Het is fijn als je op elkaar kunt reageren en om dit in je eigen tijd te doen s avonds. Thuis zijn er ook kinderen of wat dan ook, en dan is het fijn als je even kunt pauzeren”
- Both participants enjoyed the welcome video and its tempo

- Both participants approved of the concept of showing less information at first, and providing users the opportunity to explore more elaborate information through the leaf buttons

How difficult did you find it to understand how to make use of the system?

- Participants 1 and 2 often missed instructions because they weren't paying attention. Because of this, understanding how to use the system was a confusing and chaotic process. Once they actually absorbed all the instructions, the navigation went quite smoothly.
    - Participant 1: Je doet het in je eigen tijd. De kinderen verdwijnen doorheen je, je familie struint doorheen. Iets anders gebeurt. Je wordt gebeld. De fluitketel die. Jij en je denken weet je wel, wat heb ik nou net gelezen? Dat heb ik net gezien. Ik wil even terug. Wat was dat nou? Ja of gedachteloos? Heb je een paar dingen aangeklikt?
- Both participants agreed that sometimes the navigation wasn't very intuitive when there were sections that you could suddenly scroll on. The pop up 'leaf' screen however, were intuitively scrollable.
- Participant 1 mentioned that it would be useful to know how many more pages you can expect, by either putting a number at the bottom, or by also giving an overview of all pages.
- Overall, navigating through the system was successful
- Both participants agreed it would be beneficial to keep a record of the progress of the user.

How suitable is the tool in the context of a medical course?

- Participant 1 mentioned that:
    - The prototype emits a feeling of quality
    - The prototype effectively combines theorie and science with aesthetics
    - The prototype effectively draws in the people that would also be interested in the medical course, and filters out the people who would not be interested in the medical course.
    - That he gets excited to sign up for the course when looking at the prototype
    - A search function would be very useful to quickly be able to search for certain topics or certain illnesses.

- Participant 2 mentioned that:
    - The prototype is built beautifully and that you immediately notice that the contents are well-supported.

Evaluation 2

Observations

- The prototype starts off muted, users have to unmute first to hear audio.
- The participant clicked to the right of the screen after the instruction told her to do so, which caused her to accidentally skip the instruction video.
- It was not clear to the participant that they had to click on the right side of the screen after the navigation video
- It was unclear to the participant where to click or what to do after being on the navigation page
- The participant did not scroll on the chapter 1 page
- The participant liked the analogy of the leaf buttons, where the growth of the leaves meant showing more content
- The instruction video took too long to load, the participant had to reload the page
- Participant repeatedly mentioned that the prototype looked great visually
- *Time spent on the prototype*: 6 minutes. Observation: The participant was naturally able to navigate through the prototype, and very quickly went through all the contents.
- *Task*: Under one minute. Smooth.

Interview

Wat is je houding tegenover mindfulness en natuurinterventies?

Ik sta wel ook voor, maar ik weet er niet veel van. Ik pas het niet toe, dagelijks.

Heb je interesse in het wél dagelijks toepassen? En eventueel om mee te doen aan de cursus?

Als Pim het niet zou doen, dan zou ik er ook niet per se in nascholen. Maar ik ben gewoon nieuwsgierig wat hij er van gemaakt heeft. En ik ben ook wel een beetje skeptisch. Ik ben niet zo'n yoga snuiver als Pim, maar daarom juist des te grappiger omdat wij daarin niet echt per se op één lijn zitten. Maar ik ben er van overtuigd dat er veel meer in de natuur kan zitten en ik ben ervan overtuigd dat als mensen meer buiten zijn in de natuur en dat ze ook blijer zijn. Dus ja, ik, ik sta er wel open voor, nogmaals, maar ik ben er niet actief mee bezig.

Hoe voelt het dan voor jou, als niet super mindful persoon, om die korte mindfulness pauzes en die oefeningen te doen?
Ik heb ze natuurlijk niet echt gedaan, maar ik denk het wel heel goed is. Ook om te ervaren dat je daar zelf rustiger van wordt. Ik heb ooit een keer mindfulness training gehad en het is nu eigenlijk alleen maar een moment om te ademen. En dat doet wel wat met je. Ik ben alleen zelf niet zo heel goed daarin, om dat te doen. Ik ben er nu wel een beetje toe gedwongen, dus dat is wel goed denk ik

Is je emotionele toestand beïnvloed door het prototype op welke manier dan ook? Indien ja: op welke manier?
Ik merkte wel bij het begin met dat bos en met dat geluid van die vogeltjes en die krekels dat dat wel wat doet met je. Dan denk je oh ja, lekker dat. Dat gevoel heb je wel. Alleen omdat je dan natuurlijk daarna ook gewoon weer lappen tekst gaat lezen ga je wel weer terug naar de realiteit. Maar ik vond dat tussendoor wel heel geinig en ik vond het ook wel dat het een soort film was, en je door het bos ging. Dat was echt leuk.

Wat vond je van de integratie van natuurbeelden en mindfulness in een leeromgeving? Denk je dat ze elkaar aanvullen?
Ja, dat denk ik wel. Ik ben ook iemand die heel visueel is georiënteerd. Net zoals dat als ik dingen hoor, ik ze veel beter kan internaliseren dan wanneer ik dingen lees. Dus ik denk juist door dat even voorbij te laten komen, dat je voor mensen zoals ik, die dat visueel snel oppaken, dat het dan ook even is van oh ja, het is ook wel heel relaxed om in het bos te zijn. Oh ja, je wordt ook heel rustig van die krekeltjes en die vogel geluidjes.

Wat vond je van de snelheid waarmee informatie aan je werd getoond?
Ik vond niet dat je te veel moest doorklikken voor meer informatie. En ik vond de verhouding per pagina van de tekst ook echt prima. Alleen ik vond het wel bij de dingen dat je moet lezen met een soort timer, dat ging mij net even te snel. Als ik fully focused was gaat het prima, maar als ik dus eventjes kijk naar mijn waterfles voor één seconde, dan was het weg. Ik ben wel een trage lezer, dat moet ik eerlijk toegeven.

Hoe moeilijk vond je het om door het systeem te navigeren?

In principe is dat links / rechts klikken wel heel logisch. Je zou eventueel nog kunnen overwegen of het dan niet toch fijn is om een klein pijltje links rechts te zetten. Dus hier een pijltje en hier dat het duidelijker is dat als je aan deze kant van het scherm klikt dat er dan een stap naar links is. En verder denk ik dat nu een heel mooi pad heb uitgestippeld. Ik denk dat het wel leuk is om het pad dat je hebt bewandelt te zien. Dat zou wel cool zijn, als dat kan. En misschien zou je ook nog, voor mensen die blaadjes een beetje laten pulseren of zo, zo van je kan hier op drukken. Op mijn mac heb ik ook soms zo'n icoontje die steeds ook onderin je scherm zo omhoog springt van hey, ik wil wat doen of ik sta open.

Dat vind je fijner, en niet afleidend als je aan het lezen bent?

Ik denk dat het uitnodigend is. Je zou het ook bijvoorbeeld gewoon bij het eerste hoofdstuk ofzo kunnen doen en dat het daarna misschien weg is, maar dat mensen eventjes even denken van oh ja, shit, ik kon daar op drukken. Of ik weet niet of je zo'n systeem kan bouwen dat als iemand er niet op heeft gedrukt in het eerste hoofdstuk dat je dan een soort reminder stuurt van hey, weet je nog dat je daar op kan drukken als je meer informatie wil? Maar ik kan me voorstellen als al die blaadjes in je scherm gaan dansen dat dat misschien inderdaad ook een beetje heftig is voor mensen die prikkels niet zo heel makkelijk verwerken.

Wat vond je over het algemeen van de esthetiek en het grafisch ontwerp?

Mooi, heel mooi.

Hoe geïnteresseerd ben je, na het zien van het prototype van het digitale leermiddel, in deelname aan de medische cursus?

Ik denk dat als je in zo'n hoofdstuk vrijgeeft waarin dus al die gezondheidsvoordelen staan, dat er grote medische onderzoeken zijzn gedaan met mensen met spetterende uitkomsten, met zo'n filmpje erbij met dat beeld en die vogeltjes, dat dat wel heel uitnodigend is.

Zie je jezelf de uiteindelijke versie van dit prototype gebruiken in je vrije tijd?

Ik denk eerder dan om het aan iemand anders te laten zien. Maar dat wil je eigenlijk niet, toch? Je wil eigenlijk dat ze dan ook die nascholing gaan doen. Als ik nou in de nascholing heel veel

interessante dingen leer en die slides worden gedeeld, gebruik ik ze dan bijvoorbeeld mensen buiten of binnen mijn praktijk ook iets te leren. Als je doel is om dat verder uit te breiden, dan is het goed. Maar als je daarmee klanten mist voor je nascholing, dan is het weer suf.

Wanneer jij inhoud deelt van betaalde nascholingen met anderen, weet jij of dat wel zomaar mag?

…Dat weet ik niet… maar ik ga er niet een grote presentatie over geven. Maar bij wijze van spreken leer ik iets in een nascholing, staat het in een slide, en dan kan ik bijvoorbeeld de POHS hier iets over vertellen of de assistente iets over vertellen. En dan kan ik die slides gebruiken om daar even te denken hoe zat het ook al weer? Ik ga niet copy paste die slides aan hun laten zien, maar meer gewoon als een soort naslagwerk.

Waren er onderdelen van het systeem die je zou willen veranderen of die je in het systeem zou willen zien?

Nee, maar voor de rest ziet het er echt super mooi uit vind ik eigenlijk.

Vindt je het een gescikte tool om te gebruiken als hulpmiddel bij nascholing?

Ja, zeker. Het ziet er super cool uit.

Evaluation 3

Observations

- The first participant so far to actually focus on the welcome video and instructions video and exercise video. Because they paid attention to the instructions, they were able to navigate very well through the prototype.
- Also the first participant to say that the speed of the breathing exercise was perfect.
- Participant asked if the welcome video could be paused
- Loading times were quite long. Especially the user guide didn't want to load, the participant had to refresh the browser.
- The participant didn't know they had to click right after the instruction manual
- The chapter 1 page was a bit confusing, with the scrolling.
- Participant would like to see which places she already visited on the map
- The reference page on chapter 2 was pixelated for some reason.
- Participant mentioned the welcoming video was very clear
- Participant mentioned that telling the user to use the prototype in a calm setting was very useful
- Time spent in prototype: 11 minutes
- Task: The participant wasn't initially sure how to navigate to the reference page, she asked whether that should be done via the instructions page. She then successfully navigated to the references. However, upon trying to return to the home page, she confused the home button with the home button on the instructions page.

Interview

Wat is je houding tegenover mindfulness en natuurinterventies?

Mindfulness werken wij ook mee in de praktijk. Niet dat we dat zelf doen, maar wel voor verwijzen en daar ook zeker het nut van inzien. Natuurgeneeskunde kan ook weer heel erg samenhangen met mindfulness. Ik werk in een huisartsenpraktijk met veel mensen met een lage sociaaleconomische. Waarbij er toch ook veel psychosociale problemen zijn. Dus mensen komen veel met lichamelijke klachten die niet hun oorsprong hebben in het lichaam en dan proberen wij mensen ook meer in contact te brengen met lichaam, geest. Bijvoorbeeld, waar we patiënten dan op wijzen is de vijf-vijf Coherent Breathing, wat denk ik een klein beetje lijkt op wat ik net voorbij

zag komen. In ieder geval is de gedachte erachter hetzelfde. Dus als je ademhaling vertraagt, vertraag je ook je hartslag en kalmeer je het zenuwstelsel waar een groot deel van de problemen ook dan ontstaat. Dus ik zie allemaal elementen die heel erg toepasbaar zijn en ik zie natuurinterenties echt als complementair. Ik zie wel best wel wat patiënten die alternatieve oplossingen zoeken voor hun problemen omdat de reguliere geneeskunde niet echt hen kan bieden wat ze nodig hebben. Maar soms zie ik dingen voorbij komen waar ik dan wel moeite mee heb. Bijvoorbeeld ik heb wel eens een natuurarts voorbij zien komen die dus totaal de verkeerde antibiotica voorschreef. Of eigenlijk patiënten helemaal weghouden bij de reguliere geneeskunde. En daar ben ik niet een voorstander van. Maar ik ben wel voorstander van dat het complementair is aan de reguliere geneeskunde omdat het mensen dingen biedt die ze nodig hebben en dan op die manier kunnen vinden bij een meer holistische benadering. Lichaam en geest is niet los van elkaar te zien. Dus wat ik tot nu toe in de gauwigheid voorbij zie komen bij deze nascholing, speelt dat heel erg daar op in. Dat zijn dingen die je er bij kan doen. En het kan zeker ook betekenen dat je bepaalde dingen dan niet meer nodig hebt. Een psycholoog of slaapmiddelen. Maar ja, sommige behandeling zoals suikerziekte heb je natuurlijk ook gewoon medicijnen nodig. Dat kan je niet altijd alleen maar behandelen met gezond leven en dat soort dingen. Ik denk in ieder geval dat er binnen mijn praktijk wel huisartsen zijn die hier al dingen mee doen en die hier ook zeer zeker in interesseert zouden zijn.

Hoe geïnteresseerd ben je, na het zien van het prototype van het digitale leermiddel, in deelname aan de medische cursus?

Hangt voor mij een beetje af van de tijdsinvestering. En hoe diepgravend het is. Ik vind het wel leuk om dingen eruit te pikken die je ook praktisch kan gebruiken in de huisartspraktijk. Maar als het heel diepgravend zou gaan over en over natuur, geneeswijzen en bijvoorbeeld bepaalde kruiden en planten, wat voor mij dan weer naar een andere soorty vorm van huisartsgeneeskunde gaat, antroposofische huisartsgeneeskunde, waar natuurlijk ook gekeken wordt naar natuurproducten, kruiden en dat soort dingen. Dan zou je me een beetje verliezen. Maar de dingen die ik tot nu toe voorbijgekomen, daar doen wij ook al dingen mee. Niet dat we mensen in een bos laten zitten. Alhoewel ik wel vind dat de natuur ingaan en wandelen en bewegen. Wij hameren heel erg op bewegen, dat dat helpt. Dus ik heb er zeker interesse in. Het hangt er bij mij wel een beetje vana hoe het programma eruit ziet en wat de tijdsinvestering is.

Hoe voelden de korte mindfulness pauzes en oefeningen?
Ja, vond ik wel leuk. Ik denk dat die ademhalingsoefening ook leuk was. Over die 'laat je schouders zakken', ik had het wel door, maar het was vrij kort, dus dan vraag ik me af, wordt het dan opgepikt als dit is iets waar ik iets mee moet? Of kan ik me afvragen of iemand dan snapt wat de bedoeling daarvan is? Maar ik vond het heel leuk, want ik dacht oh ja, mijn schouder kan nog wel even naar beneden.

Wat vond je van de integratie van natuurbeelden en mindfulness in een leeromgeving?
Ik vond het heel mooi. Ik vond die foto's heel mooi en passend en het opening filmpje ook heel prachtig. En ik vond het ook goed dat er ergens een melding is van ga even ergens zitten waar je ook de rust hebt. En toen dacht ik het is ook goed om heel even bewustzijn te maken van dat je beter leert als je ergens rustig zit. Ergens niet storend, in ieder geval. Maar misschien vinden sommige mensen van je je kunt me niet vertellen hoe ik deze nascholing moet doen. Maar ik vond het wel goed om even dan te bedenken, zit ik wel op een rustige plek, ben ik wel goed voorbereid om goed informatie in me op te kunnen nemen?

Is je emotionele toestand beïnvloed door het prototype op welke manier dan ook?
Ja, ik zou het niet een emotie willen noemen, maar het gaf me wel een gevoel van rust. Vanwege de kleuren. Groen is een rustig makende kleur en het begint ook plaatjes en filmpjes van natuur die zijn er in zijn verweven dus dat wekt wel een beetje een gevoel van rust.

Zie je jezelf de uiteindelijke versie van dit prototype gebruiken in je vrije tijd?
Nou, misschien als ik iemand anders wat wil leren. Ik leid huisartsen op. Dus dat ik me dan kan voorstellen van nou, bekijk dit hoofdstuk eens. Ik weet niet of ik zelf dan weer snel zou terugbladeren. Het is ook lastig te zeggen, want dat kan ik eigenlijk pas zeggen als ik de hele cursus heb gedaan. Huisartsen zijn hele praktische mensen, dus voor mij zou het fijn zijn als deze cursus niet alleen mijzelf meer leert, maar ook een verbinding maakt met de praktijk. Dus, hoe kan je dit nou gebruiken voor je patiënten? Dus ik zou het dan fijn vinden dat je makkelijk kan vinden, stel ik heb een patiënt op het spreekuur en ik zie dat de ademhaling heel hoog is en ik probeer die patiënt de verbinding te laten maken met de lichamelijke klachten en de ademhaling. Dan zeg ik, misschien

moet je eerst ademhalingsoefeningen thuis gaan doen. Dan vind ik het fijn als ik bijvoorbeeld hieruit iets kan gebruiken waar de patiënt wat mee kan. Dus het materiaal. Meestal zeggen wij tegen patiënten ga op YouTube kijken en kijk naar vijf-vijf coherent breathing en dan volg je gewoon een filmpje. Adem in, adem uit en dan probeer je dat op het tempo van het filmpje te doen, en dan hopen we dat patiënten, meer rust en kalmte kunnen ervaren. Dus dan zou ik er denk ik meer gebruik van maken. En het hangt er ook een beetje vanaf hoe je de omgeving aanbiedt. Je bied het dan online aan neem ik aan. Dus dan zou je moeten inloggen op een website?

Je hebt geen inlog nodig om er gebruik van te maken.
Ja. Ik denk dat het afhankelijk voor mij is hoe makkelijk je de dingen kan vinden waar je nog een keer op terug wil kijken of waar je eventueel gebruik van wil maken. Van oja, dit vind ik een handige oefening, wil ik graag aan mijn patiënten uitleggen, is er dan een linkje wat je kan kopiëren en aan patiënten zou kunnen sturen. Dat soort dingen. Ik denk dat je er dan meer gebruik van zou maken. Ik weet natuurlijk niet precies wat de insteek van de nascholing is. Want als het echt is, we willen de huisarts iets leren, meer over dit onderwerp en ook misschien over jezelf? Of wil je ook echt de huisarts hele concrete tools bieden om het in de praktijk te gaan gebruiken?

Alle twee, de eerste hoofdstukken leggen theorie neer, en in hoofdstuk 5 wordt uitgelegd hoe je de theorie toepast in de praktijk.
Ja oké.

Waren er onderdelen van het systeem die je zou willen veranderen of die je in het systeem zou willen zien?
Dat is denk ik lastig om te zeggen. Moment. Dat mijn kind ja. Nee, ik kan het nu niet even één twee, drie zeggen, want het is natuurlijk nog maar een heel klein beginnetje.

Je noemde bijvoorbeeld eerde dat je het fijn zou vinden als je heel snel dingen kan vinden. Dus misschien heb je een tip qua navigatie?
Nou, ik kan me wel voorstellen dat inderdaad nadat je het hebt helemaal doorlopen en je denkt ik wil nog even wat weten, maar waar stond dat ook alweer? Dan weet je natuurlijk ergens nog wel een woord wat je dan op de site zou kunnen zoeken. Dat is misschien wel fijn dat je dan zoiets kan

doen. En waar we het al even eerder over gehad hebben gehad, dat het bij mij in begin niet helemaal duidelijk was wat heb ik nou gehad en wat heb ik al gelezen, en wat ik heb ik nog niet gelezen?

Wat vond je van de snelheid waarmee informatie aan je werd getoond?
De handleiding was niet te veel informatie en het ging ook niet te snel. Dus dat vond ik echt prima en daardoor was het redelijk duidelijk. In het begin had ik niet helemaal door waar ik moet kilkken, want normaal gesproken als je links of rechts klikt zie je dus vaak een klein pijltje, maar ik snap ook dat je het weg wil laten voor het grafische van de website, maar dat was mij in het begin niet helemaal duidelijk. Dat je dus gewoon op rechts kan klikken, dus misschien kan je daar nog wat mee. Qua informatie op een pagina. Was het niet te veel. Vor wat ik tot nu toe heb kunnen vinden is is dat overzichtelijk en fijn.

Wat vond je van de esthetiek van het prototype?
Ik vind het grafisch mooi gedaan. Ik vind het lettertype mooi. De zinnen staan niet te dicht op elkaar. Het is duidelijk dat dit het hoofdstuk is. Hele mooie foto's, die vind ik echt heel mooi. En ik vind de kaart ook leuk gedaan. Ik hou heel erg van groen. Dus dan heb je mij al. Ik vind het. Maar ik vind het heel mooi gedaan omdat je een hele mooie natuurlijke vorm hebt gebruikt. Dat vind ik passend bij het onderwerp. Eik zie dit als een pad wat je bewandeld, en net als door het leven ga je ook op een pad. Dit is het pad van de nascholing. Dus ja, ik vind het heel mooi gedaan.

Hoe geschikt is de tool in de context van een medische cursus?
Ja, want dit is dan niet *de* nascholing hè?

Nee. De echt nascholing is een drie-daagse cursus in het bos.
Oke, dus er is ook een fysiek gedeelte van de nascholing. Ik zat inderdaad denken, als het alleen maar dit is, dan is het wel een beetje saai. Zeker is het natuurlijk wel mooi als je dit kan ervaren ook. De eerste hoofdstukken zijn natuurlijk vooral een onderbouwing van waarom dit behulpzaam kan zijn in de geneeskunde, maar ik kan me voorstellen dat het heel fijn is dat dat je even kan nog even kan nalezen wat er gezegd is. Normaal gesproken, als er een nascholing is, dan schrijven mensen dingen op of maken vaak ook screenshots of foto's van de powerpoints en zo. En dan

zeggen ze wel ja wie wil kan de powerpoints krijgen en dan krijg je de hele powerpoint opgestuurd. Daar doe ik nooit wat mee, want dat vind ik niet een mooie manier om iets terug te vinden, want dan moet ik eerst door al die dingen bladeren enzo. Terwijl dit ziet er dan wel heel mooi uit. Zeker als er een zoekfunctie nog zou zijn dan kan je alles terug vinden.

Additional questions that were not explicitly asked due to time constraints, but answers can be summarized through observations from the interaction session:

How difficult did you find it to use the system?

- The participant paid attention to the instructions and was able to fluently navigate through the program. There were some initial questions about where to click, however. The participant also found the navigation through the map very clear and a good overview of topics. Lastly, the participant was smoothly have to scroll on the specific areas that contained scrolling.

Evaluation 4

Observations

- Loading time for starting animation was quite long
- The newly implemented clicking indications at the end of the videos worked well.
- Participant almost clicked to the right after the instructions video told her to click to the right. The animation should flow more and not stop, to prevent people from clicking prematurely.
- Participant didn't understand they had to click right after the instructions guide, but they missed the indication that they should do so.
- Participant initially didn't understand they could click right to go to the next navigation page. The arrow should be animated.
- Participant immediately scrolled on chapter 1 page
- Participant navigated through the system extremely well.
- Time spent in prototype: 8 minutes
- Task: went smoothly and quickly

Interview

Wat is je houding tegenover mindfulness en natuurinterventies?

In principe positief.

Is je emotionele toestand beïnvloed door het prototype op welke manier dan ook?

Het is wel rustgevend.

Hoe voelden de korte mindfulness pauzes en oefeningen?

Ja, dat vond ik wel leuk.

Wat vond je van de integratie van natuurbeelden en mindfulness in een leeromgeving?

Ja, op zich wel, maar ik vind de kaart voorbeeld veel mooier dan de waterval de hele tijd. Ik denk dat ik een beetje neutraal sta tegenover die plaatjes, het zijn een beetje van de cliche plaatjes. Maar ik heb ben niet per se voor of tegen, maar dit vind ik veel mooier. Dit is wat artistieker, wat

anders, maar wel heel rustgevend en natuurlijk. Je hebt altijd standaard op wat voor dingen dan ook altijd zo'n waterval en dat gekletter op.

Wat vond je van de esthetiek van het prototype?
Het is wel heel veel tekst, wat op zich normaal is. Als je een boek leest is het natuurlijk ok zo. Andere e-learnings zijn wel veel interactiever. Dat je een stuk leest of een stuk ziet en dat je daarna ook gelijk een over vraag beantwoord. Ik denk wat het voordeel daarvan is, is dat je dan dus iets actiever erin mee bezig bent. Dit is meer dan informatie geven, maar ik denk dan heb je iets gelezen, en als je dan na een tijdje toch even een vraag erover moet beantwoorden dan oh ja, wat heb ik ook weer gelezen?

Wat vond je van de snelheid waarmee informatie aan je werd getoond?
De snelheid was oké.

Zie je jezelf de uiteindelijke versie van dit prototype gebruiken in je vrije tijd?
Dat hangt denk ik heel erg van af. Ik denk als jij zelf iets wil toepassen wat je hebt geleerd, wat je even vergeten bent, misschien wel ja. Misschien als korte referentie naar iets wat je leert, een ademhalingstechniek die je hier hebt geleerd of zo die je aan een patiënt geven.

Als jij andere nascholingen doet, zijn het dan vooral voor praktische redenen of voor dingen die je kunt toepassen in de praktijk dat je dan nog het lesmateriaal achteraf openmaakt?
Ik heb eigenlijk nog nooit nascholing gehad waarbij je het lesmateriaal nog kan open maken daarna. Of tenminste, dat wist ik dat dat kon. Je krijgt wel vaak de powerpoint, en die kijk ik echt nooit. Wat ik meestal doe is omdat ik weet dat ik dat dan niet ga doen, want dat staat dan ergens in een mapje, dat ik toch in mijn iPhone in een notitie wat schrijf. En dan dingen die mij dan opvallen tijdens het lesblok. Die echt belangrijke dingen die wil ik echt wil onthouden, die schrijf ik dan even op of ik maak een foto. Zo doe ik het altijd. En ik denk, maar dat weet ik niet zker, maar dat de meeste het ook zo'n beetje doen. Komt omdat je natuurlijk ook op zoek kan naar de powerpoint, maar dan moet je eerst in je email zoeken waar het ookalweer was. Dat moet je in de powerpoint zoeken waar het was, wat je wilt weten. In die zin is zo'n leeromgeving dan beter, omdat je in ieder geval makkelijker kan zoeken waar het was, op zijn minst omdat er een inhoudsopgave staat. Ik

denk inderdaad dat dit wel toegankelijker is dan een PowerPoint terugkijken. Dus misschien iets eerder wel dan.

Hoe moeilijk vond je het om te begrijpen hoe je het systeem moet gebruiken?
Het was zeker te doen met de instructies. Ik denk dat het enige inderdaad was dat ik dat dingetje niet had gezien, dat je dan naar rechts moet klikken.

Waren er onderdelen van het systeem die je zou willen veranderen of die je in het systeem zou willen zien?
Niet dat ik zo één, twee, drie kan bedenken. Het ziet er goed uit, zou ik zeggen.

Hoe geschikt is de tool in de context van een medische cursus?
Ik denk het wel. Ik heb dus nooit eerder zoiets gezien. Meestal is een e-learning in ieder geval wat lelijker en wat statischer, maar hebben wel meer filmpjes, meer en meer plaatjes en meer opdrachten. Maar de vormgeving is veel lelijker. Tenminste, daar wordt totaal niet op gelet.

Hoe geïnteresseerd ben je, na het zien van het prototype van het digitale leermiddel, in deelname aan de medische cursus?
Zeker, op zicht wel. Het is een beetje lang voor mij en ik denk dat dat voor veel mensen misschien zo is. En dus als er geen accreditatie is, dan zou ik het denk ik niet doen, maar puur vanwege de lengte. Ik denk dat het de middag is en ik ben er erg in geïnteresseerd zou ik het ook nog wel zonder accreditatie doen? Maar drie dagen, dat is wel echt heel lang voor punten die je wel nodig hebt en dan niet krijgt. Maar ja, zeker.

Evaluation 5

Observation

- The initial play button could be more clear that the user should click on it
- The welcome video should be more clear that you can skip it the
- The names of the page behind should not be visible when the instructions video pops up
- The instructions video should be clickable. Keeps the user more engaged and is better for GPs that read faster
- It's not visible that you are able to skip the mindfulness exercise
- Referenties 2 is pixelated
- Referenties 1 is not accessible
- The participant mentioned it would be nice to make a separate spot on the map for the mindfulness exercise
- Time spent in prototype: 12 minutes
- Task: completed successfully and smoothly.

Interview

Wat is je houding tegenover mindfulness en natuurinterventies?

Ik vind dat we het allemaal veels te weinig doen en dat er meer onderzoek naar gedaan moet worden zodat we het aan zorgverkeraars kunnen verkopen en dat het zinnig is om in te zetten.

Is je emotionele toestand beïnvloed door het prototype op welke manier dan ook?

Nee. Nouja, een soort van geamuseerde geinteresseerdheid zovan oja, wat leuk om te zien hoe Pim dit heeft vormgegeven. Ik wordt niet geirriteerd, en ik wordt ook niet per se heel blij. Ik vind het wel mooi vormgegeven.

Hoe voelden de korte mindfulness pauzes en oefeningen?

Aan de ene zijds spreekt het me aan, aan de andere zijd, omdat je niet zo goed kan plannen, is het misschien… Tja, ik zit een beetje te twijfelen. Misschien als je een soort tekstje schrijft: Hier volgt een korte mindfulness oefening. Nou, dat is misschien ook niet handig want dan klikken mensen misschien gelijk door. Maar misschien als je als je zegt, hier volgt een mindfulness oefening van 1 minuut. Zodat mensen er niet van schrikken, maar ook niet schrikken als het er opeens is.

Ja, de gedachte erachter is dat je een kleine pauze krigt tussen het lezen van al die lappen tekst.
Dokters zin ook wel gewend aan hele lappen tekst lezen. Dokters zijn ook heel eigenwijs, zo van ik bepaal zelf wel waarvoor ik tijd vrij maak. Dat is mijn ervaring.

Wat vond je van de esthetiek van het prototype?
Ik vond het mooi. Het past er wel bij, met de kleuren en die vertakkingen, het doet je wel denken aan een tak van een boom ofzo. Het past wel bij het geheel. Het gaat wel iets ten kosten aan de overzichtelijkheid, maar aan de andere kant zijn de verschillende hoofdstukken en paginas ook weer zo clean dat het niet zo erg is dat het wat minder ergs is dat het niet zo hierarchiesch onder elkaar staat.

Zou je het dan denk je handig vinden als ik bijvoorbeeld een pagina bijvoeg dat echt in een keer een overzicht geeft van alles?
Ja maar dan zou ik hem op het eind zetten. Dus als je alles gehad hebt, kan je daarna nog makkelijk terug kan naar iets, en anders gaat iedereen dat doen en is het zonde van hoe mooi het is en wat het idee is. Maar als je inderdaad alles gezien hebt en dan denkt oja, wat is nou dat ene wat ik ook al weer zag over bosbaden, dan kan je daar snel op kilkken. Maar het is niet alsof ik het echt mis. Maar als je het nu zo vraagt zou ik zeggen van ja, op die manier zou ik het wel doen.

Wat vond je van de snelheid waarmee informatie aan je werd getoond?
De hoeveelheid tekst op een pagina was goed. Af en toe een beetje meer, af en toe een beetje minder. Lekker overzichtelijk, dit is de essentie. In de filmpjes, ik ben iemand die snel leest, dus dan is het fijn om de controle te hebben in plaats van die snelheid aan te moeten houden.

Wat vond je van de integratie van natuurbeelden en mindfulness in een leeromgeving?
Het is een beetje soort van bevredend, omdat het niet is wat je gewend bent in een naschoolomgeving. Er komt dan zo'n prachtig bos voorbij met die vogeltjes en dan denk je wel ach, wat mooi. Mensen die met deze cursus meedoen zullen ook wel wat met natuur hebben, dus dan denk ik dat dat wel gewardeerd wordt.

Hoe moeilijk vond je het om te begrijpen hoe je het systeem moet gebruiken?
Nee, ik miste af en toe een beetje een knop. Waar alles wel zichtbaar is, vind ik het niet ingewikkeld.

Zie je jezelf de uiteindelijke versie van dit prototype gebruiken in je vrije tijd?
Wanneer je denkt op je werkplaats oke, ik heb hier heel veel over geleerd, en wil ook mijn collega's hierin meenemen, ik ga gewoon even een presentatie hierin geven. Dan dat je inderdaad gewoon even uitleg geeft van alles en daar zijn de referenties enzo, daarvoor is het heel erg handig. Ik ben zo'n type die heel veel in een keer onthoud, en die learning by doing doet, maar mensen die wat preciezer en uitzoekeriger zijn zullen het misschien wel meer nakijken, amar het past niet helemaal mijn leerstijl. Dus voor mij zal het eigenlijk alleen zijn om dingen na te zoeken waneer ik er zelf mee verder wil.

Dat is wel een interessant iets. In mijn eedere evaluaties is ook al gezegd dat mensen het product voornamelijk zouden gebruiken om anderen wat te leren. Maar voor Pim is het niet fjin dat de leeromgeving, met al zijn betaalde cursusinhoud, wordt gedeeld met iederen. Misschien schrijven minder mensen zich dan in voor de cursus.
Als er misschien wat meer in zit dat interactief is, dat je bijvoorbeeld na afloop van de cursus nog een soort nacusus doet ofzo, of een test, of iets waar je van gedachten kan wisselen. Als er wat interactiefs is, ben je meer uitgedaagd om terug te komen naar de leeromgeving.

Hoe geïnteresseerd ben je, na het zien van het prototype van het digitale leermiddel, in deelname aan de medische cursus?
Ik heb me al ingeschreven, dus nee, niet per se meer.

Hoe geschikt is de tool in de context van een medische cursus?
Wat dat betreft denk ik niet dat je bij mij moet zijn, omdat ik niet veel ervaring heb met nascholingen. Ik heb maar 1 eerdere nascholing gedaan, en die was ook heel erg niet typisch. Dat was in de bergen, in plaats van in het bos. Het was heel leuk, maar ik ben in opleiding dus ik heb ook geen nascholingsverplichting. Wat dat betreft ben ik niet helemaal de geschikte persoon om die vergelijking te maken.

Had die nascholing in de bergen ook toevallig een leeromgeving?
Nee, dat was old-school. We hadden van te voren ene paar artiekelen gekregen via de mail, en verder gewoon aantekeningen gemaakt in een schriftje. Ik moet wel zeggen, dat ik tijdens die cursus wel soms het gevoel had van ik had niet bijhouden. Daar had ik het wel fijn gevonden als ik daar een leeromgeving had gehad waarin ik dingen terug kon zoeken. Ook wanneer je in gesprek bent met iemand anders, en dat probeert uit te leggen. Zo werkt je geheugen natuurlijk ook, het wordt getriggered wanneer je een gesprek met iemand hebt en vervolgens denk ik je ja hoe zat dat ook al weer en ga je het terugzoeken, en daar kon dat dus niet. Dus ik zou me wel voor kunnen stellen dat ik het in die situatie zou gebruiken.

Waren er onderdelen van het systeem die je zou willen veranderen of die je in het systeem zou willen zien?
Misschien een betere link naar de cursus. Misschien komt dat nog? Dit is wel clean informatie en onderzoeksgegeven, en dat staat wel heel ver vanaf van het feit dat we zo in het bos gaan lopen op onze blote voeten en in een tent gaan slapen. De leeromgeving doet me voor nu nog heel weinig denken aan de bosbeweging, en wat we straks in de praktijk gaan doen.