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Gaming guidelines game

Engaging the players of Norsk Tipping to learn about safe gambling habits.

Bachelor's thesis in Web development (BWU) and Interaction design (BIXD)

Supervisor: Aliaksei Miniukovich

May 2024

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Preface

We would like to take this opportunity to say thanks for the support we've received from Norsk Tipping and especially thank our problem owners Tanja Sveen and Carly Grace Allen who have been of great help sharing their knowledge of the domain we've been working with and guiding us towards this thesis issue. We have learnt so much about the intricacies of gambling and responsibility through working with this thesis that we wouldn't have, hadn't it been for this collaboration. We would also like to thank our tutor, Aliaksei Miniukovich, who have given us immense guidance and support during this time.

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Abstract

Title: Gaming guidelines game – Engaging the players of Norsk Tipping to learn about safe gambling habits.

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Participants: Storm Olav Hansæl, Marianne Arnesen Mytting, Thomas Kolderup Selvig, Anders Helgesen Hesselberg

Supervisor: Aliaksei Miniukovich

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Excessive gambling is an issue that affects multiple areas of an individual's life. In Norway in 2019, according to statistics from "Den samfunnsøkonomiske kostnaden av problemspilling i Norge" by Kristensen, Leino and Pallesen (2022), 5.14 billion NOK was calculated to be the socio-economic cost related to excessive gambling. These statistics also include the socio-economic costs of early death among players, which sheds light on the complexity of the issue and how it can unfold if no measures are taken (Kristensen, Leino and Pallesen, 2022). In this thesis, we investigate the approaches to increase the effectiveness of Norsk Tipping's gaming guidelines to increase the overall knowledge of the guidelines among the players and their close relations. We researched techniques of gamification and other elements such as scenario-based learning to find methods that could help us reach the goal in increasing the understanding, and ultimately the players' overall retention of the guidelines. We developed a prototype using gamification techniques and compared user test results from today's solution and our prototype and found that gamification increased users' interest in interacting with the guidelines.

Sammendrag

Tittel: Spillevevttspill – Engasjering av spillere hos Norsk Tipping til å lære om trygge spillevaner.

Dato: 13.05.2024

Deltakere: Storm Olav Hansæl, Marianne Arnesen Mytting, Thomas Kolderup Selvig, Anders Helgesen Hesselberg

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Overdreven gambling er et problem som påvirker flere områder av en persons liv. I Norge i 2019 ble 5,14 milliarder kroner, ifølge statistikk fra «Den samfunnsøkonomiske kostnaden av problemspilling i Norge» av Kristensen, Leino og Pallesen (2022), beregnet til å være den totale samfunnsøkonomiske kostnaden knyttet til overdreven gambling. Denne statistikken inkluderer også de sosioøkonomiske kostnadene ved tidlig død blant spillere som belyser kompleksiteten rundt problemet og hvordan det kan utvikle seg dersom det ikke iverksettes tiltak (Kristensen, Leino og Pallesen, 2022). I denne oppgaven undersøker vi tilnærminger for å øke effektiviteten av Norsk Tippings Spillevevttregler for å øke den generelle kunnskapen om trygg spilladferd blant spillere og deres nære relasjoner. Vi undersøkte teknikker som spillifisering og andre elementer som scenariobasert læring for å finne metoder som kan hjelpe oss å nå målet vårt med å øke forståelsen og spillernes generelle kunnskap om trygg spilladferd. Vi utviklet en prototype med bruk av spillifiseringsteknikker og sammenlignet resultatene vi fikk fra brukertestene fra dagens løsning og prototypen vår, og fant ut at spillifisering økte brukernes interesse for å samhandle med retningslinjene for trygg spilladferd.

Table of contents

1. Introduction	1
2. Theory	4
3.1. Gamification	4
3.1.1. Frameworks	5
3.1.2. Engagement	7
3.2. Information retention	8
3.2.1. Readability	9
3.2.2. Scenario-based learning	9
3.3. Ethics	10
3. Execution	11
4.1. Discover	11
4.1.1. Existing solution	11
4.1.2. Competitor Analysis	13
4.2. Define	17
4.2.1. Game plan workshop	17
4.2.2. Scrum	18
4.2.2. Gamification scope	18
4.3. Develop	20
4.3.1. System goal	21
4.3.2. Archetype/Personas	21
4.3.3. Prototype	22
4.3.4. Content	23
4.3.5. Technologies	24
4.3.6. User testing	25
4.4. Deliver	35
4.4.1. Information architecture	36

4.4.2. Game system	37
4.4.3. Character customization	43
4.4.4. Web accessibility.....	45
4. Discussion.....	47
5. Future work	50
6. Conclusion.....	51
Reference list	52
Figures	58
Tables	59

1. Introduction

Excessive gambling is a problem experienced by individuals that affects society negatively (Kristensen, Leino and Pallesen, 2022). In 2019, the number of people experiencing issues related to gambling were 55 000 and the total socio-economic costs related to excessive gambling was calculated to be 5.14 billion NOK (Kristensen, Leino and Pallesen, 2022). We've collaborated with Norsk Tipping on developing an issue for the thesis on responsible gaming focusing on preventing excessive gambling habits from forming in players. With knowledge of the aforementioned statistics, and considering the United Nations Sustainable Development Goals, we desire that the outcome of the thesis is to improve Norsk Tipping's existing measures to prevent excessive gambling. More specifically, we will focus on the following sustainability goals:

- Goal 3: Good health and well-being (United Nations, no date),
- Goal 8: Decent work and economic growth (United Nations, no date), and
- Goal 10: Reduced Inequalities (United Nations, no date).

The possible consequences of excessive gambling include financial loss, unemployment and other consequences that follow addictive behaviour (Kristensen, Leino and Pallesen, 2022). Challenges with a person's health (Goal 3) can potentially cause issues related to their employment (Goal 8), thereby causing financial and social inequalities (Goal 10). Kristensen, Leino and Pallesen mention that along with the societal costs of gambling addiction, poor mental health and poor private economy can even lead to criminal offenses such as illegally obtaining money to manage a financial debt or to finance further gambling activity (2022). In our context, reaching Goal 3 therefore includes taking measures to promote safe gambling, meeting the thesis goals, and promoting sustainability.

Norsk Tipping is a Norwegian national owned gambling company that facilitates gambling activities (Bryhn, 2023). In Norsk Tipping's "Rapportering om ansvarlig spillvirksomhet for 2022", a report on responsible gambling activities from the year of 2022, the report states that the effect of the measures taken to prevent problematic gambling behaviour is achieved by all their responsibility measures combined with the visibility and attractiveness of their services

to players (Norsk Tipping, 2023). One such measure is the importance of the customer journey of players (Norsk Tipping, 2023) which according to Kaplan is the way players uses a service to reach a goal (2023). They also utilize a tool called “Playscan”, in which they register how often, for how long and how much a player spends on their services. This tool is used as a risk assessment tool to customize the environment of the service according to different players' needs. A player can either have a green, yellow or red profile in which the colours indicate their risk assessment. Red is assigned to players with a high degree of risk behaviour, yellow is assigned to a medium degree, and green to those with a low degree of risk. These color-codes are then used to depict the needs of interventions that are to be taken for each user, such as giving feedback to the user to make them aware of their habits (Hoffmann, 2019). Red profiles will benefit from different degrees of interventions than green profiles due to the differences in their risk assessments resulting in varied customer journeys (Hoffmann, 2019).

With this work we wish to influence the customer journey of green players, a group of players classified as not yet having a gambling problem, by making the gaming guidelines, which is a preventative measure consisting of a set of tips on how to safely use Norsk Tipping’s gambling services, more effective. The reason why we wish to focus on this aspect of the customer journey of green players is mainly due to the importance of preventing players from developing risky gambling behaviours. Yellow and red players entail that the players are already experiencing risky gambling behaviour and gambling addiction which goes beyond the scope of this thesis.



Figure 1: Norsk Tipping's gaming guidelines (Norsk Tipping, no date)

Norsk Tipping maintains a responsible gambling presence to prevent players from leaving to alternative, less social responsibility-oriented gambling sites. This suggests that using Norsk Tipping's services as an alternative may be a responsible choice (Norsk Tipping, no date). The gaming guidelines serve an important purpose of illustrating, as short-form text, what dangerous patterns players should avoid.

However, from testing Norsk Tippings' solution today we found that the gaming guidelines¹ were inaccessibly placed and the affiliated informative pages on responsible gaming² (Norsk Tipping, no date) were hard to navigate due to requiring several page shifts before acquiring meaningful information. Due to this and the inherent optimism bias of players not believing they will develop an addiction themselves, players may neglect the guidelines, meaning there is potentially a large touchable area within this sector to prevent players from developing dangerous gambling habits. We have done research on gamification and engagement and looked into how we could transform Norsk Tipping's gaming guidelines into something that would make users engage more with the content. Therefore we created a prototype of a quiz that reflects the information that the gaming guidelines convey to answer the issue "How can the knowledge of safe gambling be increased among Norsk Tipping's players?"

¹ A set of best practices to prevent excessive gambling.

² <https://www.norsk-tipping.no/spillevev>

2. Theory

Firstly we will begin by outlining gamification methods, frameworks and its effect on learning and engagement. Secondly, we will discuss information retention and how it's affected by readability and a person's reflective and recall abilities. Lastly, we will discuss the ethics of the thesis, involving Norsk Tipping's Kanaliseringsoppdrag³, which is a term used to explain the attaining and retaining of users to use their services (Norsk Tipping, no date).

3.1. Gamification

Gamification means “the practice of making activities more like games in order to make them more interesting or enjoyable” (Gamification, no date). Games typically focus on people's inherent desire for “play” (Matallaoui, Hanner and Zarnekow, 2017, p. 3). This is often seen in contrast to information and education-based systems, where the focus is rather placed on people learning information because they have to, due to education or work requirements. There is a distinct difference between the two approaches to capturing the attention and motivating the person, hence the term gamification is used to refer to pulling elements commonly used by games for motivating certain desired behaviours in an entirely different context (Matallaoui, Hanner and Zarnekow, 2017, p. 3).

Gamification elements can increase users' knowledge of how to use a system effectively, as well as providing elements of motivation to those who use it. The idea behind gamification for increasing usability stems from the principle that the more the user progresses through levels of higher difficulty, the more features of a gamified system they discover, and the more comfortable the user becomes with these features (Basten, 2017). Gamification can entice users to put more effort into learning about a system, due to its ability to motivate (Basten, 2017). Basten (2017, p. 77, Table 1) lists the “Common Game Elements” as follows:

³ <https://www.norsk-tipping.no/selskapet/samfunnsoppdraget>

- Feedback, for immediately telling the users whether actions they perform are correct or wrong.
- Goals, to inform the user to perform a specific activity to gain rewards.
- Badges, as rewards to provide engagement incentives within and outside of the system.
- Points, to indicate user progression, such as distance to the next reward and user level.
- User levels, to indicate to the user where they place in the reward system (2017).

3.1.1. Frameworks

To implement gamification into a system, there are several existing gamification frameworks and methods currently being used. The MDA framework (Cardona-Rivera, Zagal and Debus, 2020) is a way to consider gamification in practice as three elements: mechanics, dynamics, and aesthetics. However, this doesn't account for the role and limitations of the narrative designer of the game. Defining the scope of the narrative designer is necessary for a cohesive narrative, and is one of the missing elements of the MDA framework (Cardona-Rivera, Zagal and Debus, 2020). The GFI framework addresses this shortcoming by complementing the MDA framework with a focus on blending the disconnect between game design frameworks, such as MDA, and narrative design. GFI (Goals, Feedback, Interpretation) is complementary to MDA as "goals (like mechanics) are closer to the designer perspective. Interpretation (like aesthetics) is closer to the player. Feedback (like dynamics) bridges between these" (Cardona-Rivera, Zagal and Debus, 2020). The GFI framework recognizes that all games tell stories and narrative is not just explicitly stated lore, but also implicit storytelling. GFI considers an item expected in the narrative context to also take part of the story, without this being explicitly mentioned narratively (Cardona-Rivera, Zagal and Debus, 2020). With this in mind, MDA may be useful for considering what game aspects from the perspective of the mechanics, dynamics, and aesthetics one wishes to include, from a standpoint more technical than narrative. Narrative elements can also be introduced to possibly keep a cohesive narrative to immerse the player through an implementation of the GFI framework.

MDA

Assessing gamification design from a technical standpoint, the MDA framework can be used to understand how gamification is implemented, as the three core elements: mechanics, dynamics, and aesthetics. The mechanical element of MDA is the representation of the game from an algorithmic point of view and is how player behaviour interacts with the game's rules. MDA's dynamics detail the interaction between the player and the game together over time, which is accomplished through the game's mechanics. Dynamics is thus the description of why the player behaves the way they do within the game (Hunicke, LeBlanc and Zubek, 2004). Finally, the aesthetic element of MDA is the description of how the game wishes to emotionally impact the player, not just passively through perception through senses, but also through interactions, such as discovery and challenge (Hunicke, LeBlanc and Zubek, 2004).

MDA views a game as three separate components, where from a game designer's point of view the different elements are provided in the order of more technical gameplay mechanics giving rise to the overall behaviour of the system (dynamics) which in turn gives rise to desired feelings in the player (aesthetics). The player experiences these separate elements in the other order, first experiencing a general feeling from provided aesthetics, then noticing system behaviour and technical mechanics (Hunicke, LeBlanc and Zubek, 2004). MDA is thus useful for understanding how different game elements appeal to different players, providing a testable framework for gamification by breaking down game design into a more granular understanding based on player desires, which can be modelled through archetypes.

Some common game-design elements are mentioned by Matallaoui, Hanner and Zarnekow (2017, p. 8) which allow for following relevant dynamics:

- progress bars and general progress indication: this is essential to let the player know how much progress they've made, which is typically accomplished through points and levels.
- feedback: Understanding games as having value for their behaviour rather than just observable info (Hunicke, LeBlanc and Zubek, 2004), a core aspect of dynamics becomes the interactivity between the player and the system. For this, prompt

feedback is essential to making the experience feel interactive and that the player's behaviour and actions make an impact.

- long and short-term goals: blending the line between dynamics and mechanics, giving the player goals to follow is important for the player to have use for the provided mechanics to be rewarded with aesthetics.
- progressive rewards: The player should feel a reason to continue to perform actions and behaviours within the system to continue to interact with the dynamics. This blends in with the dynamic of feedback.

These are common gamification design properties that MDA helps model how to test and implement based on different player archetypes.

GFI

Through use of GFI as a framework with narrative design in focus, one can define what narrative elements are relevant and how to implement and test for narrative design as a gamification element in an application (Cardona-Rivera, Zagal and Debus, 2020).

To motivate the player to use an application, the player should be immersed in the system's context to wish for rewards. To utilize GFI as a framework in practice, one needs to establish a narrative with narrative goals for the player to fulfil, which will count towards setting player expectations and affect how the player interprets the narrative. This is where GFI complements the MDA framework, where GFI fills in definitions for how to account for narrative goals (Cardona-Rivera, Zagal and Debus, 2020).

3.1.2. Engagement

Gamification has been used in areas where user engagement is important, for instance in classrooms and other arenas of learning, where the level of a gamified system has been proven to correlate to the expected learning outcome amongst users (Hamari *et al.*, 2016). Considering that gamification increases engagement, learning outcomes also likely correlate with engagement among students. Göksün and Gürsoy conducted a study to map out the differences between conventional learning strategies and the gamified learning solutions Kahoot (Kahoot, no date) and Quizizz (Quizizz, no date) to measure its effectiveness on

learning outcomes. Their findings suggest that the learning outcome was better when utilizing gamified solutions. However, they also suggest that Kahoot increased the students' performance the most due to the competitive, time-restrained, and social element in the game, which engaged the students when participating, engaging even more with the material and resulting in better learning outcomes (Göksün and Gürsoy, 2019). Comparing Quizizz and Kahoot, where Kahoot is the more gamified system of the two, shows congruence with Hamari *et al* showing correlation between the level of gamification and the level of learning outcome (2016). This also allows us to consider the effect of engagement and the presumption that the more engaged the students are with the material, the better the learning outcome is.

3.2. Information retention

Information retention over time, what constitutes memory, is the process of obtaining information (encoding), storing the information (storage) and remembering the information (retrieval) (The Derek Bok Center, Harvard University, no date). Furthermore, the duality of this process is presented by The Dual-process theory which presents two ways in which information is encoded, stored and retrieved. The first process is related to the quick, automatic, everyday tasks in which decisions are made unconsciously and no active recall is needed. The second process on the other hand has the characteristics of being slow and intentional, often being less error prone than the prior process and relies on the analytical aspect of active memory recalling (The Derek Bok Center, Harvard University, no date). The second process being analytical depends a lot on the first process as “critical thinking requires a lot of memorized knowledge and intuitive, automatic judgments to be performed quickly and accurately” (The Derek Bok Center, Harvard University, no date), which makes focusing on the first process, and looking at recall of information important when presenting new information.

Another duality to consider is short-term memory and long-term memory. Short-term memory, often consisting of acoustically encoded information (what is heard), has a shorter lifespan and much more limited storage capacity than the information that is stored in the long-term memory which is often constituted by semantically encoded information (what something means) and has the potential of being stored indefinitely with unlimited storage

capacity. By practicing regular recall one can more effectively store information in the long-term memory (The Derek Bok Center, Harvard University, no date).

3.2.1. Readability

Both Leroy *et al.* (2013) and Ghafourian, Hanbury and Knoth (2023) found that, in their respective domains, the importance of readability when conveying information is crucial for its effectiveness. More specifically, Leroy *et al.* (2013) focused on the perception and retention of information in health literacy among groups of people with different degrees of prior knowledge of the vocabulary used. This showed that the information that was harder to read and understand was also harder to learn, and vice versa. Similarly, Ghafourian, Hanbury and Knoth (2023) found a connection between readability, understandability and engagement in their study on search engines and their usage for gaining knowledge in learning, suggesting that readability is important to consider for understandability, as well as for material engagement.

3.2.2. Scenario-based learning

Working on recall is an effective way to learn a material (The Derek Bok Center, Harvard University, no date), but according to Salih and Abdelbagi, the conventional Multiple-Choice Questions (MCQs) may not be the most effective way to learn (2022). Even though MCQs are widely used in measuring and assessing knowledge, they often become a tool for facts recalling, which is not necessarily the most effective way for a respondent to reflect on and retain the new knowledge (Salih and Abdelbagi, 2022). However, Salih and Abdelbagi argue that Scenario-Based Questions (SBQs) can be utilized in the same manner as multiple-choice questions but for greater learning outcome. By offering viable scenarios in SBQs that the respondent needs to analyse and assess, the respondent is more likely to improve their reflection skills whilst also preparing the respondent for applying what they've learnt in real-case scenarios (2022). Similarly, Hursen and Fasli argue that scenario-based learning aims to show a connection between the problem and the real world (2017). Further arguing, that this, as a result, should improve understanding with the learners as they gain a reference to how they would apply it in their personal or professional lives (Hursen and Fasli, 2017). Scenarios also aim to offer a more enjoyable experience and make it easier for the

learner to come up with more than one correct solution and could establish a stronger link between theory and practice (Hursen and Fasli, 2017).

3.3. Ethics

Kim and Werbach write about how in the context of ethics, gamification must be evaluated on a case-by-case basis. They go on to mention that previously, gamification has been considered an immoral and manipulative practice, in part because previous studies were based on generalized conclusions rather than conclusions based on individual context (2016). They propose that there are four primary determinants to which the ethics of gamification can be evaluated: the extent of user exploitations, user manipulation, use harm, and socially determined negative effects on any parties involved (Kim and Werbach, 2016).

One problem is that, for a user, it can be hard to determine if the gamified system sufficiently separates virtual and real-world norms (Kim and Werbach, 2016). An issue that is brought up is that norms and ethics surrounding game systems don't correspond with real-world ethics. Kim and Werbach use 'griefing' as an example, where a player goes out of their way to inconvenience or disrupt the gameplay for someone else. In this scenario, the griever may experience that they are acting outside the social norms of the virtual world, but not the real one. This is rarely an issue within a gaming environment, where the player consents to the rules and behaviours of a gaming world, however gamification obfuscates the borders between virtual and real-world. This has some potential side effects, in which a user may find a disconnect between their interests and that of the system (Kim and Werbach, 2016).

A gamified system, especially one that is related to gambling, must have protections put in place for its users. Gamified systems encourage users to interact with their product through engagement rewards. These rewards usually tend to be superficial or give no real-world gratification. As a result, there is a disconnect between what the user gains and their investment (Kim and Werbach, 2016). Kim and Werbach also mention that gamification can encourage a user to invest deeper into a system than originally intended or wanted (2016).

3. Execution

After gaining further insight about the problem area from theory and Norsk Tipping, we decided to restructure Norsk Tipping's pages on responsible gaming, develop a customisable avatar and develop a game system in which involves simple quiz and drag and drop modules to convey the gaming guidelines and other information about responsible gaming in an engaging manner. For documenting the design and development process in a sensical manner, we decided to use the double diamond model. We start by introducing the "discover phase" in which we gather insight into the problem area, then we move on to the "define phase", where we define the problem that is to be solved. In the "develop phase" we develop the solution and conduct user testing to gain further insight into alternative ways for the problem to be solved. Lastly, the "deliver phase" shows the final solution for this iteration.

4.1. Discover

This section will present the existing solution today and identify some of the problems in which we mean to solve. Along with a literary review, we carried out a competitor analysis giving us insight into how similar gamified systems with a focus on learning outcome, use gamification and other design elements to their advantage.

4.1.1. Existing solution

When accessing the landing page (Figure 2), the gaming guidelines (Figure 1) are placed at the bottom of the page, placing it last in the hierarchy of important information the page wants the user to obtain (Gordon, 2021).

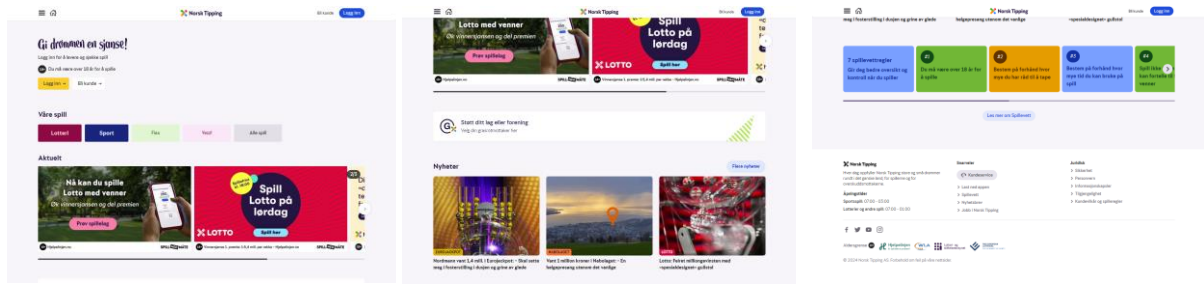


Figure 2: Screenshots of landing page showing the placement of the gaming guidelines at the bottom of the page.

When logged into Norsk Tipping, a button on “Spillevevt” appears along with a noticeable amount of white space (Figure 3). Accessing the user profile shows the player's name and presents actions the user can take such as transferring money and accessing previous transactions (Figure 4).

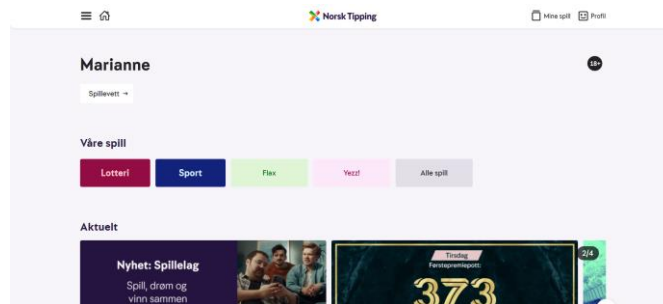


Figure 3: Screenshot of landing page when logged in.

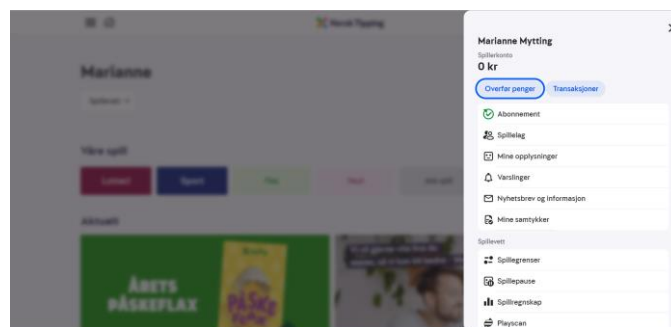


Figure 4: Screenshot of the view when a user accesses their profile.

The pages on responsible gaming (Figure 5) presents nine options for the user to choose between. When choosing one of the options the menu is aggravated into several

submenus including the choice to read more information about the topic chosen or go to a related service they provide.

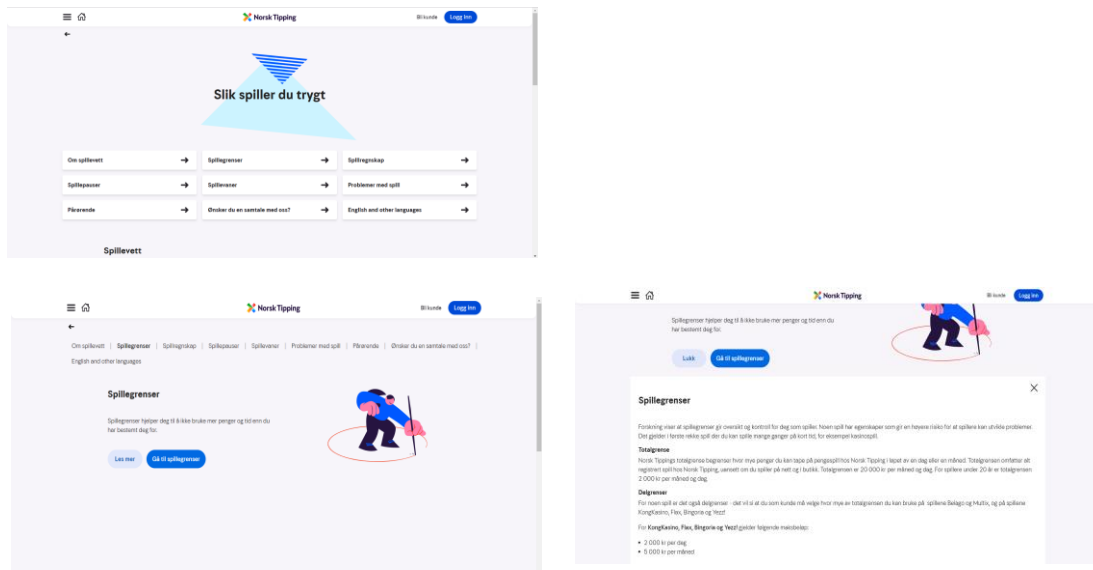


Figure 5: Pages on responsible gaming.

4.1.2. Competitor Analysis

Research into gamification techniques currently used by education-focused services provides insight into how to effectively utilize gamification for increasing learning motivation in practice. Table 1 presents the analysis, based on the “Common Game Elements” (Basten, 2017, p. 77, Table 1).

Platform	Purpose	Solution
Khan Academy ⁴	Give the user adequate and satisfying feedback to actions performed on a given challenge.	Khan academy uses playful sounds and shows playful images, icons, and animations upon completion as feedback. The challenges also provide tips continuously as the user

⁴ <https://www.khanacademy.org/>

		interacts, without having the user ask for tips explicitly.
Khan Academy	The user should know what goals they can achieve within the system.	Khan academy implements goals through course-specific challenges. Course-goals are short challenges in a course where the user is told how many goals are required to progress along a clearly defined learning path, with frequent breaks in the types of goals the user must complete to avoid repetition.
Khan Academy	Provide an indication of progress.	“Energy points” are awarded to the player to measure provided effort. Points are awarded for certain obligatory challenges and all optional tasks such as “badges”/achievements. This is in addition to a clearly defined progress indication through showing where you place in the enrolled course’s learning path.
Khan Academy	Cosmetic rewards for the player to want to collect.	“Energy points” can be used to unlock cosmetics (“avatars”) and to “evolve” your existing cosmetics into different variants.

Duolingo ⁵	Give the user adequate and satisfying feedback to actions performed on a given challenge.	Uses animations, playful sounds, vivid colours, and moving characters implicit in the overarching narrative.
Duolingo	The user should know what goals they can achieve within the system.	There is a clearly defined “learning path” with common checkpoints, so you know where you are in regards to the next checkpoint, and you know how much progress you have left to complete your current unit.
Duolingo	Cosmetic rewards for the player to want to collect.	Users are rewarded with badges.
Duolingo	Provide an indication of progress.	Indicated with the use of points (XP).
Duolingo	Provide social incentive for engagement.	Leaderboards (leagues) and badges
Codecademy ⁶	Give the user adequate and satisfying feedback to actions performed on a given challenge.	Uses immediate feedback if a certain task is done correctly or incorrectly and provides hints and offers solutions if a task is consecutively done incorrectly and the user doesn’t progress.
Codecademy	Telling the user what goals	Utilizes learning paths where

⁵ <https://www.duolingo.com/>

⁶ <https://www.codecademy.com/>

	they can achieve within the system.	a learning path has several submodules in which what the learning outcome is, is clearly set.
Codecademy	Cosmetic rewards for the player to want to collect.	Codecademy utilizes badges for interacting with the site, completing modules and meeting your own personal set goals. The badges do however not seem to be incorporated in the game, other than that you can view them in your profile.
Codecademy	Provide an indication of progress.	Provides insight into progression with several progress bars for overarching goals as well as subgoals (skippable modules within learning paths).
Codecademy	Provide social incentive for engagement.	Does not have any explicit leaderboards or other social incentive to engage, but they utilize a community forum in which users can discuss the different learning activities.

Table 1: Competitor Analysis

The competitor analysis reveals that all three platforms analysed implement clear learning paths with common checkpoints/breaks: a short path of ~3 chapters for Duolingo, ~8 units for Khan Academy, and ~14 concepts for Codecademy, where each item is short and

contains a clear progress indication. All of them have a common shift in challenge-type: In order to break up a monotonous flow, there are rarely more than two of the same type of challenge in a row.

4.2. Define

During this phase we defined the scope and issue of the thesis and detailed out a starting point to which we began the development phase.

4.2.1. Game plan workshop

We arranged the project's first workshop with the members of the group with a focus on a game plan, which helped us re-contextualize the projects goals, wants and needs throughout the project. The workshop asked the participants to detail their assumptions and expectations on the project. The workshop was an individual and collaborative exercise, where every participant was asked to first work by themselves, before we discussed every topic. Doing this allowed the participants to express their opinions before they were aired in an open environment. By working individually, it forces participants to consider their own position in the project, giving the game plan a varied perspective with a higher likelihood of inclusion. The game plan was not the only point of interest, as we also needed to ensure that our expectations of the project were the same, as well as helped us set a plan of action and a work-schedule.

The workshop led to a clearer understanding of the design domain, a more specific problem definition and broader scope of the project. It also allowed for establishing a procedure for discovering and developing a solution in steps, as our knowledge about the problem area progressively expanded. Therefore, we landed on the following issue: “How can the knowledge of safe gambling be increased among Norsk Tipping’s players?”

4.2.2. Scrum

We attempted to follow Scrum (Microsoft, 2022) which is an agile development approach. Agile development is defined in Microsoft's "What is Agile development?" as a term describing an approach to software development that focuses on being iterative in shorter segments of time. These segments of time are called "sprints". During each sprint, both coding and testing must take place, which in turn makes for an accelerated work pace (Microsoft, 2022). Each of the sprints lasted two weeks, where we developed features the first week and tested them the second week. We kept up such sprint sessions in the beginning when designing, but as the thesis evolved and the tasks became clearer, we converted to one week sprints where development and testing was continuously done during each iteration of the system.

An important factor to successful Scrum is having a refined backlog (Microsoft, 2022). We kept a meeting log to keep track of the different pending tasks. The meeting log was structured similarly to a backlog, but instead of having a single long list of items, we had a table that was copy-pasted each meeting and adjusted this to the existing, finished and new tasks. This allowed for the convenience of adding comments and showed a clearer view of abandoned tasks and finished tasks as well as it forced us to notice and discuss tasks that had been pending over an extended period of time.

4.2.2. Gamification scope

As part of the scope definition, we utilized the MDA and GFI gamification frameworks to map out the ludological⁷ and non-ludological elements respectively we would need to implement.

MDA: The ludological gamification elements

The mechanics we want the player to be able to do within the system are:

- Navigate the game world including completion of varying types of tasks.
- Interact with "Quiz" levels from clearly communicated selectable options.
- Interact with "Drag and drop" levels through dragging or keyboard interaction.

⁷ Ludology: The study of game (Ludology Definition, no date).

Dynamics define the player's motivations for interacting with the system and addresses why the player would want to perform the defined mechanics (Hunicke, LeBlanc and Zubek, 2004). The dynamics we want the player to experience are:

- Completing levels in order to progress within the game.
- Completing levels to earn points that unlock character customization cosmetics.
- Completing easy levels that are of low enough difficulty to be considered just a reward for interacting with them.
- Build more advanced knowledge through solving levels of progressively increasing difficulty.

Aesthetics define what we want the player to feel through the back and forth interactive dynamic with the system (Hunicke, LeBlanc and Zubek, 2004). We want the player to experience feelings of:

- Exploration, through navigating the different levels and chapters.
- Progression, through the world opening up new paths for the player to explore.
- Learning by doing, through traversing knowledge in an interactive format, and with a limited amount of information provided at a time.

GFI: The narrative gamification elements

As mentioned in the theory section, GFI is complementary to MDA by filling in gaps for narrative goals (Cardona-Rivera, Zagal and Debus, 2020). We utilize it as a tool, to define what place the narrative gamification elements serve within the system.

The goals we want the player to experience within the game from a non-ludological standpoint are:

- Experience the learning-based game in a non-repetitive gameplay loop, by breaking up level-types and not having the same types of levels too often in a row.

- Attachment to the player character and a desire to unlock and dress up the virtual avatar. The player is able to customize their virtual selves as a narrative element in the system.
- Discover what the virtual world has to offer through navigation.

The feedback we want the player to receive as part of interaction over time, are modelled as:

- World navigation gives the player an indication of where they are in the virtual space. This information is provided through level labels and completed and unlocked levels changing colours.
- Interacting with levels will immediately tell you if you answered wrong or right through satisfying alerts.
- When completing a chapter, the player is rewarded with feedback unprompted by the system, through animations and unlocked character customization items.

We want the player to interpret their interactive experience over time to experience the desired feelings through:

- Worldbuilding, by placing the levels on a map in a virtual traversable space to inspire feelings of exploration.
- The game theme is a mix of website-look and game-look to set expectations of being a game but at the same time informative.
- Feedback that clearly indicates to the player whether it is a reward or a negative indication, either unprompted such as telling the user they just unlocked something, or prompted feedback such as “Right!” or “Wrong!” responses to level answers, through colour, animations, and images.

4.3. Develop

The following constitutes what we’ve considered, discussed and tested for during the process. It includes the attempt at designing and planning for a solution to the issue, while discussing the different considerations we’ve needed to take into account as we’ve moved forward.

4.3.1. System goal

Our goal was to make people more aware of the responsible gaming guidelines. In order to do so, easing the user into the content we want them to acknowledge is a better approach than expecting them to read the material on their own. This can be backed up by following “The Fogg Behavior Model” which illustrates how motivation, triggers and ability must all be occurring for a wanted behaviour to occur. Comparing this to what is known as “baby steps”, this means that people are more likely to repeat a task if the task was simple to do and they felt successful after completing the task (Fogg, 2019).

4.3.2. Archetype/Personas

A standard way to empathize with a user is to create an archetype or persona. Creating these allows us to empathize with the user of the system more easily. We started by dividing the users into three different levels of experience with games and gambling as well as one comprising next of kin. We divided the users into levels of experience to more easily separate how to best design for differing levels of expertise. We assumed that a user that had less experience with game systems would be less familiar with its workings, and would therefore need more guidance through the system. The four major archetypes we created were therefore “Family member”, “non-gamer”, “passive gamer” and “active gamer”. These four segments of the user base should give us sufficient variation to accurately map out the needs of the users. As it can be harder to empathize with less human archetypes, we decided to transform the four segments into personas. These personas became four individuals that each filled a unique niche within the user base. None of the personas have been exposed to active gambling as that would be outside the scope of the thesis. These personas will be the basis for any further scenario-based insight.

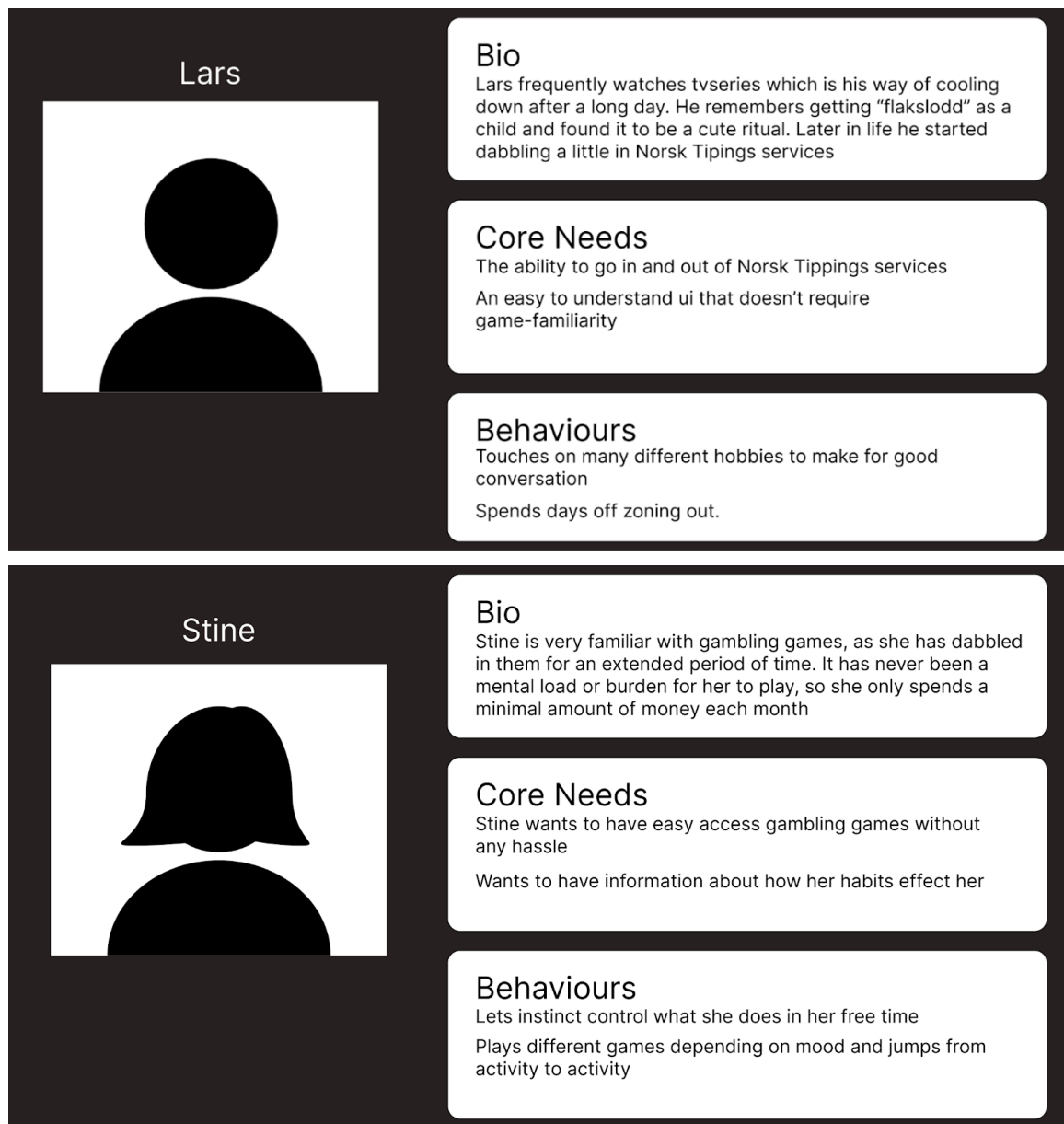


Figure 6: Personas, illustrated

4.3.3. Prototype

The project is very limited on time, and as such, it is important to prioritize the resources in order. Prototyping is an efficient way to iterate and design cheaply, which will allow for better and more streamlined products (Camburn, *et al.*, 2017). The project went through multiple iterations during its design process. To accomplish this, we made different drafts of the project with differing levels of fidelity. This started by mapping out our initial ideas with pen and paper to visualize the requirements of the project. Doing this allowed us to communicate visually early in the process. Early prototyping is important not only for

iterations but allows us to evaluate the feasibility of a project (Camburn, *et al.*, 2017). After making some very simplistic prototypes on paper, we used the observations we made, to change the premise of the project ever so slightly towards a more gamified system before we began making simple wireframes in Figma⁸. These wireframes went through several iterations, as the project changed from a simple information overlay to a game. As the project got more concrete and we decided on a specific route to follow, that being the quiz-game, we started gathering more concrete feedback through testing. As the project got more complicated and required more interactions, we decided it would be beneficial to code the prototype and iterate changes directly through programming, as the requirements to make the prototype testable in Figma would take more time than we would be able to spare.

4.3.4. Content

Originally the content of the prototype reflected Norsk Tipping's own gaming guidelines. As the project changed from focusing on how Norsk Tipping presented their information to developing a quiz, we had to add new content to the end product. We went through multiple iterations of questions before we decided to create scenarios based on the existing information obtained from their pages on responsible gaming. Scenario-based learning is a way to allow a learner to build a connection between the theory and the real world, which will in turn help their ability to empathize with and retain the information they are presented with (Hursen and Fasli, 2017). The project shifted from conveying content through the format of learning cards (redesign of gaming guidelines) to a quiz and with that change we had to develop new content to use for the quiz module. To do this, we read through Norsk Tipping's available information on responsible gaming and developed initial questions based on this information. We also made use of some pre-made questions that Norsk Tipping had created and were available on Norsk Tipping's pages on responsible gaming. Originally we only had a series of multiple-choice questions and drag-and-drop games with the intention of teaching the base theory that Norsk Tipping wants their users to be aware of. To better convey this information, and with the goal of increasing user retention, we made some of the questions into scenarios, as they have been proven to increase retention long term for learners (Hursen and Fasli, 2017). We also decided to repeat some of the questions, varying the semantics, as this corresponds well with the strategy of active recall to

⁸ <https://www.figma.com/>

better retain the content (The Derek Bok Center, Harvard University, no date). As the project focuses on what Norsk Tipping refers to as green users, we will have content targeting this specific user group. However if we were to include yellow and red users as well, we would have to adapt the content, with the intent of giving different information to different types of players as this would allow for better targeted learning to each user (Erümit and Çetin, 2020).

4.3.5. Technologies

For the development of the application, we utilized Visual Studio Code⁹ (Visual Studio Code, no date), which is an open source code editor, as the development environment. We used GitHub¹⁰ (Github Docs, 2024) which is a version control software which we used code collaboration of versioning control. We used React¹¹ (React, 2024), a JavaScript-based development library, to create a component based system that relies on a set of data stores managed through Zustand state management¹² (Pmndrs docs, no date) which is a small and fast state management system that centralises data changes making it easier to control the system. We made use of Zustand's `persist` middleware, which stores all of the state data in local storage (Pmndrs docs, no date). We chose to store the data in local storage due to the restriction in social interaction when logged into Norsk Tipping's services, that would allow for the minimum viable product to operate as expected on the browser alone, removing the need for a database. Furthermore, we made use of Material UI¹³ (Material UI, 2024) to ensure consistent, readable code as well as ensuring accessibility.

Artificial Intelligence

We utilized two Artificial Intelligence technologies when developing. Firstly, GitHub Copilot¹⁴ (GitHub, 2023) was utilized early on in the beginning for menial copying and pasting of content (gaming guidelines) between files, when the goal was to quickly prototype several prototypes and test these solutions to kickstart the process. This proved useful as it saved time when developing components that were all based on the same data. We also

⁹ <https://code.visualstudio.com/docs>

¹⁰ <https://docs.github.com/en>

¹¹ <https://react.dev/>

¹² <https://docs.pmnd.rs/zustand/getting-started/introduction>

¹³ <https://mui.com/material-ui/getting-started/>

¹⁴ <https://github.com/features/copilot>

utilized ChatGPT¹⁵ (OpenAI, 2023) for assistance when debugging and making use of it as a code encyclopaedia to further our understanding of a technology's documentation. With that said, we find it useful to discuss some of the disadvantages and advantages of our use of artificial intelligence. A disadvantage when using ChatGPT is that it's not always reliable and the provided answers may be misleading (OpenAI, 2023). What we have used it for instead, which is where we've found it to have the greatest advantage is to aid us in debugging specific use cases. What this entails is a prompt including information about our code and what does or doesn't happen when the code is executed. ChatGPT then creates a use case specific list of steps to take in order, to find the issue with the code and fix it. This is also useful for future development due to ChatGPT also providing explanations of why the code doesn't run as expected and what measures can be taken to avoid similar errors in the future. Bearing in mind the recommended measures given by ChatGPT also may be error-prone, it's a helpful tool to brainstorm what causes the error. This illustrates how artificial intelligence can be helpful when used cautiously to leverage analytical problem solving perspectives and reasonings.

4.3.6. User testing

To iterate effectively over our different ideas and do technological discoveries on what possibilities and limitations we have in regards to developing the final idea, we started by each member developing different components of the overall system and testing each component as well as the existing solution of Norsk Tipping with users. In this manner, we were able to test the existing solution as well as our ideas, compare the test results and then iterate on the parts that were deemed most successful. In order for us to be able to develop the different components, we began by developing a mock-up of Norsk Tipping's website so that we could properly test the game in an environment that would simulate the real experience for the user.

Placement and noticeability

With only our assumptions about the gaming guidelines being hard to notice due to its placement, we decided to test the concept as well as some of our own ideas on how to make

¹⁵ <https://openai.com/chatgpt>

the guidelines more accessible to the user. This testing phase was crucial in defining which way we would take the thesis as it resulted in gaining insight in how users navigate the site and look for information. The results from the test gave us an incentive to split the further work into (1) developing a gamified system and (2) attempting to better structure the information architecture of Norsk Tipping's informational pages on responsible gaming.

Procedure

Test script:

We defined the following user tasks for the users to complete whilst thinking aloud:

- Can you tell me what gaming guideline number three is?
- Do you understand the information given by the gaming guidelines?
- Can you find the gaming guideline about spending money?

For Norsk Tipping's existing solution we also asked the user the following question in order to gain some insights about how the user navigates through the existing architecture.

- Can you tell me what the spending limit for players under the age of twenty is?

Results

In order, the results from testing Norsk Tipping's existing architecture, a version of the gaming guidelines redesigned as an overlay component, popup component and tabs component are presented below.

Norsk Tipping's existing solution

This component showcases the gaming guidelines (Figure 1). It consists of a component on the bottom of the landing page (Figure 2) that can be browsed through by clicking on the arrow, showing the user the next rule in the queue. All of the rules are currently each holding a link that will direct the user to a designated page on responsibility, where the user can read further about the responsibility initiatives.

The insight we gathered can be reduced to the notion that the ease of accessing the gaming guidelines does not correspond with its initial placement on the landing page.

Mapped accordingly to the different users' experiences, we tested on a total of 4 participants, whereof 2 utilized the hamburger menu to locate the gaming guidelines, whilst the remaining 2 left the page and utilized google to search for "spillevettregler". This leaves us a total of 0 of the 4 participants successfully navigating to Norsk Tipping's component in the manner we expected.

When testing Norsk Tipping's solution we also wanted to see how the users navigated through the information architecture of the pages on responsible gaming (Figure 5) by telling the user to locate the information given about spending limits for players under the age of twenty. We expected the user to utilize the pages on responsible gaming, navigate to the section on "spillegrenser", then press "read more" to access the information.

However, 2 out of 4 users did not utilize the "read more" button. Both of the 2 remaining participants commented about the content being inaccessible and 1 out of the 2 utilized the "go to gaming limits" before accessing the "read more" button.

Overlay component

The overlay prototype consists of a button that is supposed to be available to the user throughout the architecture of Norsk Tipping's website. When the user presses the button a component including the gaming guidelines will overlay some part of the page the user is currently on and gives additional information about the gaming guidelines if the user clicks on any of the rules. Clicking the rule again will cause the additional information to be hidden again as well as clicking anywhere outside of the components, will cause the component to close.

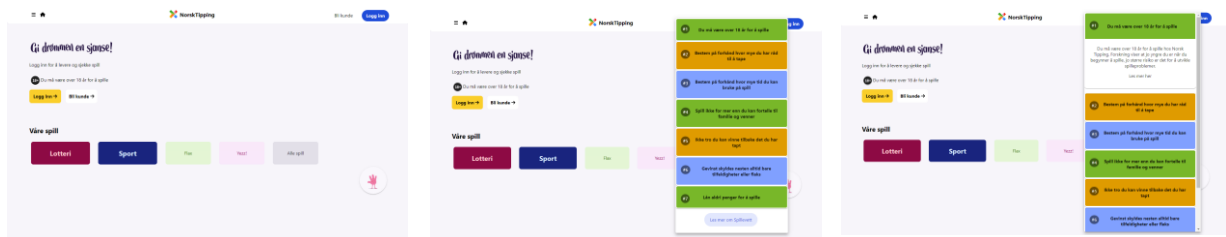


Figure 7: The expected use of the overlay component.

Testing on 3 different users, none of the users found the gaming guidelines without first trying the hamburger menu located in the header and/or other buttons on the landing page. 1 of the 3 users commented that it resembled a chatbot and that this was the reason why the user didn't think it was the gaming guidelines.

Popup component

The pop-up prototype aims to remind the player of the gaming guidelines in a timely manner. In the bottom left corner, a pop-up with a random gaming guideline pops up at a random interval. When the user clicks on the pop-up it will disappear.

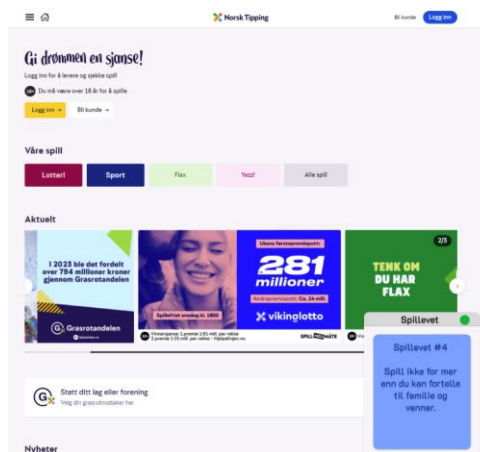


Figure 8: Showing a random guideline at a randomized interval.

Testing was done on three users, and during testing none of the users saw the popup at first glance. The users were asked to identify what stood out on the website, and they needed to be specifically guided towards noticing what was in the right bottom corner in order for them to notice the prototype. Two of the users commented about the pop up being intrusive.

Tabs component

The tabular prototype presents the gaming guidelines in a one-by-one format wherein each rule is provided with both a title and a description. The location of the component is placed on the top part of the landing page.

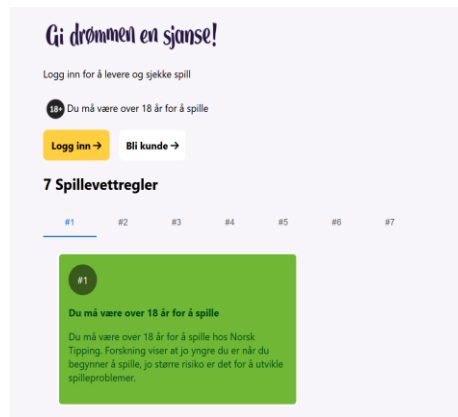


Figure 9: The gaming guidelines only showcasing one rule at a time.

Tested on one user which provided insights into the accessibility of the content, as well as what is realistically read by the user. The user found the information requested and succeeded in the test. There were comments by the user that the use of both a title and description of the guideline is a good thing due to them not having to read more than the title of the guideline to understand the main concept, but with the choice of reading a more detailed, short description should they choose to. The user finished by commenting that the information was easily understood.

Conclusion

The key takeaway from testing the different versions of the gaming guidelines were placement and immediacy. After identifying that the most successful test was done using the tab component where users were able to identify the gaming guidelines immediately, we found that the placement of the guidelines as well as its accessibility, not being hidden away as done in the overlay and pop-up components, were important factors in making users find the information faster and more easily. The results of the findings are supported by Soava and Radeuteanu's findings regarding heat maps and the "Golden Triangle" which is a notion depicting the area in which users tend to look on a website (2013). The "Golden Triangle" is regarded as the top-left portion of a page layout (Soava and Raduteanu, 2013). From this, we can extract that placement and immediacy of information as important factors to consider further on in the design process.

We also found through the testing that the information architecture on the pages on responsible gaming could potentially benefit from being restructured by reducing the number

of aggregated menus, allowing the user to get immediate feedback when accessing the information they're after.

Redesign of information architecture

The architectural layout of the section on responsible gaming is divided into several subcategories and has a tree structure that requires three to four clicks to get detailed information in relation to each individual gaming guideline. This makes it harder for users to navigate correctly to fetch the information they are looking for, as was discovered during the initial testing on placement and noticeability. To remedy this, we wanted to push the information up one level, by giving the information immediately instead of needing the users to navigate further into the tree structure. We did this by showing the information to the user immediately by using dynamically displayed information.

Procedure

We tested on 4 people to see how they would find the relevant information. In this test, we utilized the same method as we did when testing for placement and noticeability. Doing this allows us to match the previous finds to the results of this test.

Results

In this test, there was a slight improvement, as we didn't experience anyone getting lost, or not being able to navigate in accordance with our expectations. As the website didn't actively change what the user was looking at unless the user had already scrolled down on the page themselves, there was some minor confusion. However, there was a clear advantage to the new layout, as it led more users to find the information we requested.

From this we gathered that we needed to implement a way in which the user could notice that the view changes automatically in response to their interaction. This corresponds with Budi (2018) discussing change blindness suggesting that users who expect an action generally don't notice changes unrelated to their expectation of what the action entails. Budi (2018) exemplifies this by describing that a user who attempts to open a hamburger menu will focus on the side of the page where the menu is expected to appear, and not necessarily noticing changes happening in other parts of the page. Budi (2018) then suggests that animations can be a way to avoid change blindness, therefore we implemented that the

website automatically scroll down to the dynamic content as it was interacted with to respond to the changes. This will guide the user better and more easily to the information they request.

Learnability – Multiple-choice questions vs. Scenario-based questions

In order to fill the quiz with content, we began looking into theories on the perception of multiple-choice questions and another similarly used variant, scenario-based questions. To find out if scenario-based questions could be a viable option in our context we decided to conduct an interview on it. This interview revolves around finding out whether there's a difference between multiple-choice questions and scenario-based questions when it comes to people's ability to retain information. Salih and Abdelbagi suggests that there's an advantage to scenario-based questions due to its inherent need for the participant to reflect over what the question is asking for as well as what the different alternatives imply, improving their reflection skills, unlike multiple-choice questions, where the participant is tested on their active recall skills (2022). The aim of the interview is to recognize whether or not a scenario will benefit the user in perceiving a given question. The project aims to make learning easy and accessible for the players of the game. We want to see whether Scenario-based questions can add value to the content, and see how a user feels about the addition of scenarios.

Procedure

The interview consisted of three participants and two sets of questions. The two question sets were developed consisting of the same core questions phrased differently. The first question set consisted of multiple-choice questions and the second set consisted of scenario-based questions. The interview was conducted by sending the first question set to one participant and the second question set to the remaining two participants by E-mail for the participants to read through on their own. The participants were then asked to give their impression of the respective question set they were tasked to read through. Following are the question sets:

Question set 1: *Multiple-choice questions:*

- What is the legal age of gambling in Norway?
- What service does Norsk Tipping provide that limits how much you can play for?

- If you meet your spending cap of 5000,- in a month, what service is provided to allow you to increase your monthly spending cap?
- How can Norsk Tipping help a player reduce how long they play for?
- Consider the following Statement: If I play long enough, I will win back the money I have lost. Is this statement true or false?
- How could you support a close friend or family member who is deeply involved in gambling?
- Consider the following statement: The likelihood of the roulette ball landing on red is the same in the first game and after it has landed on red four times in a row. Is this statement true or false.

Question set 2: *Scenario-based questions:*

- Sander is 16 years old and wants to participate in gambling, is he old enough to play?
- Sander has lost more money than he is comfortable with, within the last week, what can Norsk Tipping do to help him reduce future spending?
- Sander is limited to 5000,- per month, he has for a long time wanted to exceed this cap. How should he go about increasing this cap?
- Sander has spent more time than intended on gambling, what service does Norsk Tipping provide that could help him play less?
- After losing more than he is comfortable with, Sander wants to play more to gain back what he has lost. Is it likely that Sander will win back what he has lost?
- Sander has an older brother that gambles more than he does. He sometimes notices that his brother can disappear into the game, and when he is finished, he seems grumpy. What could Sander do for his brother?
- Sander is playing roulette and has lost on red four times in a row. Sander wants to bet on red again as he is certain it has to be red this time. What is the likelihood of the ball landing on red?

The instructions for the interviewer:

- Tell the participant to read the questions and give answers if they are comfortable doing so.
- Ask the participant: Now that you have read the questions, could you read through them again and tell me what your impression of each question was?

Result

Through the interview we were able to gauge the participants' response to each question, as well as the ability to evaluate the quality of the content. The answers from the control participant gave us insight into how some of the questions could be interpreted in a way that we did not notice ourselves at first. In the control, the participant noticed that two of the questions could need more context, as it was unclear what the question asked for. One of these questions asked what a player should do if they spent 5000,- (their spending cap) on gambling in one month and wanted to play more. Arguably there are two solutions that could be considered correct, namely adjusting the gaming limits or seeking out other platforms to gamble on. This was caused by the question not clearly indicating that the gaming limits were the focus of the question and not the player immediately wanting to play more. The other one that needed attention was, similarly, a question not clearly indicating what the premise was, making the learner make an assumption as to what they were answering.

The interview helped us conclude that there is a clear value to having scenario-based questions, as it helped the participants understand the context of the questions. The biggest problem the participants faced when a question proved problematic was not understanding their context. By adding these scenarios, it was easier for the participants to answer the questions as they aided the participants in understanding the context.

Game system

This test involved seeing which features the users noticed and chose to interact with and if they understood the mechanics of the game. We also prompted the users to think aloud which gave us crucial feedback on how the user expected the system to work and whether this aligned with what we had developed. This resulted in feedback which made us able to improve further on the system. The game was tested on a total of four users, where about half

of the users were being tested on an early version of the game, whereas the other half were tested on the game after some improvements had been made in accordance to the received user feedback. Improving the system in between testing had the benefits of being iterative, making the users produce different kinds of feedback which gave us different kinds of valuable insight into how the user perceived the game.

Procedure

The test followed a premade test script. The script was made short to allow the user to freely roam the game without too much guidance. This was done with the goal of observing how the user interacted with the game without external prompting. Doing this allows us to see whether or not the user notices the elements we want them to.

Test script:

We defined the following user tasks for the users to complete whilst thinking aloud:

- Give the website a look over.
- What options are available?
- Talk your way through “spillevettspill”¹⁶.

In the case where the user had already noticed their profile.

- Open the profile.

In the case there the user had not already noticed their profile.

- Tell the user about the profile, ask them to open the profile.
- Go through every interaction.

For debrief:

- Can you recall what you have just been through?

Result

¹⁶ The name of game in Norwegian, and also the name of the button that when clicked opens the game.

The result from the user testing showed that all of the users interacted with the game as expected, except from one user who interacted with the user profile first and then investigated the game due to noticing the locked cosmetics in the avatar wardrobe. Thus, all users managed to notice and interact with the system without being guided. The feedback from the users gave us clear insight into how we could improve strategically and iteratively:

- Progress bar was not noticeable as a progress bar as it was initially set to 0% only showing as a grey line.
- Right and wrong answers would give points.
- Progress bar for overall progression and progress bar for a level in-game is the same colour which was confusing.
- There was a lack of instructions.
- No explicit explanation on how to unlock cosmetics.
- You get a correct answer alert on quiz tasks, but not on drag-and-drop tasks.
- Game store does not persist in local storage, but cosmetics store do resulting in the ability to dress the character after completing the game (unlocked all cosmetics), refreshing the page and not being able to undress the character.
- Not intuitive what levels are played or not.

In conclusion, the users were able to find and use the system in an expected manner and gave us useful feedback which we integrated iteratively into the solution further improving the game.

4.4. Deliver

Lastly, we'll introduce the final solution which consists of three parts. Firstly, the redesign of the information architecture of the responsible gaming pages and secondly, the game system, the introductory game path to responsible gaming, thirdly the ability to customize your own character to add more personalization to the service and lastly we'll cover web accessibility measures.

4.4.1. Information architecture

We restructured some of Norsk Tipping's pages on responsible gaming (Figure 5) to optimize the amount of clicks needed to read about each section of information. The initial tests found that some users found it hard to navigate the existing pages looking for specific results.

To remedy this in the prototype, we created a solution (Figure 10) that would allow for a user to access the material they are seeking with fewer clicks. In the existing solution, each section opens a new page, which each contains a set of links. Each link opens a new page the user must navigate to get more information about the subject. The prototype reflects all the information in one page and utilizes dynamic display of information, meaning that the information displayed changes based on the chosen topic in order for the user to get information about the wanted topic without leaving the page. We aimed to achieve a more structured and accessible way of displaying information in which later test results reflect.

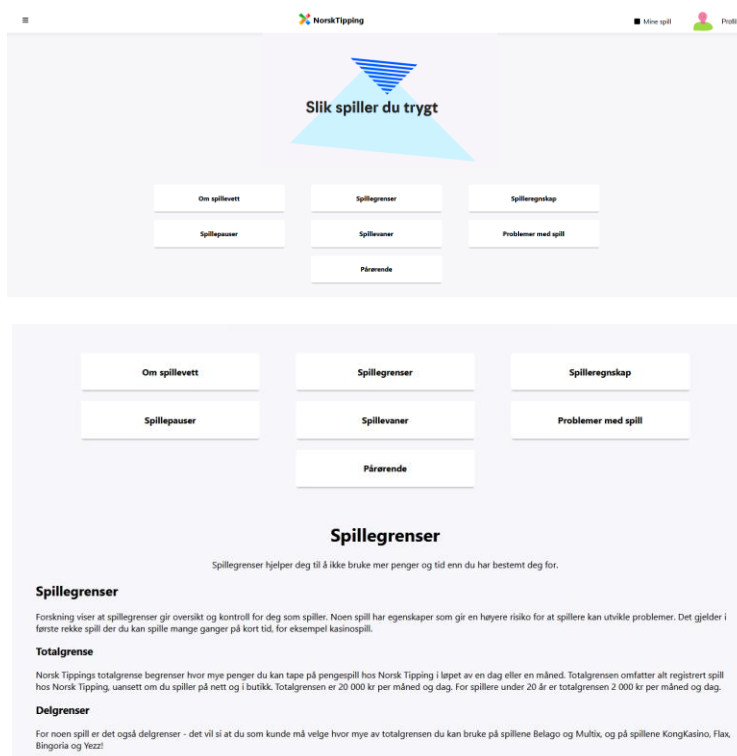


Figure 10: Redesign of pages on responsible gaming.

4.4.2. Game system

Despite the ethical concerns around gamification, it is important to take into account how Norsk Tipping is inherently invested in the administration of safe gambling environments. They are also concerned with the channelisation of players towards regulated services and low-risk games like Lotto, which is what they call “kanaliseringsoppdraget”. This sort of canalisation is done to prevent players from developing problematic gambling behaviours. In order for people to choose their services, rather than unregulated services, it is important that they offer attractive services that make users want to stay and keep using their regulated services. When concerned with the manipulative effects that some gamification elements have on users and evaluating these against Norsk Tipping’s mission, this may not be of concern because the wanted outcome of the steering of the users is inherently good with the players best interest in mind (Norsk Tipping, no date).

To make use of gamification, as mentioned above, we will be needing to design for the aesthetic aspects of the game as well as the mechanical aspects which are important aspects in regards to how the game is perceived by the user and how the system guides the player through the game (Zichermann and Cunningham, 2011, p. 36). With the aesthetics being somewhat already defined by an existing design system (Norsk Tipping), we still need to account for how we can design a gamified system that collaborate well with their existing design, as well as figure out how far from their design we can stretch the aesthetics to fit a gamified narrative, as it is important that the user can easily distinguish the design from the main activities of the site. All the mechanical aspects are all inherently non-social elements of gamification, excluding i.e. leaderboard mechanics. This is due to the nature of privacy in a gambling-oriented context, which in turn makes competitive and social aspects of gamification less sensical in this context. The gamification features we focused on include: Points, Progression and Character customization.

Points

Designing the experience- and redeemable point system in one will allow for users to collect points while interacting with the game that will account for their progress as well as unlock character customization choices. Since the game will be based on non-social surroundings, we decided that the points should carry the operation of both acting as experience points and redeemable points, to counteract the effect of users not wanting to

engage due to a steeper learning curve than what would be necessary (Zickermann and Cunningham, 2011, p. 60).

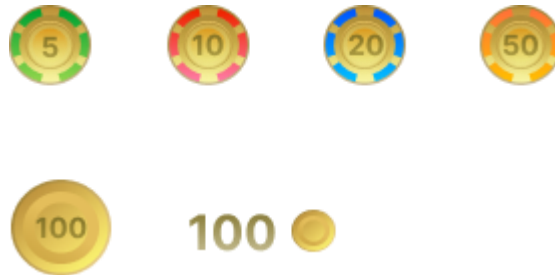


Figure 11: Different variations of points, illustrated.

Progress

As the system intend to be limited, the intent is to offer a set of levels tracked with a progress bar (Figure 12) that is based upon the experience points a user has achieved while interacting with the game, which allows the user to clearly see their own progress (Zichermann and Cunningham, 2011, p. 48). Focusing on the mechanical aspects of “onboarding” will be of importance as the main task will be about how we can attract users to use the system. Onboarding in game design revolves around a user’s first encounter with a service and marks as a crucial crossroads to whether a user will want to stay and further interact with a service or not (Zichermann and Cunningham, 2011, p. 59). Offering too much information to a first-time user can make them resign, making it important to consider the what and how much information we wish for the users to be introduced to at first encounter (Zichermann and Cunningham, 2011, p. 60). Therefore, following existing, simple and traditional design choices for games will hopefully prevent a user from being overwhelmed, and also prevent its purpose from being misunderstood. Shown below is the progress bar at first encounter to signal that progress is being tracked, and the last progress bar a user will see before it is removed to signal that the progress bar, and the game, has completed.

Beginner



Intermediate



Figure 12: Progress bar, illustrated.

There's also a consideration to take into account how many levels are necessary. Creating more levels than needed, will in this game possibly be deemed redundant as the users' main motivation for visiting Norsk Tipping isn't necessarily to learn about responsible gambling, but rather to conduct the activity of gambling itself. In our case the goal of the game is for users to have gained some satisfactory insight into the responsibility measures of Norsk Tipping (Zichermann and Cunningham, 2011, p. 32). However, for the user to have more insight into their own progress, and also give the user a greater sense of the introductory game being temporary, we found inspiration from other gamified systems such as Duolingo with their usage of learning paths, showing a satisfying user interface of available levels, unavailable levels and finished levels (Munson *et al.*, 2022). In effect this also gives the user more choice, allowing them to choose their own path towards the last game signified with the castle at the right hand side of the roadmap (Figure 13).

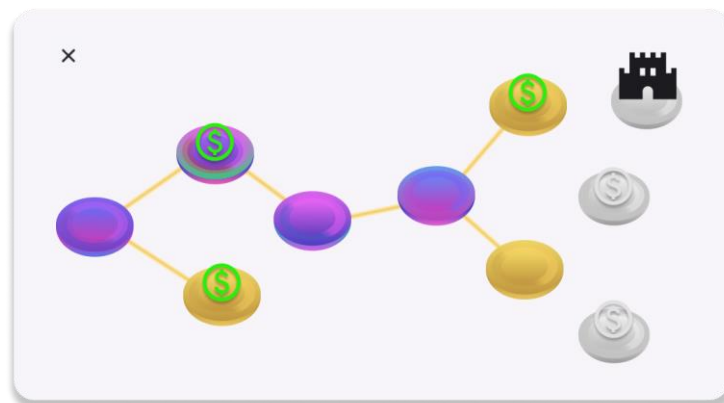


Figure 13: Game roadmap, illustrated

When defining the different levels of progression, we followed the same structure as shown by Zichermann and Cunningham given in tables 7-1 and 7-2 (2011, p. 113-115). The tables explained the system behind points and levels whereas the point level explained the number of points given, each activity that resulted in the point and the purpose of why the point was given. In our context it would look like this:

- 1 point is be given each time a quiz question is answered correctly with the purpose of teaching users about responsible gaming.

The levels table explains the number of level, name and points required to reach the level, which in our context looks like this:

- 1st level: Beginner (0 points required)
- 2nd level: Novice (6 points required)
- 3rd level: Intermediate (12 points required)
- 4th level: Advanced (18 points required)
- 5th level: Expert (24 points required)

Final solution

Figure 14 shows is what the user is met with when they are logged in:

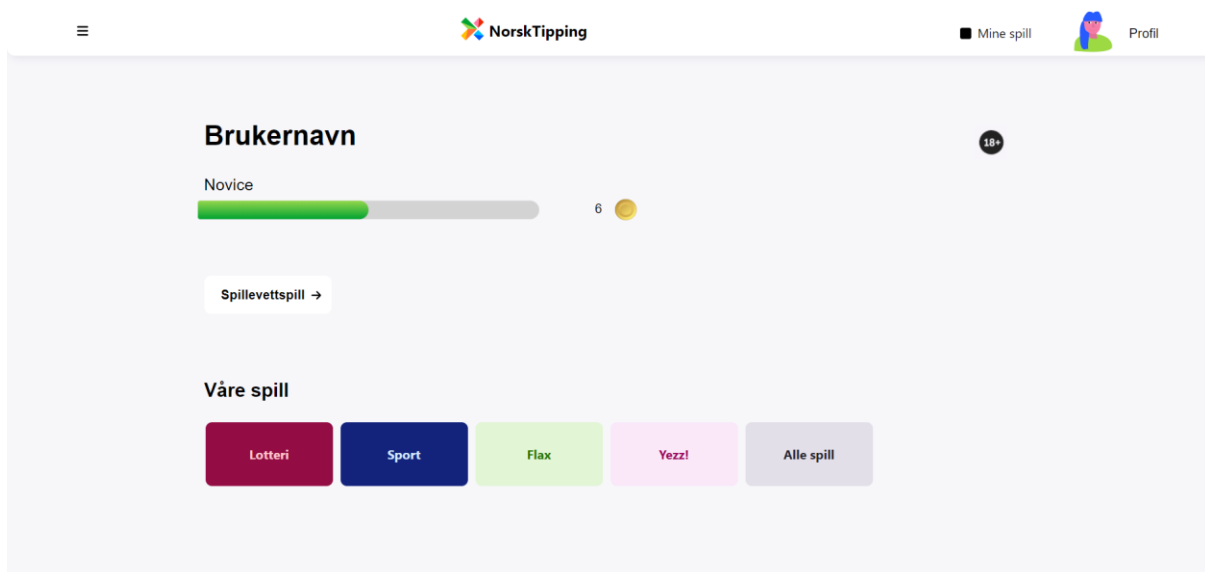


Figure 14: Screenshot of landing page when a user is logged in after implementation of game.

The game consists of a map of chapters (Figure 15), where the user has a clear overview of the size of the game as a whole.

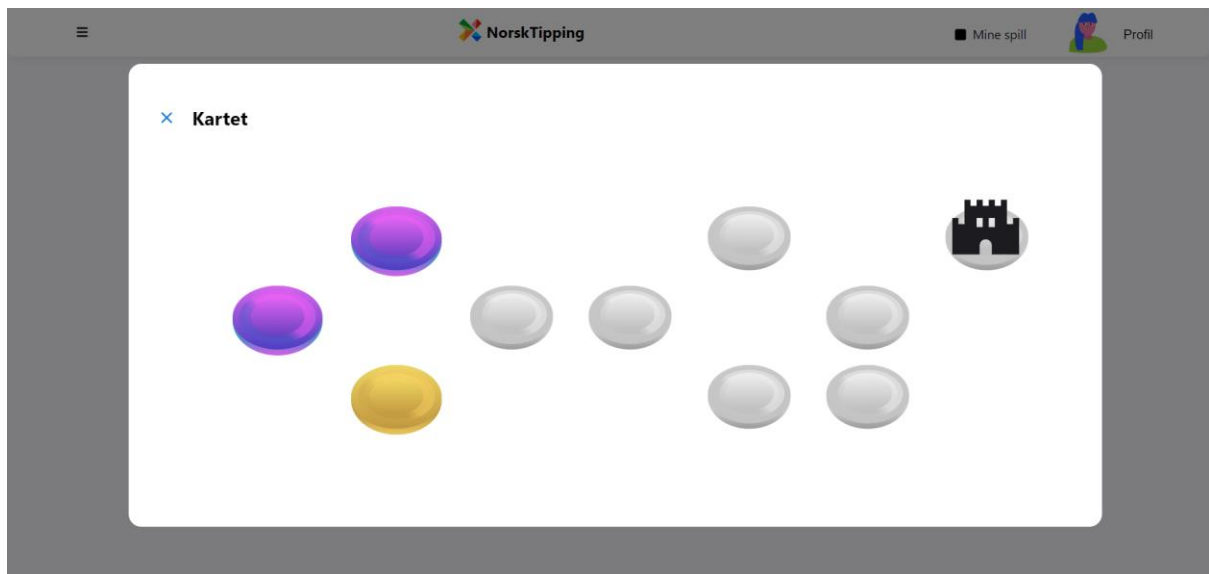


Figure 15: Screenshot of game map.

Each chapter on the map consists of between 3 to 5 levels, with each chapter containing a progress bar to indicate how big each chapter is visually. The levels consist of several challenge-types, to break up gameplay flow to avoid a monotonous gameplay loop. One of the challenge-types are “Drag and drop” levels (Figure 16, Figure 17), in which the user has to correctly place words into an incomplete sentence in order to progress.

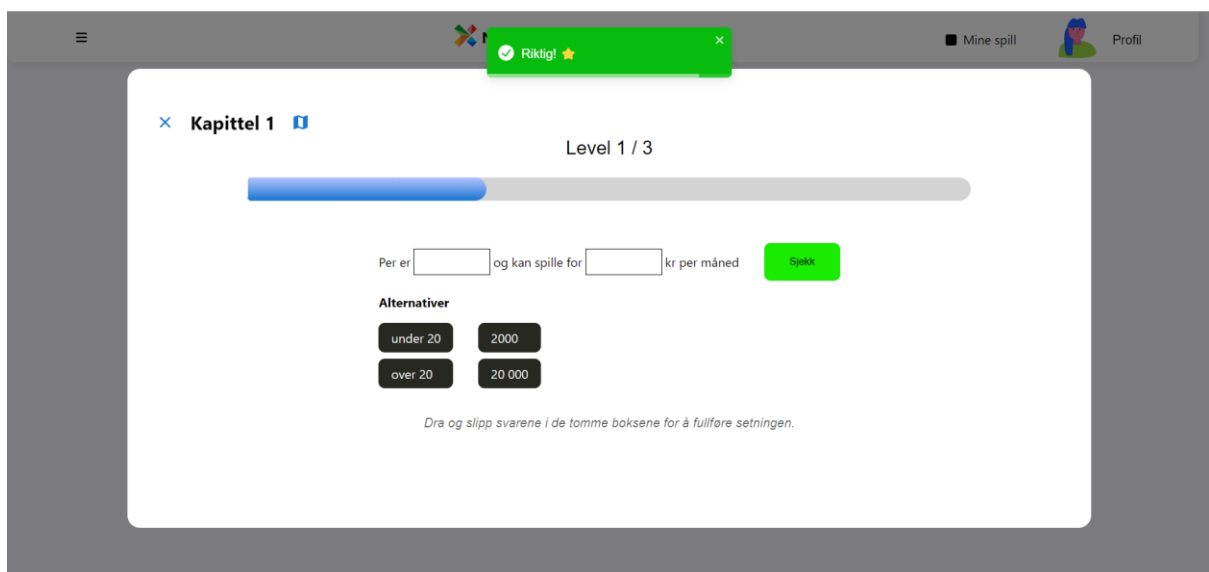


Figure 16: Screenshot of a drag-and-drop component and the feedback occurring after answering correctly on the previous question.

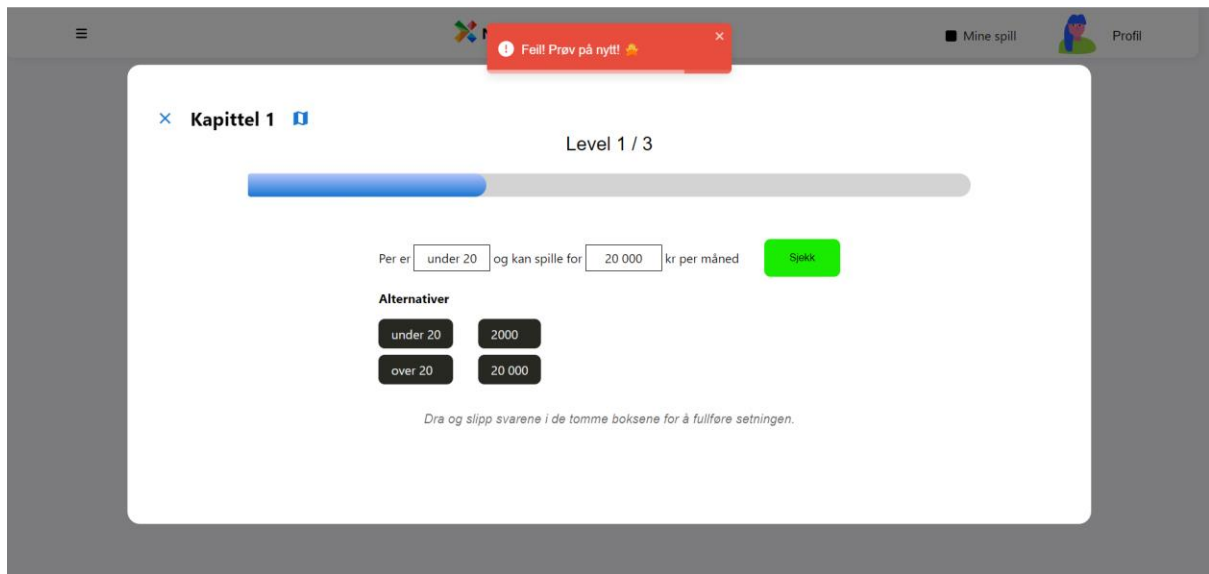


Figure 17: Screenshot of a drag-and-drop component and the feedback occurring after answering incorrectly on the drag-and-drop component.

Another challenge type are “Quiz” levels (Figure 18), where the user is presented with a question prompt and multiple answer alternatives. The question may be a scenario-based question or a multiple-choice question depending on the level’s place in the current chapter. The difficulty of the challenges are adjusted by providing the user with either more or less obvious wrong answer alternatives and by nature of the question prompt.

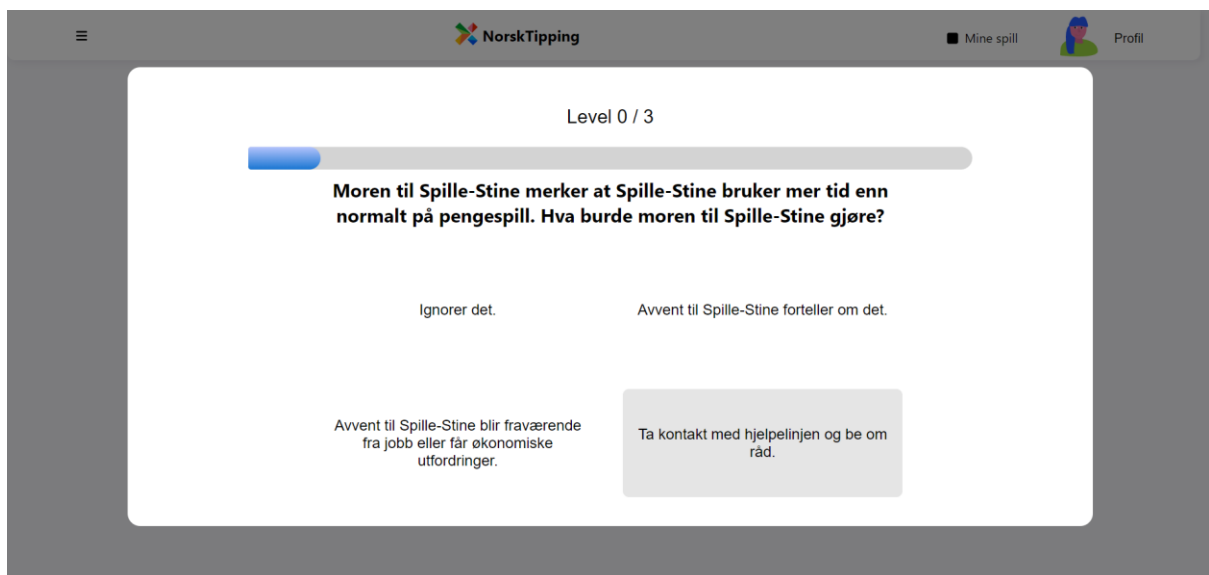


Figure 18: Screenshot of a quiz component.

4.4.3. Character customization

When looking into character customization and avatars and whether or not we should implement it into the system, we found two arguments for why we should implement it. Firstly, we can make the process work somewhat like collectibles, which can eliminate badges while also adding value to the point system. Keeping the character creation options hidden or locked until a user reaches a certain amount of experience points, will make the options for character customization similar to collectibles. The reason for why it is interesting to treat the options as collectibles is due to the strong connection between natural human behaviour and collecting as some of the reasons behind the interest for collecting, identified by James Halpern, includes pride of ownership, possessiveness and the need to control one's environment which essentially may work as a motivation for a user to partake in the game (Zichermann and Cunningham, 2011, p. 83). Secondly, and more importantly, it can add value to Norsk Tipping's service by offering users a sense of ownership to the platform which fosters loyalty and increases user retention (Chou, 2023). Figure 19 shows the character design, taking into consideration Norsk Tipping's illustration style and colours.

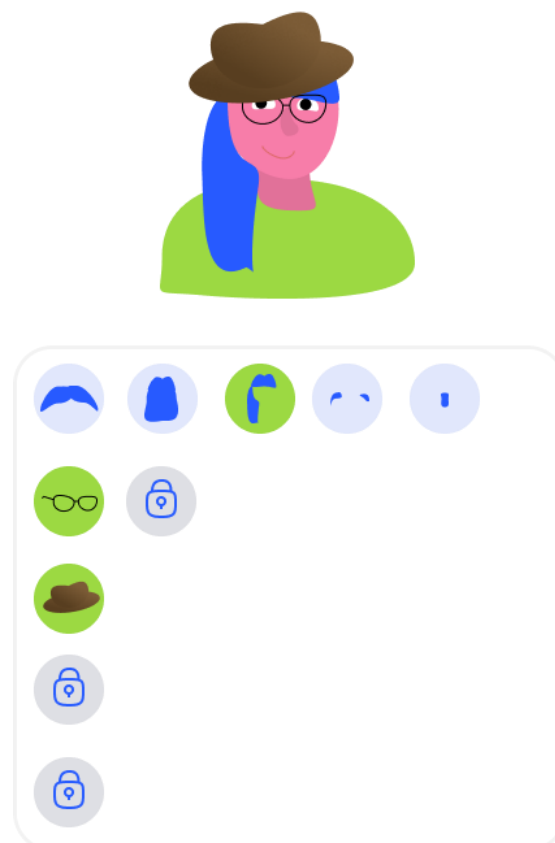


Figure 19: View of avatar and avatar customization, illustrated.

When a user logs into their account, they are met with their name and a link taking them to the responsible gaming view (Figure 3). The name and the link is centred on the left side of the page leaving a notable amount of blank space on the right hand side of the view. With the exception of the user's name, a button linking the user to the responsible gaming view and a logo depicting the user has to be over the age of eighteen, the section is mostly blank. Due to this and that there already are user actions related to responsible gaming, we can justify using this placement for further development of the game. To meet the goals of making the gaming guidelines and general information about responsible gaming more available, it is in our interest that the game is available hierarchically, meaning it's one of the first things you notice on the page, in order for the user to notice it sooner and possibly increase the chance of the user interacting with it.

For the placement of the avatar design, we therefore chose to utilize the blank space on the right hand side of the user's name within the modal that appears when accessing the profile of the user (Figure 4) resulting in what can be seen in Figure 20. We also chose to apply the avatar design to replace the generic logo in the navigation bar that signifies the profile in the existing solution. The reflected changes can be seen in Figure 21.

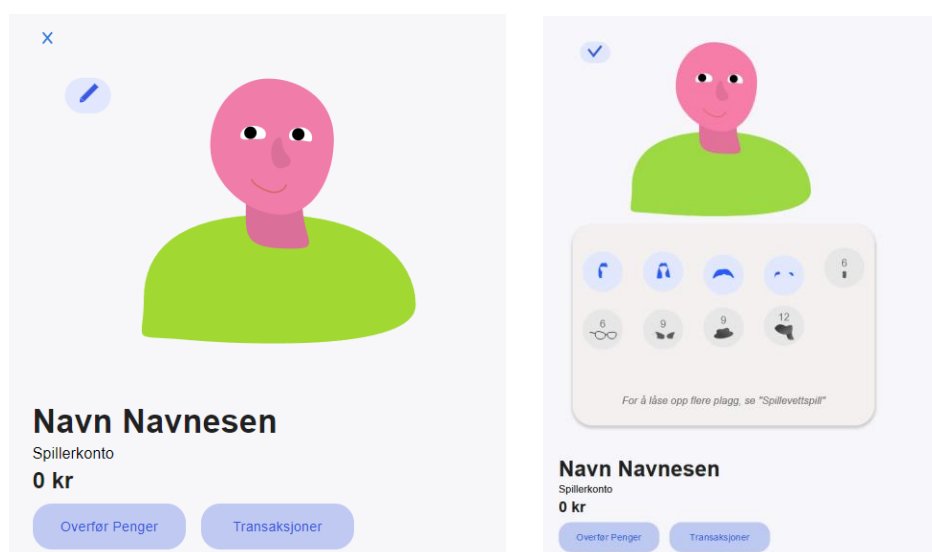


Figure 20: Avatar and avatar customization shown, placed in user profile.

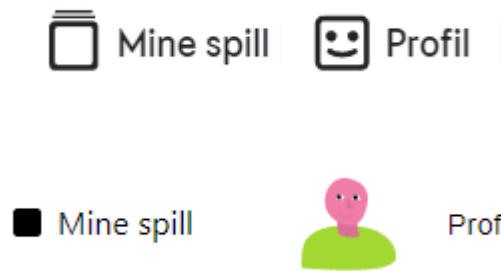


Figure 21: Screenshots showing before and after changes made to the profile button in the navigation bar.

As the user progresses through the game, they are rewarded with points for correctly answering levels (Figure 22). These points unlock new cosmetic items which can be used to customize your avatar outside of the game itself. Points are not consumed when an item is unlocked, but rather serve the purpose of illustrating how far the player is to the next unlockable, visually presented by a number overlaying the unlockable item (Figure 20).

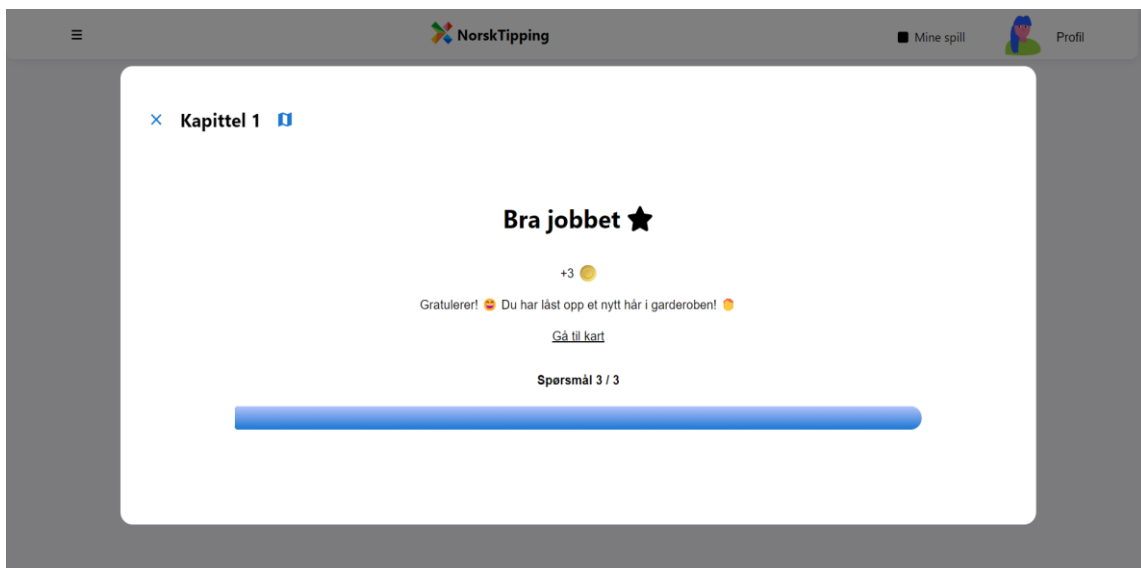


Figure 22: Screenshot of unlocking new cosmetics by completing games.

4.4.4. Web accessibility

Developing accessible services and removing accessibility barriers is crucial to creating and maintaining a web for everyone. Essentially, this means creating services that take into account and develop ways in which people with auditory, cognitive, neurological,

physical, speech or visual disabilities can still use the service. This means implementing code that allows for keyboard-only usage, screen readers and taking into consideration word phrasing, colour contrasts and other design adjustments amongst others to accommodate all users visiting a site (W3C, 2024). For the project we chose to utilize Material UI as the component library as they are concerned with accessibility and deliver some features out of the box, such as keyboard navigation and offers a guide on which elements a developer must implement individually to ensure fully accessible services (MUI, no date). As for testing we utilized the Web Accessibility Evaluation Tool (WAVE)¹⁷ to get direct feedback on contrast and other errors that we had missed while developing and corrected these. We did however not correct the colour contrast issues that derived from the colour palette that Norsk Tipping uses today, but focused rather on the errors resulting from our implementation.

We utilized Lighthouse as well for testing the performance and accessibility. Lighthouse generates a report on a web page's metrics and gives insight into how a web page's performance, accessibility, best practices and SEO can be improved (Chrome for developers, no date). Figure 23 shows the Lighthouse report generated for the application.

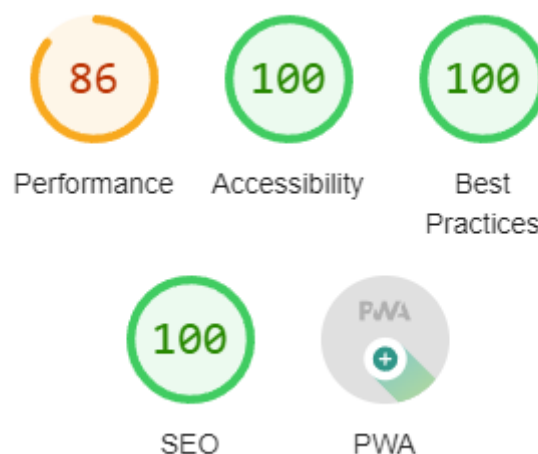


Figure 23: Lighthouse report before implementing keyboard navigation.

Since evaluation tools don't cover all possible aspects, we have also gone through the WCAG criteria we found most suited for the application and made sure that the application follows these. These criteria are met alongside the criteria of alternative texts, appropriate use

¹⁷ <https://wave.webaim.org/>

of headings, and other aspects that were identified by WAVE and Lighthouse. Keeping in mind that the game is desktop-only due to our problem area being based on a desktop view, there are critical criteria that are not met in regards to dynamic content. This is however a disadvantage in terms of usability and will require a future iteration where the module is made dynamic spanning across all screen sizes. To manually get an overview of the requirements, we followed Yale University’s simplified “WCAG 2 A and AA Checklist” (Yale University, no date) which we went through and adjusted the applicable specifications to fit the requirements of the application.

After implementing more expected keyboard navigation, we generated a new lighthouse report (Figure 24) which reflected warnings about utilizing tabindex, which we used to implement the keyboard navigation.

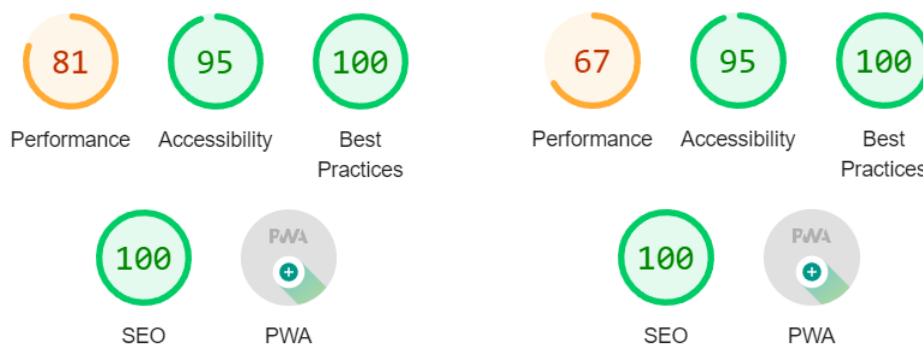


Figure 24: Lighthouse report for landing page (left) and pages on responsible gaming (right) after implementing keyboard navigation.

4. Discussion

In this section, we will discuss the results of the user tests with the perspective of our theoretical framework. We aimed to create a system that could provide users with a greater retention of the gaming guidelines. The user testing we administered was conducted on few users at a time, following the UX principle of preferring fewer users and testing more often in an iterative manner (Nielsen, 2000). This way the first round of tests would notice faults with the system that can then be reiterated on and tested again to find other issues (Nielsen, 2000). Considering that the product has been in development throughout the process we haven’t been able to test for the long-term effects of the game and will therefore not be able to discuss

the actual retention of the gaming guidelines, but will rather focus the discussion on the results we gathered from the user tests and relate these to the applicable theory to be able to answer the thesis issue.

Firstly, from comparing the first and last user test, namely “placement and noticeability” and “game system” we can extract the similarities and differences of how users responded to the test questions on Norsk Tippings site versus the game. The test scripts for the different tests differed, meaning that they are not directly comparable, but we gathered key insights from how the users treated the tasks and the page before and after the implementation of the game. When the users were asked to find the gaming guidelines that were located near the bottom of the page at the time during the first test, the users spent more time locating the guidelines as they would navigate through different menus and pages instead of scrolling directly to the bottom of the landing page. However, in the latter test with the “gaming guideline game” placed at the centre-left of the top of the landing page, signified explicitly with a progress bar (Figure 14), the users were able to find the content of the test prompt, the “gaming guideline game” faster. This corresponds with Soava and Raduteanu’s findings in regards to how users tend to view a website beginning at the top-left portion of the page (Soava and Raduteanu, 2013).

The users were also arguably more inclined to go through the game and answer the questions when asked to locate the “gaming guideline game” in the latter test, rather than read through all of the gaming guidelines when finishing the task asking them to localize a certain guideline in the first test. This can arguably be due to the gamified experience and the increased motivations of users to interact with gamified systems, which is backed up by Hamari *et al.* (2016) and Göksün and Gürsoy (2019) who found a correlation between user engagement and the extent to which a system is gamified. This study showed that the more a system was gamified, the more engaged the users were (Göksün and Gürsoy, 2019). On the other hand, this increase in engagement can also be credited to the nature of the test question asking the user to locate a specific guideline in the first test, whereas the latter test asked the user to go through the game meaning that the users achieved the goal when locating the guideline in the first test and only after successfully completing parts of the game in the latter test. With this in mind, there was still a noticeable difference in how the users didn’t stop the interaction with the page after locating and playing through parts of the game, whereas the

interaction was more abruptly stopped by the user after successfully locating the specific guideline in the prompt from the first test.

Another consideration when comparing the two tests is that the content has changed significantly. The first test we conducted was based on the content of Norsk Tipping's gaming guidelines (Figure 1), which is a set of several written rules on how to gamble safely in the manner of "You have to be 18 years to play", "decide how much time you can spend gaming", "Don't believe you can win back what you've lost". To acquire knowledge about what Norsk Tipping considers as safe gaming habits, a user would have to read the corresponding page on responsible gaming for every guideline. We decided to base the content of our quizzes directly on the responsible gaming pages, rewritten as scenarios. This meant that the content of the tests also differed to a great extent where the gaming guidelines would be direct prompts to the user for instance as mentioned above "You have to be 18 years to play", whereas the quiz include questions such as "Per is under the age of 20, how much money can he spend gambling within a month?". Leroy *et al.* (2013) and Ghafourian, Hanbury and Knoth (2023) found in their respective studies the importance of readability when conveying information. User engagement corresponded to the understandability of content, whereas Ghafourian, Hanbury and Knoth who specifically focused on search engines found a correlation between readability and the overall material engagement (2023). Therefore, it is of interest that the content we wish to convey is understandable and readable, by keeping it simple and relevant, in order for users to keep interacting with it. Without the ability to strictly compare the tests, we can only assume that the ease of understanding the material in combination with engagement effects from the gamified system (Göksun and Gürsoy, 2019) have resulted in a positive impact on user engagement between the two tests, seeing as the latter test showed more user engagement overall.

When testing the readability of the quiz, we received feedback that some of the questions were too vague, leading the reader to spend more time than intended on individual questions. We noticed that overly complex questions or answers that proved too vague would take longer to read and might lead to wrong answers as a result of misunderstanding the question. Testing the content of the quiz became an important component in creating easy to digest content. We wanted the quiz to be a quick and intuitive way to gain a broader understanding of responsible gaming. Hursen and Fasli (2017) found that scenario-based questions lead to an easier understanding of complex learning materials, as it relates closer to

their own experiences. Considering this, we decided to implement the personas directly into the content of the quiz to give the players a neutral party they could relate to, instead of using the players themselves as examples. Furthermore it would allow them to rationalize a context in which the content of the quiz could be relevant in their lives, which would in turn make the questions easier to read and digest (Hursen and Fasli, 2017). We did however conclude that not every question is required to be scenario-based, as not all of the content was complex enough to warrant a scenario to help the user understand the questions better. One thing we didn't test was the order of the questions, which could have proved useful as there is a possibility that some questions would be easier or harder to understand in the context of other questions.

To answer the thesis issue, "how can the knowledge of safe gambling be increased among Norsk Tipping's players?", we would ideally have a way to measure the knowledge of safe gambling in order to see the real effects of the game versus the gaming guidelines. Assumably, the quiz game requires more attention and interaction from the user as they are more actively involved with the content in contrast to the gaming guidelines which doesn't require any focused interaction from the user. Another important difference between the two is the content exposed to the user. The gaming guidelines consists of limited amount of information presented as short rules that a user should consider before playing, whereas the game contains a larger scope of information from their informative pages on responsible gaming. With this perspective and the acknowledgement that engagement positively impacts learnability (Hamari *et al.*, 2016), we can assume that there is a greater chance for users playing the game to acquire more knowledge about safe gambling in general.

5. Future work

As this has been the result of the first developmental iteration we are left with several different ideas to how we could take this project further if we had more time. Firstly, it would make sense to broaden the scope of the thesis issue. The issue was necessarily adjusted to fit the thesis' time frame, and should ideally be broadened in a future iteration. This would also give us more time to improve the code and meet web accessibility criteria, especially measures in terms of implementing dynamic responsiveness and the inclusion of all viewports. Furthermore, conducting research on the effects of the application is a crucial step

in future work as the testing in this thesis has revolved around usability of the site and not the potential effects the application may have. As the goal pertains to affect players' knowledge on responsible gaming, it would be interesting to conduct a bigger study over a longer period of time that would be tailored to investigate such effects. It would also make sense to develop the functions and content of the game further such as giving users points for visiting the pages on responsible gaming or when meeting other criteria created to promote responsible gaming behaviour. Developing the content further could mean developing and choosing a range of questions that are particularly critical within the domain - whereas the content we have today is tailored only to the extent of our own knowledge about the domain. A possible future endeavour would also be furthering the gamification of Norsk Tipping, such as adding interactive elements, more personal customization and world building to create engagement and possibly reduce the chances of users finding other's services more appealing to keep user retention up.

6. Conclusion

The combination of the theory on gamification shedding light on user engagement and the test results we got showing more interest in the content, we conclude this thesis by arguing that gamification by implementing interactivity can increase user engagement. Utilizing this design method can potentially positively benefit the total acquired knowledge users interacting with the game will have about safe gambling habits. A longer study on the effects of the system in a future study would allow for a greater span of time in which the study will take place and focus on the effects of the application rather than the development of it allowing for a more precise answer to the issue. In conclusion, utilizing gamification is a way to create engagement with content, which is an important factor when the goal is to invite users to interact more with content to increase their knowledge on responsible gaming. The effects of increasing players knowledge on responsible gaming is then also something that could potentially be tested for in a longitudinal study to find out whether or not the knowledge about safe gaming habits had an effect on the self determination of players. Assuming greater knowledge can prevent excessive gambling, the benefits of greater knowledge of players can then aid in meeting the related sustainability goals of our context:

- Goal 3: Good health and well-being (United Nations, no date),

- Goal 8: Decent work and economic growth (United Nations, no date), and
- Goal 10: Reduced Inequalities (United Nations, no date).

With this said, the conclusion to this thesis issue “how can the knowledge of safe gambling be increased among Norsk Tipping’s players?”, is that transforming the existing gaming guidelines, or adding to it, by broadening the information on safe gaming given to the user and presenting this information in a more interactive manner that creates engagement with the content, can contribute to increase the knowledge of safe gambling among Norsk Tipping’s players.

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Figures

Figure 1: Norsk Tipping's gaming guidelines (Norsk Tipping, no date).....	3
Figure 2: Screenshots of landing page showing the placement of the gaming guidelines at the bottom of the page.....	12
Figure 3: Screenshot of landing page when logged in.	12
Figure 4: Screenshot of the view when a user accesses their profile.	12

Figure 5: Pages on responsible gaming.....	13
Figure 6: Personas, illustrated.....	22
Figure 7: The expected use of the overlay component.	27
Figure 8: Showing a random guideline at a randomized interval.	28
Figure 9: The gaming guidelines only showcasing one rule at a time.	29
Figure 10: Redesign of pages on responsible gaming.....	36
Figure 11: Different variations of points, illustrated.....	38
Figure 12: Progress bar, illustrated.	39
Figure 13: Game roadmap, illustrated.....	39
Figure 14: Screenshot of landing page when a user is logged in after implementation of game.	40
Figure 15: Screenshot of game map.....	41
Figure 16: Screenshot of a drag-and-drop component and the feedback occurring after answering correctly on the previous question.	41
Figure 17: Screenshot of a drag-and-drop component and the feedback occurring after answering incorrectly on the drag-and-drop component.....	42
Figure 18: Screenshot of a quiz component.	42
Figure 19: View of avatar and avatar customization, illustrated.	43
Figure 20: Avatar and avatar customization shown, placed in user profile.	44
Figure 21: Screenshots showing before and after changes made to the profile button in the navigation bar.	45
Figure 22: Screenshot of unlocking new cosmetics by completing games.	45
Figure 23: Lighthouse report before implementing keyboard navigation.....	46
Figure 24: Lighthouse report for landing page (left) and pages on responsible gaming (right) after implementing keyboard navigation.....	47

Tables

Table 1: Competitor Analysis.....	16
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