Designing and implementing a gamification prototype

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MASTER'S THESIS
Interaction Design (MAMM01)

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(Increasing engagement in Grade's platform)

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Abstract

 The goal of this master's thesis was to design and implement gamification features into Grade's platform in a way that will enable the end users to feel more engaged.

A process based on literature research, competitor analysis and design iterations allowed for a solution that integrated two well-known gamification concepts; leaderboards and badges. The literature research provided the authors with a model on how to design gamification, called the MDE Framework (Mechanics, Dynamics, Emotions). The MDE Framework was used as a foundation for understanding gamification and designing the prototype.

The project resulted in a working prototype with the possibility for administrators to create and manage leaderboards and badges. Both features have the possibility to manage rules connected to them, which must be fulfilled in order to earn a badge or receive points in a leaderboard. The users of the system can strive towards earning badges but also be participating in a leaderboard, competing against others for completing tasks such as online courses.

Sammanfattning

Målet med denna masteruppsats var att designa och implementera funktionalitet i Grades plattform som hjälper slutanvändarna att känna sig mer engagerade.

En process baserad på litteraturgenomgång, konkurrentanalys och designiterationer resulterade i en lösning som integrerade två välkända gamificationkoncept; poängtavlor och utmärkelser. Litteraturgenomgången gav författarna en modell över hur gamification kan designas med hjälp av MDE-modellen (Mechanics, Dynamics, Emotions). Modellen användes som en grund för att förstå gamification och designa prototypen.

Projektet resulterade i en fungerande prototyp som gav administratörer möjligheten att skapa och ställa in poängtavlor och utmärkelser. Båda funktionerna tillåter att regler kopplas till dem, vilka måste vara uppfyllda för att förtjäna en utmärkelse eller samla poäng i poängtavlan. Användarna av systemet kan arbeta mot att förtjäna utmärkelser men också vara delaktiga i poängtavlor där de kan tävla mot andra användare genom att genomföra uppgifter som till exempel online-kurser.

Acknowledgements

Contents

Dictionary

- **API** - Application Programming Interface. In this paper referring to an interface between a client (frontend) and a server (backend).

- **MDE Framework** - The gamification design framework consisting of Mechanics, Dynamics and Emotions.

- **Leaderboard** - A list displaying status in competition.

- **Badge** - A reward handed out to the users when rules have been completed.

- **Gamified** - A system that uses gamification can be said to be gamified.

- **UX** - User experience.

- **Frontend** - Management of what the users sees in the web browser.

- **Backend** - Management of the database for a web application.

- **Fullstack** - Frontend and backend represented in one word.

- **Pulse survey** - A survey which is sent out frequently with the aim of measuring the current level of engagement in a company.

Chapter 1

Introduction

1.1   Background

In a world where digital products overflow our daily life, the companies behind the apps, services and social platforms need to compete for our attention. One way to get users coming back for more is to apply game principles to their product - a concept known as gamification.

Companies can either build their whole product around gamification, or they can implement gamification principles to increase engagement in certain parts of their product. Often, companies implement gamification principles in their product not as a first step, but much later when the product have matured.

This master's thesis was carried out in collaboration with the company Grade AB, which offers software to increase competence and engagement in companies. The platform is further described in section 1.4. Engagement is increased through the use of different software tools available in their product. In order to increase engagement, the employees must use the GRADE platform and its features. If employee engagement can be increased through the use of the platform, how can Grade make sure the employees actually use the platform? This is where gamification comes into play. If gamification can be applied in order to get employees to use the platform more, the overall engagement level may be increased.

The prototype implementation and database design were carried out by the authors, but this thesis will not go into any depth about any technical details relating to that.

The work has been equally distributed between the authors, both during the project and the thesis writing, as well as the presentation preparations.

1.2   Goals and Research Questions

The goal of this master's thesis was to ultimately implement gamification features into Grade's platform, which is described more in section 1.4, in a way that will enable the end users to

feel more engaged. The project included the whole process from investigating what kind of gamification features would be interesting for the company and their customers, to designing concepts and implementing them. The goal was also to carry out a usability evaluation of the implemented concepts and to answer the following research questions:

R1: What is gamification?

R2: Can we find a model on how to implement gamification in Grade's product?

R3: How can we implement gamification to increase engagement in Grade's product?

R4: Is it possible to implement a gamification concept which spans two or more of Grade's product modules?

1.3 Limitations

There are always limitations in projects. In the case of a master's thesis, there is the obvious limitation of time. The project must be completed in 20 weeks of full time studies. The time limitation put in itself limitations on the amount of detail that could be put into every phase of the project, as well as the amount of gamification concepts that could be implemented.

From a technical perspective there were limitations in the choice of programming languages and frameworks, but also in that the solution had to fit inside the frames of Grade's current software infrastructure. A system as mature as GRADE also forces new features into a certain way of looking and behaving, which would affect the final design greatly.

The project has some important user testing parts, but they were limited to only include test persons from inside the company.

1.4 The GRADE platform

Grade AB is a company which provides the platform product GRADE, which is a product with the purpose of increasing the employee engagement and competence in its customer's organizations. The customer base using the GRADE platform consists of both private and public companies. Examples of private companies are Kicks, PEAB and Lime Technologies. The public sector consists of Region Stockholm, Region Skåne and more. The customers often use the functionality which for a long time have been the core of the platform, namely the e-learning features which can provide courses and certifications. Features such as digital performance reviews and competence planning are also popular.

The platform consists of different modules which in themselves offers different functionality [12]. In order to provide a good understanding of GRADE as a product, each module is explained below.

1.4.1 Grade LEARNING

This module, formerly known as LUVIT, is an in-house produced Learning Management System which handles e-learning courses, classroom based courses or a combination of both. It is possible for the customer to offer courses both privately inside their company, or publicly to people who are interested. Course participants can communicate with each other, perform tests in the course, receive certifications from courses and much more.

1.4.2 Grade TALENT

Grade TALENT is a Talent Management System with functionality aiming to increase employee engagement. The tools in this module enable for the possibility of swapping manual processes for digital ones. For example, performance reviews, talent and competence analysis, management by objectives, competence development and qualification support are all part of the module. Employees can easily get an overview of what career opportunities their company offers and what requirements must be met in order to rise in the company.

1.4.3 Grade ENGAGE

The ENGAGE module provides functionality for measuring the level of engagement among the employees. Depending on how the trend looks, the system recommends certain actions for the management to take. These suggestions support the management in the specific area were engagement is in a downward trend.

The engagement levels are measured by employees answering surveys on a regular basis. The surveys may be sent out once a week or once a month and include a handful of randomized questions which are answered on a scale of one to four.

1.4.4 Grade COMPOSER

The aforementioned LEARNING module also comes with a tool used for creating e-learning courses. With a combination of components such as text, images, videos, quizzes, tests and sections, COMPOSER is a tool with many possibilities for e-learning creation.

Chapter 2
Theory & Methods

This chapter comprise the theoretical background which was used as a base for our master's thesis. Firstly, it will go through the concept of gamification, what it is and how it is utilized. Secondly, relevant parts of the design process are explained. The main processes used in order to create a design that could be implemented are described. Finally, some general information about the software tools and frameworks that were used to implement the gamification prototype is presented.

2.1   Gamification

Gamification applies game mechanics to non game environments and its purpose is to increase the user's engagement and user experience by working with users' emotions and amusement to play [20, p.528].

Gamification is becoming more and more popular in today's software where companies want their users to be more engaged in their products [25, p.1237]. Even if gamification is recognized more frequently today, the concept has been around for a long time. It was and is frequently used and its purpose is to make the games more entertaining and to make the players more engaged and loyal [6, p.9]. Since companies strive to have engaged and loyal product users, companies that did not have a game as a product started to adapt the concept of gamification. The first documented use of gamification dates back to 2008, but it was not until 2010 the concept started to spread [6, p.9].

Customers should be happy about using the system and should be frequently coming back. In the paper *Is it all a game? Understanding the principles of gamification* [31, p.413] Robson et al. state that:

> *"Gamification can create desired behavior change in business contexts through rewarding desired employee and customer behaviors, thus leading to more satisfying outcomes for employees or customers than in a non-gamified context."*
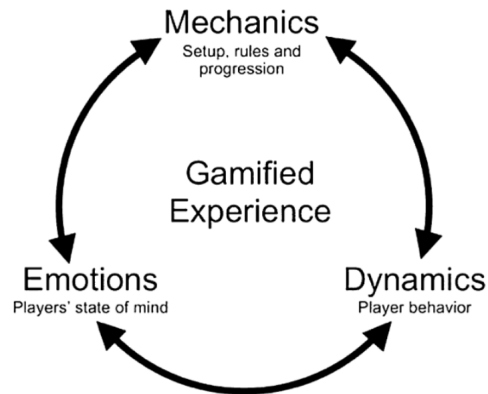
Figure 2.1: The MDE Framework [31].

By using gamification the companies can achieve this effect, but how does it work? With gamification, the goal is to influence the user by using different kinds of reinforcements and emotions [31, p.413]. Reinforcements will motivate the users in different forms, e.g. with extrinsic and intrinsic rewards [31, p.413]. The extrinsic rewards include for example prizes and money, rewards that affect us from the outside. The intrinsic rewards are inside us. Fun and enjoyment are two examples. By using a mix of these two kinds of reinforcements the behaviour of the users can be formed and thereby increase the motivation and satisfaction.

There are some large companies that recently added gamification into their products. Reddit is a well-known online community and message board which in 2019 started to use coins which works as a currency among the users [29]. These coins can be bought for real money and if a Reddit user thinks a post or comment has a high value, the coins can be used to buy awards that are given to the author of the post or comment. With the coin system, Reddit users get rewarded by putting out good content. The medal systems purpose it to make the users feel emotionally satisfied or proud by using social recognition.

Another company that has introduced gamification in their system is the application Habitica. This app is a productivity app which purpose is to help you reach goals in your daily life [13]. This app has implemented gamification by making the whole app into a complete game. Players have their own avatar where they can level up and earn achievements. The company have been growing in popularity and today has a user base of two million users [41]. By designing the gamification mechanics in the app, the developers can steer the users towards certain emotions and behaviours.

Even though gamification is meant to do something good by increasing engagement, there might also be some drawbacks with it. If the setup mechanics are not well-designed, the dynamics and emotions may not be desirable [32]. Even though gamification is trending, it is important to take into consideration if the product will benefit from it or not. Is it really needed and if so, how is it implemented so that it gives us the results we want? If the gamification is rushed the end-result could be negative. The gamification concept can be quite difficult to understand. To help in getting a better understanding of the gamification concept and how to implement it, the MDE Framework can be used [31, p.413]. This model describes the relation between three important categories; mechanics, dynamics and emotions. See Figure 2.1.

2.1.1 Mechanics

Robson et al. [31, p.415] explain the mechanics in gamification as something that is defined before the player enters the game. The mechanics stay the same during the the lifetime of the game and is the same for each and every player. The boundaries of what is possible, the rules of the game, the goals of the game and the interaction possibilities are all part of the mechanics. All these aspects are purposefully designed parts of the experience [25, p.1239].

Mechanics can in itself be divided into three subgroups; *setup mechanics*, *rule mechanics* and *progression mechanics*. These types of mechanics will be explained further below, as they are important for gamification [31, p.415].

Setup Mechanics

The setup mechanics are what molds and makes the environment of the gamified experience [31, p.415]. Examples of what's included in setup mechanics are [31, p.415][25, p.1239];

- What objects are available in the game?

- How is the setting of the game?

- Is the game made for one or several people?

- Do you play with or against other people?

- Is the game infinite or finite in length?

We would describe setup mechanics as an overall foundation of a gamified experience. However, to create structure and meaning in a game, certain rules must be applied. This is were rule mechanics are helpful.

Rule Mechanics

Rule mechanics define what actions are allowed in the game, what goals can be achieved and what constraints are put on players [25, p.1239]. They can be both deterministic or non-deterministic depending on how they are formed [31, p.415]. For example, a certain action may always lead to the same result. On the other hand, if chance is part of an action, like a lottery, it is not obvious what will happen. Rule mechanics decide when a player gets a reward, but progression mechanics, described below, decide what constitutes the reward.

Progression Mechanics

Implementations of progress bars, points and feedback can be used to turn a repetitive task into something exciting [19]. Excitement is a form of reward and rewarding behaviours are more likely to be repeated [34]. This is very important in gamification since the concept can be used by companies to improve routine work tasks [32, p.32].

In the MDE Framework, the progression mechanics represents the rewards and incentives in relation to certain actions performed by players [25, p.1242]. In a gamified product, players can be rewarded with achievements when completing certain tasks. This can be a powerful way of displaying progress, especially if the achievement can be seen by other people. This

is due to the fact that an achievement which can be obtained by every player in a group can represent where a player stands socially within the group [31, p.415]. That's why leaderboards are popular in gamification, motivating users through competition. If players consent to using a leaderboard, the productivity may rise. However, if the players do not consent to using the leaderboard, it can have the reverse effect [18, p.1949].

2.1.2 Dynamics

When players start to use the gamified system the game dynamics, or the way users interact with each other, start to appear. It is the social results of the mechanics being followed, broken or bent by the users [16, p.352]. Dynamics could be hard to predict for the developers since they are controlled by the users. Depending on how the users dynamics evolve, the developers can adjust the mechanics and in this way being able to affect the dynamics [15, p.567].

The value of badges is an example of how dynamics are connected to mechanics. If a developer implements a gamification system where the badges are used, the users will then give it some sort of value. If a badge is hard to earn it will be valued higher than if it is easy to earn. The developers need to find a good balance of how they hand out badges. It can be done by keeping an eye on how the users values the badges.

2.1.3 Emotions

Emotion is the last pillar in the MDE Framework. It is the result of players following the game mechanics and creating the game dynamics. In gamification, as in regular games, the goal is to generate positive feelings for the players. Usually, both positive and negative emotions are felt by the players [31, p.416]. Compare for example the emotions of earning an achievement reward with the emotions related to losing a badge.

The MDE Framework suggests that enjoyment for the players is the the most important goal to achieve. Enjoyment may be a product of different experiences such as completing challenging goals, being surprised or feeling excited. However, creating positive emotions in players is not the answer to everything. Letting players experience sadness, disappointment, or other negative emotions when appropriate is also important [25, p.1239].

2.2 Design methods

In the following sections, the critical parts of the design process are explained. These principles and processes are followed throughout the project in order to increase the chances of achieving a successful result.

2.2.1 LoFi and MidFi Prototyping

LoFi prototyping stands for low-fidelity prototyping and the main idea is to create prototypes which are cost-efficient early in the design process. They should take a small amount of time to create and therefore shorter prototyping iterations follows naturally. Since the

resulting product is meant to be used by the end-users, they should be highly involved in the process. An example of LoFi prototyping is drawing by hand. If the designer is an experienced drawer, a paper prototype could be very cost efficient [39, pp.661-662]. With time, paper prototyping has become less and less used because technology has evolved. Scripting based tools such as Visual Basic and HTML can create prototypes quite easily with the benefit of looking better than just doing it with pen and paper [7, p.205]. These prototypes can fall into the category of MidFi, which means they are more advanced and more detailed than a LoFi prototype. Nowadays, tools like InVision [17] or Marvel [22] can be used to easily create MidFi prototypes.

Another aspect of LoFi and MidFi prototyping is the possibility of avoiding unnecessary costs. In the early stage of the design process, the prototypes are very basic and a lot can change. If a programmer would start working with a more advanced implementation in the early stages, unnecessary time could be spent on implementing things that might not be part of the final implementation [30, pp.137-138].

2.2.2   HiFi Prototyping

A high-fidelity prototype, or HiFi, is a prototype that is supposed to look very similar to the final product. The users can interact with the prototype as if it were the real product, including clicking around or writing into text fields. This level of detail in a HiFi prototype compared to a LoFi or MidFi prototype naturally takes more time to create. The realistic result is the benefit [36, p.78].

A HiFi prototype of a software system should present a realistic experience of the visual and navigational parts. The system under the hood, or backend, may not be functional but rather simulated [7, p.204].

2.2.3   Design Iterations

Working with iterations is good approach when you want to follow a user centered design process. User center design (UCD) puts the user in focus in every step of the design process. By analysing users' needs and defining requirements, designing solutions and finally evaluating the design with user testing before reiterating the process, the opinions of the users will affect the final design.

Iterations are also a good way of working if there is a need to respond quickly to changes. Iterations are part of the agile working method, which consists of four general phases; analysis, design, implementation and testing [5, p.113]. UCD and agile software development methods can be combined to ensure that the developed software is of value to the user [1, p.35].

In order to encompass both UCD and agile software development, the phases used in the iterations are the following; analysis, design concept, prototyping and user testing. See Figure 2.2. Much of the information about the phases is based on the UX Planet article *User experience design process* [24].
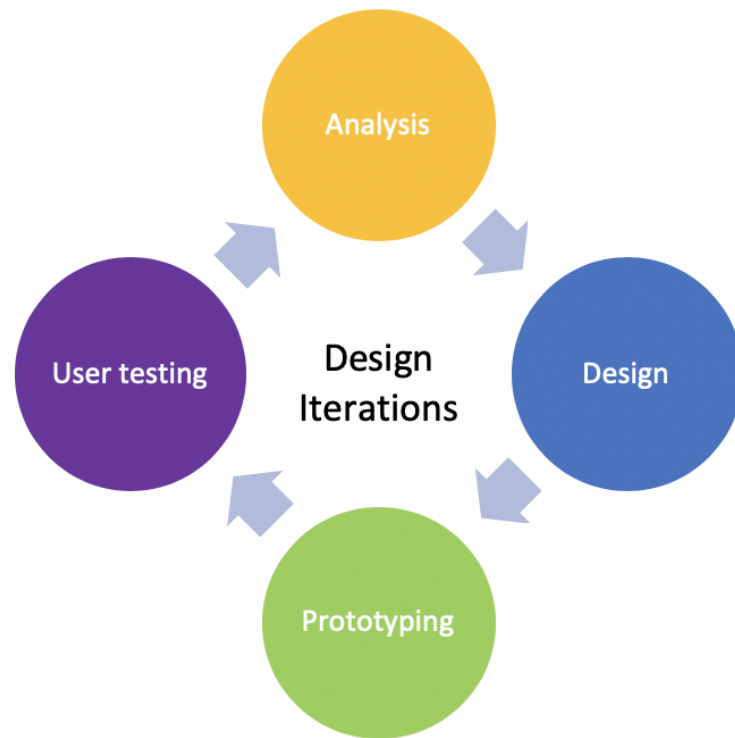
Figure 2.2: The iterative design process

Analysis

The analysis phase aims to be a foundation for the rest of the iteration by focusing on understanding user requirements or analysing user tests. The conclusions resulting from the analysis should be taken into consideration when creating a design. For example, looking at how competitors have implemented gamification is an activity that should be carried out in this phase.

Design

After analysing what is necessary to include in a design, the next step of the iteration is to be creative and invent solutions that is thought to satisfy the users' needs. Designing concepts of functionality, drawing sketches of the user interface, deciding the flow of interaction or designing images could be part of this phase. The goal is to decide what ideas are good enough to build a prototype upon, which is the next step.

Prototyping

Implementing a prototype of the design is a natural next step of the iteration. This is necessary in order to carry out user testing in the end of the iteration.

In a LoFi or MidFi design iteration, the prototyping phase means putting together several concepts into something that works as a whole. There should be a possibility to create something called a Use case, which can be described as a task that can be performed by a test subject.

In HiFi, the prototype phase will focus on implementing the design in code, making it as realistic as possible.

User testing

The final phase of the iteration focuses on evaluating the prototype design. The design is evaluated by letting users carry out different tasks in the prototype. For example, if the goal is to design a door, the user might be given the instruction to open the door. The user may be observed when carrying out the task without getting any input from the organizers. On the other hand, the organizer might want to have a conversation with the user during the testing in order to explore the user's experience deeper. Other times, the user completes the task alone and is asked to fill in a questionnaire [33, pp.12-13].

When this phase is complete the whole process is iterated over again, starting with an analysis of the previous iteration.

2.2.4 Design principles

Some of Don Norman's design principles will be used throughout the project to create a design that is usable. The principles are described below [26].

Affordance

Affordance can be described as a characteristic of an entity, which gives the user a clue about what can be done. For example, a light switch affords to be toggled and a door bell affords to be pressed. In the context of interaction design, designing visual components so that their purpose is easily understood is important.

Feedback

Norman describes feedback as communicating the results of an action. If pressing a buttons sets of a particular process, the result of the process, or the progress of the process, should be obvious to the user. Feedback that is either too insignificant to be understood, too much to be helpful or too slow to be meaningful will not be appreciated by the user. For example, if a user adds something to a list of items, the new item should be clearly shown or a message of success should be communicated.

Constraints

The constraint principle can be used to create functionality that is easy for the user to understand and use and limits many possible wrong-doings or mistakes. For example, constraining the amount of possible actions in a process can help in guiding the user towards making the right choices.

Consistency

Consistency means to design similar functions in similar ways. If a blue button is recognized as triggering a specific action in a system and suddenly there is a red button that triggers

the same action, it might lead to confusion for the user. Even worse, what if the blue button suddenly triggers an action opposite to what it usually triggers? This is the reason why consistency is important.

2.2.5   6-3-5 Brainwriting

6-3-5 Brainwriting is a brainstorming exercise were the goal is to generate a lot of ideas in a small amount of time [37][4]. The method is designed to include six persons sitting in front of a table, each person with a blank sheet of paper. The session begins with setting a timer to five minutes. Each participant is supposed to write down three ideas during these five minutes. When the time is up, the paper is handed to the person next to them. Each participants now have a new sheet of paper with three ideas already on it. The timer is again set to five minutes and each person is supposed to write down three new ideas. This time, inspiration can be drawn from the ideas already on the paper. This process is repeated five times and will ideally result in 90 ideas. Some ideas may be similar but others are hopefully unique.

2.3   Software tools / Technical background

In this project we use two main tools to implement our gamification concepts. For developing the front-end we use React, a JavaScript library for building user interfaces. For the back-end and API we use ASP.NET, a back-end framework built with .NET and C#. Below follows some relevant information about the software which may help in understanding the rest of the paper.

2.3.1   React

React is a JavaScript library which is used to create user interfaces. It uses a syntax extension called JSX which allows the user to write HTML code in a JavaScript file. Thanks to this, the developer does not have to create separate files for the HTML and JavaScript code. React is also declarative, meaning you create expressions instead of statements, which makes the code more predictable and easier to debug [27].

One feature of React is called React Components and is a way of creating reusable pieces of the user interface [27][28]. One component can be built out of several other components. There is no limit in how many components can fit into a component tree. An example of reusable components could be a popup box which can look exactly the same every time it is used, but the text inside can change. It would be a waste of time to re-implement the design of the popup box just to change the text inside. Components solve this issue.

2.3.2   ASP.NET

ASP.NET is an open source development platform which was released in 2002. It brings tools, libraries and languages to build dynamic applications, for example web applications. With ASP.NET both the backend and the frontend is built with the language C#. The fact that both the frontend and backend use the same language makes it easier to develop since

you only have to know one language. HTML, CSS and JavaScript are also needed as they are the primary web application languages [23].

2.3.3   Marvel

Marvel is a digital online tool with the purpose of simplifying the creation of LoFi or HiFi prototypes [22]. In Marvel, it is possible to create views from both the computer and smartphone perspective. Views can be created from uploaded images combined with the library of icons, wireframe elements and simple drawing tools. Every view can be configured so that if a user clicks on a certain area in the view, another view is shown. This functionality enables for testing how the user wants to navigate in the prototype, which is perfect for the LoFi prototyping phase.

Chapter 3

Preparations

The work process was planned in order to be time efficient but thorough enough to ensure that the final result was valuable for Grade AB. First, the concept of gamification was explored to get a good understanding of how it works. The process proceeded with a workshop with employees from Grade AB to generate ideas. The ideas were then discussed by the attendees of the workshop and chosen by how much it would increase the engagement with Grade's platform and how much time and effort it would take to implement them. With concrete ideas chosen, the design phase started out with LoFi prototyping and gradually moved over to HiFi prototyping. After a satisfactory result of the prototyping, the final design was implemented and integrated into Grade's platform. The work process consisted of the steps shown in Figure 3.1.
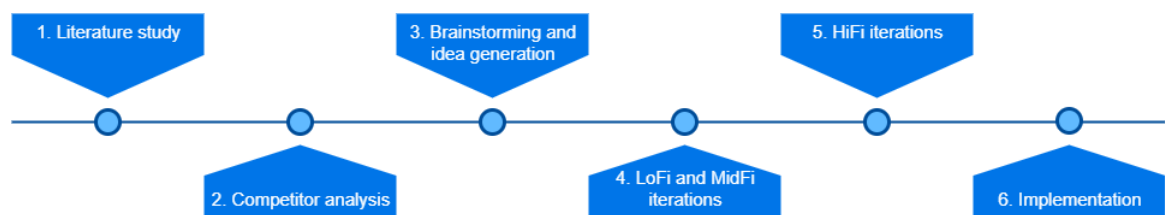
Figure 3.1: The work process.

3.1   Literature study

Before generation of ideas and implementation of code were started, a foundation of information and understanding was needed. We wanted to understand what gamification is and how it is used, but we also wanted to find as many methods as possible on how it could be implemented. The most popular and most used gamification methods like handing out medals and badges were quickly found, but we wanted to find the methods that had not been used

that much within talent management systems, learning management systems and e-learning systems.

Looking into research papers on the internet was the first step. Google Scholar [11] was the main search engine used to find literature on gamification. Keywords such as *gamification, MDE framework gamification, gamification e-learning, gamification in businesses* were used. Most of the gamification theory, e.g. the MDE Framework, presented in the *Chapter 2 - Theory & Methods* were found in resources available from Google Scholar. Another source containing relevant references were a slide on a presentation from Speaker Deck [21]. The articles that were chosen were often very general in describing gamification. This was desirable, since one of the research questions of the project was to find a general definition of what gamification is. Many articles and papers described gamification in a learning context and since this project was not only about gamification in learning, more general articles had to be found. These articles were therefore used as a foundation for this project. In addition to the information that was gathered through research papers, interesting information were gathered through the use of Google Search [10]. Keywords such as *gamification, gamification concepts, implement gamification, gamification examples, gamification features, gamification rewards, gamification design* were used to find articles and blog posts discussing gamification. These articles helped in understanding how the theories from the research papers could be implemented. Two of these sources [40][9] also laid the foundation for the created list of gamification features compiled in Table 3.1. This table was categorized into three main parts; motivation, rewards and feedback [3]. Some of the features can be put in multiple categories and some of them just fits within one category. For example, *Mystery boxes* are categorized as rewards since you get something from opening the box. Simultaneously, they are also used as a motivation, since the user is excited about what reward is hiding in the boxes and wants to find out what it is.

Table 3.1: Features of gamification found when reading research papers. In the right column there are comments which describes the features.

Feature Aspect	Comment
Motivation	
Intrinsic motivation	Behavior driven by internal rewards.
Time limits/pressure	Do a task in a given time.
Limited tries	Do a task with a certain amount of tries.
Fun (design, animations)	Design and animations that make the user happy.
Variations in things	Change behavior and look of things.
Helping others	Help other with e.g. tasks or by handing out points.
Tutorials	Make the use familiar with the system.
Investing/betting	Investing and betting with e.g. points.
Rare items (eg. badge)	Make some items rare to increase value.

Mystery box	The user do not know what the reward will be.
Customization (eg. theme)	The user can customize their view.
Team feeling/progress	A user action progresses its team.
Getting rewards	Rewards are rewarded to the users.
Rewards	
Medals, Badge, Trophy, Portrait borders	Virtual items that can be rewarded.
Currency	Buy real life things
Leaderboards and user ranking	Ranked depending on amount of points.
Stickers	Stickers that can be moved and used by the user.
Lottery/Casino function	E.g. gambling and betting
Gifting/sharing	Hand out points or other items.
Points	Gather points by doing things.
Special email signature	Get an special icon when emailing.
Fixed reward schedule	Hand out rewards a specific times.
Prize collecting - combine rewards	Combine rewards to a better reward.
Title (eg. salesman of the week)	Give users different titles.
Member of something special	Make the users become member of a special group.
Animations	Good animations can act as rewards.
Random reward	Rewards are randomly chosen for the users.
Feedback	
Progress circle/progress bar	A bar that shows the users progression.
Breakdown of results (daily, weekly, monthly)	Shows what has happened the last period.
Performance graph	A graph that shows how the user has performed.
Levels	Higher effort leads to higher level.
Encouraging messages	Messages when users do things.
Likes and comments from other users	Users gets feedback from likes and comments.

To help each other understand the information that was found we discussed the findings. As soon as useful information in articles was found we shared it with each other. If there were information that were unclear or hard to understand we looked for other articles to further help us understand. When discussing different topics and aspects of gamification, there were

always two questions in our head; why and how. These questions helped us getting a deeper and broader understanding.

The combination of having open discussions and reading research papers and articles resulted in us finding mutual ground on what gamification is and how to use it.

3.2   Competitor analysis

After building a solid foundation of gamification theory, it was decided to take a look at a group of competitors to Grade AB. Which competitors to examine were chosen by Grade and us together. Two types of competitors were included. The first type where the functionality was similar to Grade ENGAGE with the possibility to take the pulse of the employees using surveys. In the second type of competitors, the system as a whole was similar to Grade's platform. The names of the competitors will not be mentioned in this paper, but are instead named C1-C7.

The goal of the analysis was to investigate if and how the competitors had implemented either gamification or tried to make their platform more fun. Since the competitors offered software with similar functionality to Grade's platform, looking at how they implemented gamification would help in giving us ideas of how to do it in Grade's platform. Some ideas could be copied with some adjustments, and other ideas were not relevant to the project.

In order to analyse the competitors, a two-way approach was used;

- Gathering information through the official website, through Google Search and through other sources

- Signing up for using the software for a trial period or requesting a demo using a video conference software

In order to conduct an analysis more thorough than just looking at the competitors use of gamification, it was decided to use the list of gamification features created earlier and mentioned in section 3.1. If a competitor had implemented any of the features, it was mapped in the table. By structuring the analysis in this way, it was possible to quantify the amount of gamification features of each competitor. See table 3.2.

Table 3.2: Features used in competitor's software. The squares filled with green color marks that a feature is used.

Competitor Feature Aspect	C1	C2	C3	C4	C5	C6	C7
Motivation							
Intrinsic motivation	■		■	■	■	■	■
Time limits/pressure							
Limited tries							
Fun (design, animations)	■	■	■				
Variations in things							
Helping others				■	■	■	■

Feature	C1	C2	C3	C4	C5	C6	C7
Tutorials		X					
Investing/betting							
Rare items (eg. badge)				X			X
Mystery box							
Customization (eg. theme)							
Team feeling/progress	X			X	X		
Getting rewards		X	X	X	X		X
Rewards							
Medals, Badge, Trophy, Portrait borders				X	X	X	X
Currency - buy real life things				X			
Leaderboards and user ranking				X		X	X
Stickers							
Lottery/Casino function							
Gifting/sharing				X			
Points				X	X		X
Special email signature							
Fixed reward schedule						X	
Prize collecting - combine rewards							
Title (eg. salesman of the week)							
Member of something special							
Animations		X	X				
Random reward							
Feedback							
Progress circle/progress bar	X	X		X	X	X	X
Breakdown of results (daily, weekly, monthly)	X		X				
Performance graph			X	X	X		
Levels				X			
Encouraging messages	X			X			
Likes and comments from other users	X			X	X	X	
Total number of features	7	6	8	13	11	10	9

What can be seen is that if the competitor had chosen to implement gamification or making their product more fun, it was mostly achieved in the same way as other competitors. In the table, it can be concluded that the competitors C1, C2 and C3 all used the features *Fun* and *Variations in things*. Two of them also offers the user rewards, but only in the form of animations. The rewards could be in the form of fireworks or other symbolic animations. It is meant to reward the user for completing a certain task and thereby celebrating it. Since these competitors did not offer any interaction between users of the platform, other gamification aspects were apparently not as relevant to apply.

Looking at the four last competitors, C4, C5, C6 and C7, it can be seen that in contrast to the first three competitors, interaction between users were a possibility in their platforms.

Naturally, the opportunity for gamification is greater since the gamification features related to social hierarchy, competition and social belonging can be implemented. Many of these competitors have chosen to use either badges, medals or trophies in order to reward users for certain behaviours. The badges could either be handed out automatically through game mechanics, eg. using a fixed reward schedule. An example of that could be that when a user answers survey questions for two weeks in a row, a certain badge is received. However, the badges could also be a result of game dynamics. That is, the users themselves had the opportunity to reward other users with badges for good behaviour. At least three platforms used this kind of feature. For example, a user could give a co-worker a *Badge of Teamwork* and write a little note about why he or she was given a badge. The badge would then be displayed on the co-workers personal page in the system, but may also be shown in a social feed available to all co-workers in the company. Information about who gave the badge and what the giver wrote about the receiver was shown in certain products, but others chose to only display that the receiver had received a badge. The two types of ways to do it depends on the corporate culture of the company using it.

Almost all competitors use the feedback form of progress circles or progress bars. This is an easy way to display the user's progress and motivate the user to continue the current task until completion. The progress bar have even been implemented in news articles to provide feedback on how much of the article is left to read [38]. Another gamification feature was also popular among the majority of competitors, namely *Intrinsic motivation*. This is a concept which can be explained deeper, but can be summarized as motivation to gain rewards that are based more on emotional states than on physical items. For example, becoming healthier or happier would fall under this category. Achieving social recognition or getting a better working environment could also be rewards that is connected to intrinsic motivation.

Presented below are some key takeaways from the competitor analysis.

1. A couple of competitors used badges that users can earn when completing certain tasks. A badge could be made up of several different rules and the progress towards earning the badge could be displayed using a progress bar. See Figure 3.2 for an example of a badge, in this case without a progress bar.

2. A feed where the users could share information by creating posts and commenting. The feed could show badges earned by users and users could also share information and knowledge related to their role in the company. Other people had the possibility to like and comment on the content which was supposed to reinforce the will to share more knowledge.

3. Being able to praise coworkers for doing a good job was another reoccurring function. The praise might or might not be public for other coworkers to see. The types of praises were pre-defined and would cover different themes such as being a good teammate or being knowledgeable about a certain topic. Praises could be handed out with the possibility of providing a reason why the coworker earned the praise.

4. A focus on giving the user an experience of fun and accomplishment by using visual design that invoke those emotions. Animations were also often incorporated to create a more living user interface.
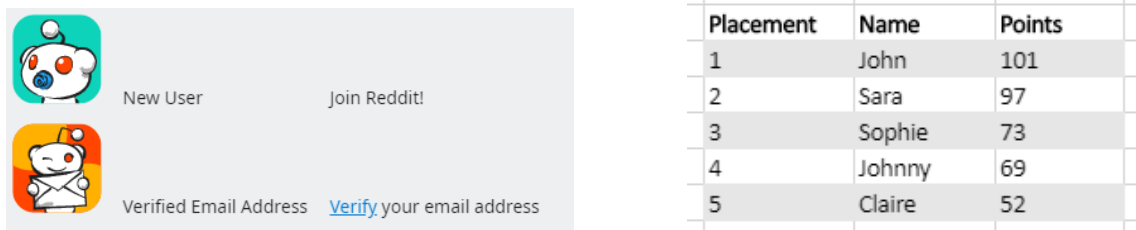
Figure 3.2: The left image shows Reddit's badges (called trophies) a user can earn when performing certain tasks. The right image shows a generic leaderboard showing top 5 competitors and their placement.

5. A leaderboard based on a point system where users could accumulate points. The points were received when certain pre-defined tasks were completed. For example, if some kind of social feed was available in the system, a user could get points for commenting or liking coworkers' posts. You could also receive points for sharing content that is viewed by others as valuable. The points are then displayed in comparison to other users' points. See 3.2 for an example of how a leaderboard can look like.

6. Many systems had the possibility for the management team to set up something that is called pulse surveys. These surveys are normally smaller and sent out with a higher frequency than regular surveys. The purpose of the pulse surveys is to collect information about the current state of engagement in the company. The questions are often answered by rating on a scale, which can be viewed as dull or boring. Some competitors had put in more work into making these frequent surveys more interesting by using different kinds of scales. One example is a scale from 0-5 where the user drags an image of a an animated person on a slider. If the answer is positive in regards to the question, the face of the person will be happy. Likewise, if the answer is negative the face of the person will be unhappy. Another example is where a user was supposed to choose certain words which represents how he or she is currently feeling about a situation. Instead of using checkboxes to choose the words, the words are combined with an icon or emoji which represents the word. Each combination forms a movable piece which the user drags into a circle of chosen words. See Figure 3.3 for an example of how it might look.

3.3 Brainstorming workshop - generating ideas

By having a thorough competitor analysis a lot of ideas where found on how to implement gamification in Grade's platform. The ideas could help improve GRADE, but most of them were all quite similar to the competitors. We wanted in some way to find the new and unique ideas that would make GRADE unique in comparison to the competitors. There are many ways to generate new and different ideas, for example questionnaires and brainstorming. The method that was chosen to generate ideas was a brainstorming workshop with employees from Grade.
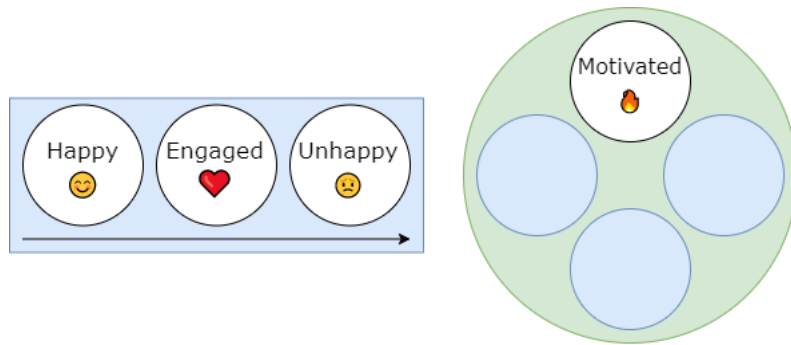
Figure 3.3: A different way of answering survey questions by dragging the words into the circle.

3.3.1 Choice of participants

Finding the right participants for a workshop is important. The dream scenario would be to have one participant from each company that uses Grade's product. All of them would then bring their own view on the product and the workshop would then get a lot of diverse ideas, but this was not the case for us. We were not able to find participants from the companies that use Grade's platform. Thankfully there were people at Grade that could attend to the workshop.

Five employees from Grade were able to attend the workshop. All of them have different personal backgrounds, experience and roles at Grade which lead to a diversity of ideas. Even though the attendees were not the final users, having employees from Grade led to other positive effects. Grade's platform is a quite complicated system which can be quite hard to understand. Since employees from Grade have a good and diverse knowledge of the system where they have seen the system from different points of views, they would be able to find new and different ideas for the whole system. At the company there have already been some discussions about gamification and they have known for some time that they need to implement it somehow in the future. Consequently, the participants in the workshop had already thought a little bit about gamification which could help in finding ideas. Another positive thing about having Grade employees as participants is to make them feel more involved. Since Grade is a quite small company there is a high chance that some or all of the participants will in the future work with the gamification ideas that was to be implemented. If they got involved in the early stage, they would get a better understanding on what they will work with.

3.3.2 Planning and execution

In order to conduct a workshop that would yield valuable result, it was natural to plan it in detail beforehand. A well thought-out plan helped in increasing the possibility of getting ideas which could actually be applied.

The first step of the planning phase was to gather resources on how to conduct a brainstorming workshop in the best way. For example, it was necessary to find information about what kind of people that should attend to create the best dynamics and perspectives, what kind of brainstorming activities that was to be carried out and how to lead the workshop in

Figure 3.4: The workshop structure

the best way. After researching these topics it was decided to structure the workshop as in Figure 3.4:

The *Introduction* was meant to welcome the participants of the workshop and explain what the goal of the workshop was, what result we wanted to achieve during the session and finally present the structure that was to be followed. The plan was then to proceed to shortly introduce the topic of gamification and explain why it is used. Since the participants were Grade employees who knew that we were working with gamification, they might already have thought about how to use gamification, thereby bringing ideas into the workshop. That was one of the reasons why we decided to have two brainstorming sessions in the workshop. The first one to empty their minds of all the ideas they already had, as well as giving them space to be creative without directing their thoughts too much. The second one for generating new ideas after getting a deeper understanding of gamification. After finishing the two brainstorming sessions and discussing the ideas, the best ideas were summarized and the workshop was concluded.

Short introduction to gamification

Here, the goal was to give the participants a sufficient background of gamification to ensure that they were not confused of what the main purpose of the workshop was. The most common reasons of why gamification is used were presented. We also explained how gamification differs from regular games as well as provided a couple of examples of gamified products. Reddit, the large online discussion community, is one of the examples that was presented. Reddit users can buy badges and gift them to users who create good content. The second product was Habitica, a type of game that helps users in achieving their goals. We did not go into too

much detail in any of these products, as we did not want to direct the participants thoughts too much. At the same time the goal was to give them as much information as needed for them to stay focused on the topic and understand what kind of ideas were interesting.

Brainstorming session 1

The *Brainstorming session 1* had the goal of emptying the participants of ideas that they might already have had when beginning the workshop. Simultaneously, the first session were also used as a warm-up exercise were we tried to loosen up the group mentally. Therefore, we chose to use a simple exercise where each person got a stack of sticky notes in a unique color. A timer was set to three minutes and during those minutes, the participants wrote down their ideas on the sticky notes. Once an idea had been written down, the person had to stand up and walk across the room to put the note in a specific place and then go back to sit down again. In three minutes, each individual produced at least two ideas. This process was repeated four times, focusing on different parts of the GRADE platform. The modules LEARNING, TALENT and ENGAGE as well as the system as a whole were the subjects of the session. Since much of the gamification literature is about gamification in learning, this could indicate that if the participants had come in contact with the subject prior to the workshop, it might have been in the context of learning. Therefore, they might already have had many ideas for the LEARNING module. It is very natural to think about gamification in the context of learning. That was the reason the same exercise was performed for each module separately, to ensure that the session resulted in a spread of ideas. After finishing all iterations, the participants were asked to get one or two of their best ideas. The chosen ideas were discussed in the group and saved for later use.

Deepening understanding of gamification

After completing the first brainstorming session and discussing the ideas, the group was given a deeper understanding of how gamification can be applied. Therefore, we chose to present the results from the competitor analysis to demonstrate some of the best ideas used by Grade's competitors. This would probably be of great interest for the group to see, as well as helping in giving a clearer picture of how gamification can be implemented in similar products. This step was deliberately put after the first brainstorming exercises in order to maximize the amount of ideas generated during the workshop. The group was allowed a little more direction and inspiration for the next session.

The presentation, which was created to increase the knowledge of gamification among the participants, included ideas on how to answer survey questions, questions that are sent out at regular intervals to check what employees think about their workplace or manager. The functionality was similar to the ENGAGE module. Should the surveys be playful, or professional but interesting? Automated badge systems were also shown, were employees receive badges as rewards for certain types of behaviour, e.g. being engaged in the platform. The use of a social feed to display achievements of employees and the possibility to comment or like the event were also shown. An example of a leaderboard and how endorsements between co-workers can be used were also presented.

By giving more applicable examples of gamification, we hoped to awaken new trains of thoughts among the participants for the next brainstorming session.

Brainstorming session 2

The second brainstorming session used another form of brainstorming technique, namely 6-3-5 Brainwriting which is described in *Chapter 2: Theory & Methods*. The participants were free to think of ideas belonging to any of the GRADE modules and they were not intentionally guided in any way towards any of the modules. The exercise was supposed to be performed for three minutes for five iterations. If all participants would have written down three ideas per iteration, the total number of ideas generated would be 75.

This method was chosen in order to let the group be inspired by each other's ideas and either build upon those ideas or let them inspire new ones. Since this method was different than the one used in the first session, the goal was to maximize the amount of ideas generated during the session.

Summary of the workshop

At the end of the workshop we summarized all the ideas that had been generated. The summary started with going through all of the ideas and letting the creator explain it if necessary.

Afterwards, the ideas were put up on a whiteboard and a voting session was carried out. Each participant got five dots with a marker pen which they could distribute on the ideas that they thought were the best. At the end of the voting session there would be three ideas which, according to the participants, were the best. Those three ideas were then discussed briefly with focus on pros and cons and implementation possibility. The discussion could help in guiding us in our decision on what to implement.

At the end of the session the participants were informed about what will happen with all of the ideas and information that was gathered during the workshop. They were promised a summary of the ideas.

The workshop ran overtime and certain parts had to be rushed, but the resulting ideas and discussions were very valuable.

3.3.3   Result of brainstorming workshop

The brainstorming workshop gave a lot of material, both from the ideas and also the discussions about the ideas. Many of the ideas were unique, which was the goal of the workshop. The ideas could be divided into two categories: ideas specific for certain modules in the platform and ideas specific to employees or managers. Most of the ideas required added features to the system, but there were also ideas of simply adding the concept of fun to the system.

The result varied between the sessions where the first session gave us a lot of free ideas, since we had not brought up any specific ideas and the second session brought ideas that was more targeted to fit Grade's needs.

The first brainstorming session resulted in each participant adding one to three ideas each round, resulting in a total of 50 ideas separated onto sticky notes. The session generated more ideas than expected which was positive. Even though there were many good ideas, there were some that did not really fit the scope of the project and some that were not implementable. For the LEARNING module there were a total of eleven ideas where five of them were relevant. For the TALENT module five ideas were generated and all of them were good. For the ENGAGE module there were a total of ten ideas where seven of them were
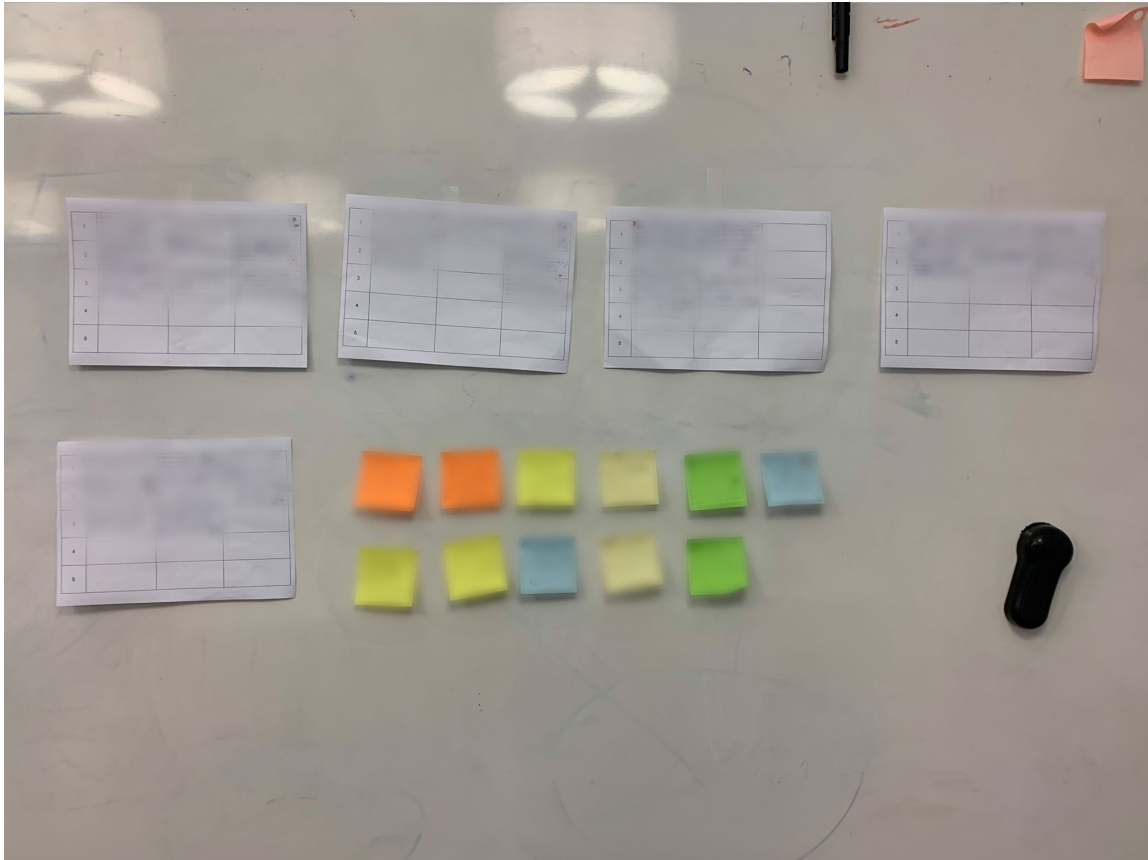
Figure 3.5: The ideas voted as best, from both session one and session two, from the brainstorming workshop. The text is blurred due to secrecy.

good. Finally there were a total of 13 ideas focused on the whole system where nine of them fit our project.

In the second brainstorming session, each person came up with one to three ideas in each iteration and this resulted in a total of 35 ideas. Some of the ideas were somewhat connected and based upon each other due to the nature of the exercise. The ideas were not very broad but more specific and directed to a certain area or module in the product.

After both sessions the participants had to vote for the best ideas. The voting resulted in three winning ideas, see Figure 3.5, were the winning ideas had three votes each. The winning ideas all differed from each other. One was based on the concept of fun where the idea was to implement animations and sound effects when something special happens. Another idea was to hand out a reward when a person improves in some aspect that is being measured. For example, when a manager whose leadership skills are rated low by coworkers reverses that trend and the rating starts to increase. The third idea was to create some sort of summary in the end of a yearly staff appraisal. This idea was out of the scope of this project and therefore abandoned.

3.3.4 Structuring ideas

The brainstorming workshop resulted in a plethora of ideas, with a definite need of being structured. A process of structuring ideas first very broadly and then more precisely was used. It began with placing ideas in different categories according to the modules that Grade's software offer; LEARNING, TALENT and ENGAGE. There was also a category for ideas that did not fit in any category or was spanning several categories.

After placing each idea into the corresponding category, each category was examined individually. New categories were created - *Progression*, *Reward*, *Fun* and *Rule*. These categories would help in separating the different components of the ideas. An idea could often include a rule (e.g. *"when the user answers questions 3 times x happens"*), a progression (e.g. *"every answer is displayed in the progress bar"*) and a reward (e.g. *"a badge is received"*). Many ideas also had a component of fun, like showing progress with an image or figure that is growing.

A digital mind map was also produced to easier work with the ideas. See Figure A.1 in Appendices.

Some ideas were discarded during the structuring process, as they were either irrelevant to gamification or not qualified enough.

3.3.5 Deciding what ideas to proceed with

After the mind map was created, it was necessary to decide which ideas to include in a solution. There were a lot of ideas, but the mind map made it easier to choose because it gave an overview of all ideas and how they were connected.

To be able to reduce the amount of ideas, two main aspects were considered; which of the ideas were reasonable to implement in the time frame of the project and which of the ideas were relevant to Grade's customers.

Another aspect which was considered was if any of the ideas could, in some way, be connected to each other. Was it possible to make a package with some ideas? By bundling ideas a more complete, structured and coherent concept could be implemented. Another important aspect was if any of the ideas were unique. Could an idea that was not used by a competitor be found? Two examples of unique ideas that originated from the brainstorming sessions were streaks and random rewards. Another unique idea was to hand out rewards that works like decorations which could be used to style the user's profile picture. This idea was fun, but we believed it would not have any impact on Grade's platform and therefore we scrapped the idea. GRADE is currently not a platform were interaction between users is a main feature of the product. If it becomes more interaction-focused in the future, the idea could be considered.

By considering these aspects a bundle of the best ideas could be made. The aspect of finding new and unique design was put on hold, since a fundamental part of the project would be to implement a gamification engine. This engine would be very relevant to enable the implementation of a meaningful gamification concept that was easy to use. The gamification engine would include handling points and badges within different modules in GRADE. It would also include a leaderboard functionality which is connected to a point system. An administration page for modifying the gamification setup was also included. The ideas were not very detailed since it was yet unknown what Grade's opinions were about proceeding with them.

This bundle of ideas was presented to the supervisor at Grade. During the meeting, the ideas were discussed from the perspectives of pros and cons. It was decided to continue into LoFi prototyping with the following ideas:

- A gamification core which is modular enough to be built upon in the future

- An administrator interface to handle gamification

- A badge system were badges can be earned by users.

    - A possibility to connect actions completed in different GRADE modules in the rules for earning badges

- A point system where points can be earned by users

- A leaderboard system where administrators can control leaderboards for different parts of the company.

- A visual widget accessible from the user's overview page showing information about badges

- A visual widget accessible from the user's overview page showing information about leaderboards

- A page in the system accessible from the user perspective showing information about badges

- A page in the system accessible from the user perspective showing information about leaderboards

Chapter 4

LoFi and MidFi iterations

This chapter describes the low-fidelity and mid-fidelity prototyping phase that was the first step in creating and implementing gamification into Grade's platform. The section is divided into subsections describing all the iterations that were carried out.

The word *unit* will be repeatedly used in the text from here on. The word must be described in more detail to be understood correctly in the context of the GRADE platform. A core feature of GRADE is the possibility to divide the customer's organization into different units. These units often follow the organizational structure of the company. For example, a company with a main office in Lund and several smaller sales offices around the country could be divided into two main units; main office and sales. In these units, subunits can be formed in order to decompose the company more. The main office may be divided into a management unit and an R&D unit. The sales unit might be divided into subunits for each sales office. The roles of the employees could also be formed as units. Look at Figure 4.1 for a visual representation of what units are. The main purpose of this functionality is to administer rights and access for different divisions of the company and their corresponding roles.

4.1   Iteration 1 - LoFi

The goal of this iteration was to produce a first draft of the ideas that were chosen to proceed with. The focus was not on looking at details such as what color a button would have, but on the main concepts and the navigational flow between those. LoFi prototyping was a good choice since a lot could change early in the prototyping phase.

4.1.1   Analysis

Before creating the first draft of the prototype there were three main things to analyse. First, it was necessary to find some way to tie the ideas together and connect them to each other,
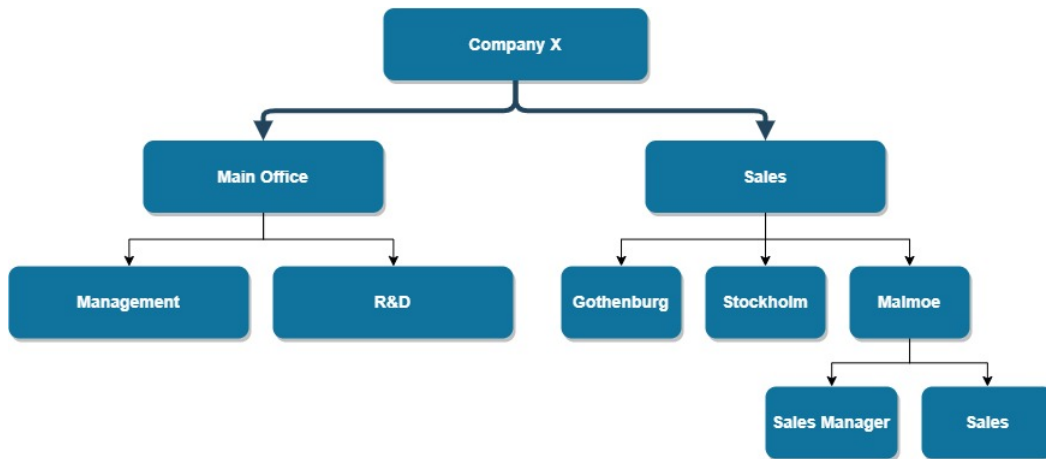
Figure 4.1: A visual representation of how units work in Grade's platform.

instead of having separated features. Secondly, it had to be decided whether badges should generate points. If a badge was worth points and the user earned the badge, it would result in the points being added to the leaderboards the user was connected to. The badges needed some sort of value for the user and by connecting the badges to points this would be achieved. On the other hand, the solution would be much more complex. Thirdly, how could the solution be designed so that it would be easy to extend after ending this project? Should the administrator be able to create their own rules for leaderboards and badges? A solution where the administrators had a lot of flexibility could be important.

4.1.2   Design concepts

With the analysis as a foundation, two concepts were created to fulfil the ideas. The first concept had a menu which was similar to GRADE's current menu system. For the administrator, there was a very open way to handle badges. The administrator was able to create badges that would be achieved when certain rules of choice were fulfilled. In this concept there were also two different ways for the administrator to create the badges. The resulting prototypes based on these concepts can be seen in section 4.1.3.

In the second main concept a custom menu system would be used, a system that differs from the current menu in Grade's platform. This concept used a different way of handling the badges compared to the first concept. Here, the administrator would not be able to create its own badges. Instead the badges would be pre-created by the developers and available to be activated from a library. This would lead to less freedom for the administrator but in return provide a simpler system to work with.

4.1.3   Prototyping

Two prototypes were created using pen and paper, for several reasons. First, the iteration had a deadline close in time. Secondly, if it is obvious that the prototype is not complete, the test subjects may be more open to criticize the prototype. Thirdly, it is easy to try out different concepts without investing too much time into any of them. The two main ideas
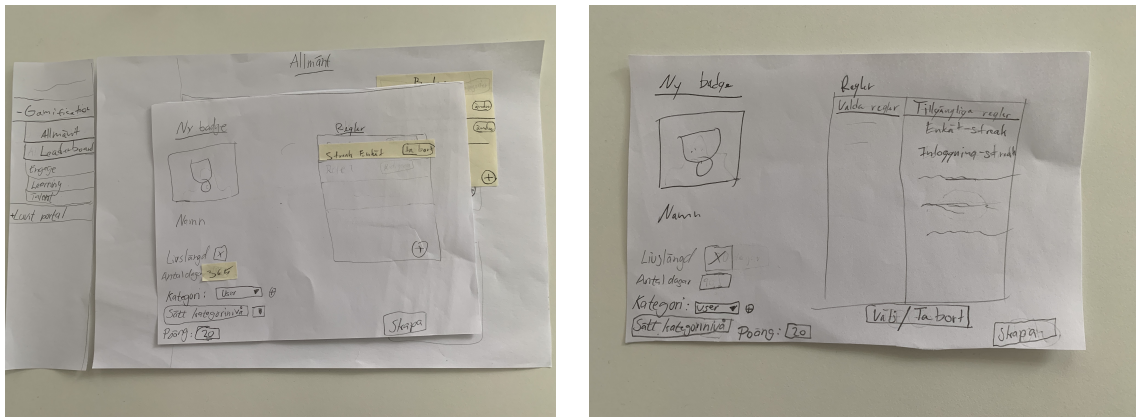
Figure 4.2: Two different concepts of adding rules to badges for administrator.

were created and some details, which was not thought of when designing the concepts, were added. For example, in the prototype where the administrator could create badges freely two different ways of adding rules to badges was created when prototyping. See Figure 4.2. In the first prototype to the left, the administrator needs to press the hovering "plus" button to add a rule. In the second prototype to the right, the administrator needs to select a rule and then press the "Välj/Ta bort" (Swedish for Choose/Remove) button to move the rule from a list of available rules to a list of used rules. Pictures of the complete prototypes can be found in section B.1 in Appendices.

4.1.4 User testing

The test of the prototype was done in the form of two interviews with a time limit of one hour in total. The interview with the first test person took about 50 minutes and it was therefore not much time left for the second test person. Since a lot of information was gathered from the first person we decided it was sufficient. There were still ten minutes left for the second test person, resulting in a little less information from that interview.

The interviews resulted in valuable information and insights of what parts of the prototype can be improved or remade completely. Below is a list of the key points from the interviews.

- Test person 1

  – Menu system should be more similar to the already existing menu system.
  – How is a leaderboard created? Was completely forgotten.
  – Needed to handle units when creating leaderboards and badges.
  – Restrict the freedom that the administrator has when managing badges.

- Test person 2

  – Had an idea about creating "profile cards" for displaying user information.
  – Some buttons were missing.

4.2 Iteration 2 – MidFi

In this iteration the online tool Marvel was used, which is described in chapter 2. Using this tool led to a prototype which, for the user, was easier to understand and had a better flow in general compared to the paper prototypes.

4.2.1 Analysis

The focus of this iteration was mainly on four of the six key points that we got out of the last iteration. These are the four points:

- The menu should be more similar to the already existing system menu.

- How is a leaderboard created?

- Needed to handle units when creating leaderboards and badges.

- Restrict the freedom that the administrator has when managing badges.

The first point was quite straight forward. This is a natural reaction since the prototype should fit into the current system. The second point required an analysis of the creation of leaderboards. We needed to completely rethink how leaderboards work. The third point was important since the units feature is part of the core in Grade's platform. Everything from courses, surveys, access levels etc. are connected to units. It was therefore important that our gamification system took units into consideration. The fourth point had been discussed a lot. How much freedom should the administrator have? If the administrator would be able to create badges with rules and progression freely, it could become quite complex to get started. On the other hand, there would be much more freedom in customizing the gamification ecosystem for each of Grade's customers. Since both freedom of choice and ease of use are valuable aspects, it was decided to make the badges system in two steps. First, a more limited badge creating system should be prototyped where pre-created badges could be chosen. If there was more time an option for administrator to create its own badges would be prototyped.

4.2.2 Design concepts

To be able to make the badge creation more restricted, a new design of badge creation had to be made. A badge library which were to be created by the programmers had to be made. This library would not be configurable by the administrator. The focus of prototyping had taken the Grade ENGAGE module into special consideration. Since there was not that many rules that could be implemented in the ENGAGE module it probably would not be a useful feature for the customers to create their own badges. It would be more beneficial to be able to chose badges from a library.

To be able to handle the units when creating leaderboards and badges it was decided to use the "unit tree" which is already used in GRADE, see Figure 4.3. The unit tree divides a company into units and sub-units in order to handle permissions and logistics.
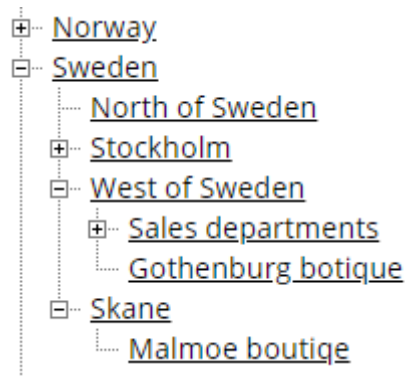
Figure 4.3: Example of unit tree in Grade's platform.

4.2.3 Prototyping

The new concepts that was created led to new prototypes. A badge library was created where two new screens were added as well as a prototype using the unit tree. For pictures of the prototypes, see section B.2 in Appendices.

4.2.4 User testing

The user testing in this iteration was carried out in same way as in the first iteration, by interviewing two persons and letting them complete certain use cases. The use cases were polished a bit to fit the changes made in the design from iteration one, but the changes were minor.

Below are the key points from each test person:

- Test person 1

  - Liked that the look is similar to how Grade Admin looks now

  - When choosing what units should be part of a leaderboard, the tree structure might become very long and not so user friendly

  - Wants to have more freedom in creating badges and deciding how many badges should be part of a badge category

  - Wanted more information about how to achieve badges or gain points in the leaderboard

- Test person 2

  - Easily found where to edit or add a leaderboard or badges

  - Wanted to have the possibility to add several rules at once to a leaderboard

  - When choosing what units should be part of a leaderboard, the tree structure might become very long and not so user friendly

  - Easily understood how to remove a category of badges due to the similarity to how Grade Admin looks now

  - Wanted information about how certain badges could be achieved

4.3 Iteration 3 - MidFi

After ending the second iteration, there were still some details that needed to be tested. This iteration was short and consisted of two working days where adding new details to the Marvel prototype was the focus.

4.3.1 Analysis

The most important things that needed to be done during this iteration was to add information for users regarding the leaderboards and badges. Users would have to know what to do in order to receive points in the leaderboard or earn a badge. Also, a way to handle units that was more consistent to the current design of Grade Admin needed to be added. Apart from that a prototype working for smartphones needed to be created.

Lots of time were spent on talking and reasoning with Grade employees on how to make the unit handling more consistent. The employees had different opinions on how to achieve that which made it quite hard to reach consensus on what would be the best solution.

4.3.2 Design concepts

To present the user with information about how to receive points in leaderboards, a simple button displaying a modal was designed. See Figure C.21 in Appendices. For badges, a menu could be expanded to inform the user about what milestones needed to be reached in order to earn the badge. See Figure C.21 in Appendices.

To be able to make the unit handling more consistent to the current system design, the already existing system was used as inspiration. Some of the already existing functionality for handling units could be applied to the prototype.

A mobile prototype had to be designed which was quite straight forward since the existing components from the website prototype could be reused.

4.3.3 Prototyping

The prototyping went really fast since a lot of the new functionality that had to be added already existed but had to be tweaked a bit.

The prototypes that were made with help from the design concepts can be found in section B.3 in Appendices.

4.3.4 User testing

The testing were just as earlier carried out with two employees from Grade. The user testing resulted in feedback about many smaller details on what could be improved, but not so much about the interaction flow in the prototype. Since the LoFi and MidFi prototypes was supposed to focus more on the flow, the interviews did not give that much valuable information.

The way to handle units were again brought up in the interviews by both test persons. Grade had some time ago started to move over to using React.js as a tool for developing their frontend, instead of using ASP.NET which the system is built upon. The question that arose

was if the unit handling should be created using React.js or ASP.NET. Depending on what way was chosen, different design prototypes would have to be made.

Below are the key takeaways from the interviews:

- Test person 1

    - Wanted to handle units in the old way (ASP.NET).

    - Divide the points into engage points and competence points instead of having point types based on the names of the GRADE modules.

    - Remove badges from the leaderboard.

- Test person 2

    - Wanted to handle units in the new way (React.js).

    - Remove badges from the leaderboard.

    - Remove points from badges.

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Chapter 5

HiFi iterations and implementation

The high-fidelity iterations differed from the low-fidelity and mid-fidelity iterations in a couple of ways. First, the LoFi and MidFi phase focused on the overall user interaction flow of the prototypes compared to the more detailed focus in the HiFi phase. Secondly, the prototypes in the HiFi phase were implemented in the React and ASP.NET frameworks as a part of the GRADE system, making the prototypes much more integrated into the complete user experience of the system.

After each iteration, the results were discussed within a group of relevant people. The group consisted of the project leader, the company's most knowledgeable employee within the area of frontend development as well as a fullstack developer. A fullstack developer has knowledge about everything from the frontend to the backend and database.

User testing was also part of the iterations. The goal of user testing is to gather as much feedback data as possible about the current state of the prototype. Optimally, user testing would be carried out in every iteration. This may be good in theory but more complex to carry out in reality. Due to the nature of this project, which included many iterations, user testing would be very time consuming if it was used in every iteration. Since the project was not disclosed to the public before its ending, user testing could only involve people from the company. The time each employee put into performing user tests was a cost in the form of salary, combined with the person's own work load being increased. Normal user testing was used in LoFi iterations, but the HiFi iterations would be too time consuming if it was used there as well. Therefore, a different approach had to be used. Instead of only performing user tests, the aforementioned group of relevant people were consulted in the end of each HiFi iteration. The feedback was used as a foundation for the next iteration. When the feedback from the group of relevant people began to result in almost nothing, user testing was carried out instead. The combination of using both user testing and an expert group lead to a good balance between time consumption and amount of feedback.

5.1   User perspective

The iterations in this phase focused on the pages displaying all information regarding badges and leaderboards from the user perspective. The general feedback was mostly about details of the prototype, which was expected in the HiFi iterations since the LoFi iterations should have taken care of the bigger things. The first iteration was based upon the the prototype and material from the final LoFi iteration, combined with the feedback from the user testing and discussions from said iteration. See section C.1 in Appendices for pictures of the pages that were part of the prototype.

As mentioned before, Grade has made the technical choice of using React.js for implementing the user interfaces for the main parts of the platform, the parts that are shown to the end user. Grade has also created a library of visual and functional components in React which could be used when implementing the design. React.js and Grade's component library made it relatively easy to create a design or make changes to it. Creating mock data to use for testing was a fast process that did not depend on any of Grade's underlying functionality, which lead to much freedom in designing the data structure and removed much of the overhead.

Refining and implementing the design created in the LoFi iterations was the main purpose in this HiFi phase. However, some additional functionality was also added. One of them was what can be described as an activity feed for the leaderboard page. The feed would display the latest user actions which leads to receiving points, performed by users who is part of the leaderboard. It has similarities to how Twitter and Facebook have implemented their feeds but with less detailed information. The feed was appreciated by the group of relevant people, as it provided a more dynamic feeling on the leaderboard page. This feature was not within the original scope of the project but the idea was assessed as providing a high amount of value at a low implementation cost.

In summary, the iterations went well and without any major problems occurring. Two of the most interesting design choices are discussed in the design highlights below.

5.1.1   Design highlight: leaderboard placement

A major design choice made in the final implementation was the possibility for users to know their placement in the leaderboard. This idea was a result from a discussion during one of the feedback sessions. It may seem obvious that a user sees where in the leaderboard he or she is placed if the placement is high enough to be displayed. However, if the user is placed outside the displayed rows of the leaderboard, there was prior to this idea no way of knowing the placement. If only the top 25 users where shown in the leaderboard, the user outside the displayed rows could have the placement of for example 26 or 100. It was not possible for the user to know. Therefore, it was decided that even if the user's placement is outside the displayed rows of the leaderboard, the user should always be able to see its placement. This would allow the user to see progress when performing points-generating tasks. How the leaderboard page looked before the implementation of this feature can be seen in figure 5.1 and the result after implementation can be seen in figure 5.2.

Figure 5.1: The leaderboard before placement is shown.

Figure 5.2: The leaderboard when placement is shown.
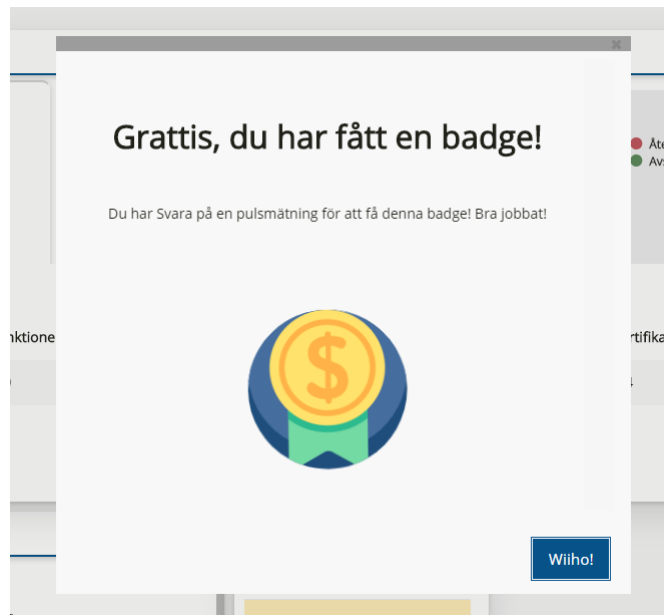
Figure 5.3: The popup a user sees when earning a badge.

5.1.2 Design highlight: receiving a badge

Just as the activity feed described prior, this functionality is also additional and was not part of the original plan. During a feedback session, a discussion about receiving badges arose. At the time, users could see what badges were completed and what badges were near completion. However, the user did not get any information about when a badge was completed. The user had to manually go to the badge page to look at the completed badges. This was not optimal from a user experience perspective and had to be addressed in some way.

The resulting design was in itself not very advanced but the functionality of the feature is key to provide a good user experience. The feedback design principle proposed by Norman and described in section 2.2.4 was relevant in designing this feature. The feature in itself is a good example of what feedback is. The user completes an action which completes a badge and the user receives feedback about the badge being completed. Another aspect considered when creating this feature was to make it fun for a user to earn a badge and to generate a positive emotion.

The prototype of the badge popup can be seen in Figure 5.3. Animations were used for creating an element of fun, which unfortunately cannot be seen in the figure.

5.2 Administrator perspective

Before starting the iterations focusing on the administrator perspective, discussion on how to implement the backend were held. The administrator perspective was implemented in ASP.NET and the user experience for handling gamification had to be similar to how other parts of the system was administrated. Much of the functionality used for creating the prototypes were already used in other parts of the system, which meant that the freedom to create mock data was much more restricted compared to the user perspective. This resulted in the need to implement the database structure and some layers between the database and user in-

terface before creating the visual prototype. Therefore, the discussions were very important in order to build a working prototype, even though they did not give us any major insights about the visual design and user experience design.

When working with the administrator perspective it was realized that there are two different types of unit connections in the GRADE platform. In the beginning of this project there was only knowledge about one type of unit connection handling which users would be part of for example a leaderboard. Apparently, there was also a second type of unit connection with the purpose of handling which administrator has the right to administer for example a leaderboard. In the LoFi prototype, as can be seen in Figure B.17 in Appendices, only the first type of unit connection were included. Now, a prototype containing both types had to be realized.

Just as in the iterations for the user perspective, user testing was performed only after several iterations of implementing and having feedback sessions with the expert group.

For more detailed pictures of the administrator perspective, see section C.2 in Appendices.

5.2.1   Design highlight: rule handling

During the iterations for creating the administration page for leaderboards, there were many discussions about how to add rules and set points for rules. Since one type of rule involved choosing courses or online courses to be completed, it would have to be easy to choose from all available courses. One concept of choosing courses was very simple, as shown in Figure 5.4. It was later on proposed that an administrator might want to add several courses simultaneously and set the same amount of points to the courses. Some of Grade's customers may also have several hundreds of courses to choose from which would make a drop-down list hard to navigate. Using a drop-down list would also limit the user to adding one course at a time which would be very time consuming. Therefore, another concept shown in Figure 5.5 was designed. The resulting prototype would use the second concept to solve these two problems.

Another important aspect of adding rules was how to set the points for each rule. Since the leaderboard could show both engagement points and competence points, the total amount of points would in some way have to be divided between these two types of points. It was discussed whether or not the points should be divided by a set percentage depending on the type for rule. Another way was to let the administrator divide the points manually. Three concepts shown in Figure 5.6 were created and the final design used the third concept. This was believed to be the most intuitive and easily used solution.

5.2.2   Design highlight: re-designing the badge page

Looking at the LoFi and MidFi prototypes for administrating badges, the intention was to create some form of library of badges which would offer a range of pre-defined badges. These badges would have names, descriptions, an image and rules already defined and the administrator would not have to do anything but activate a badge of choice.

During the first iterations, much of the focus was put into the more advanced functionality of the leaderboard. When working with the leaderboard prototypes in the administrator perspective, we learned a lot of how the systems functions and how the administrator works
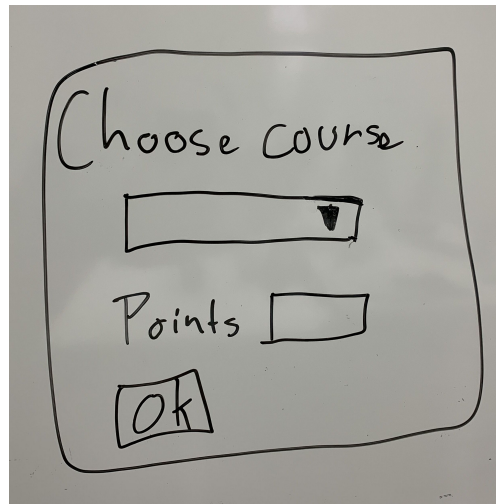
Figure 5.4: An early stage concept of how an administrator should be able to add a course as rules to a leaderboard. The user can choose a course from a drop-down list.
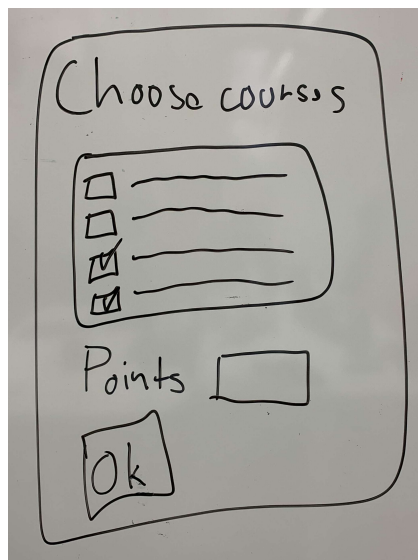
Figure 5.5: An early stage concept of how an administrator should be able to add a course as rules to a leaderboard. In this case the user can add multiple courses as rules.
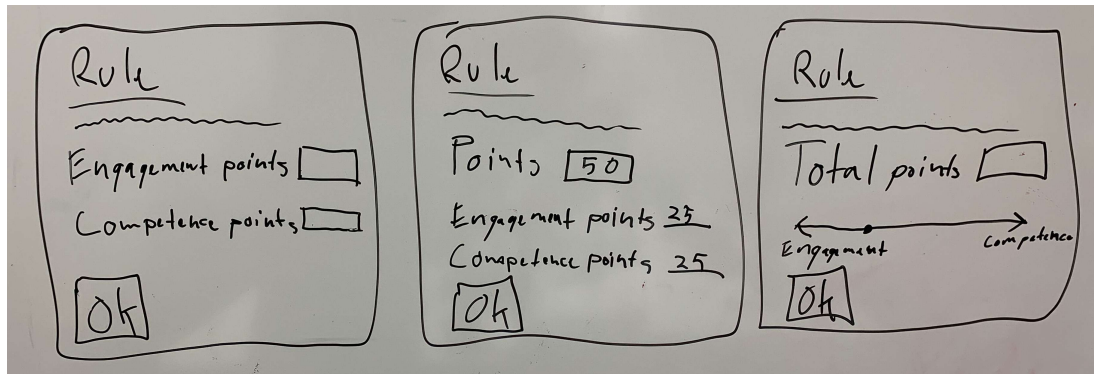
Figure 5.6: Three different concepts of how an administrator should be able to set points on a rule. In the first concept, the user is able to set both engagement points and competence points. In the second concept the user can only set the total points and a pre-defined weight will decide the distribution of points. The third concept also lets the user set the total points, but can distribute the points using a slider.
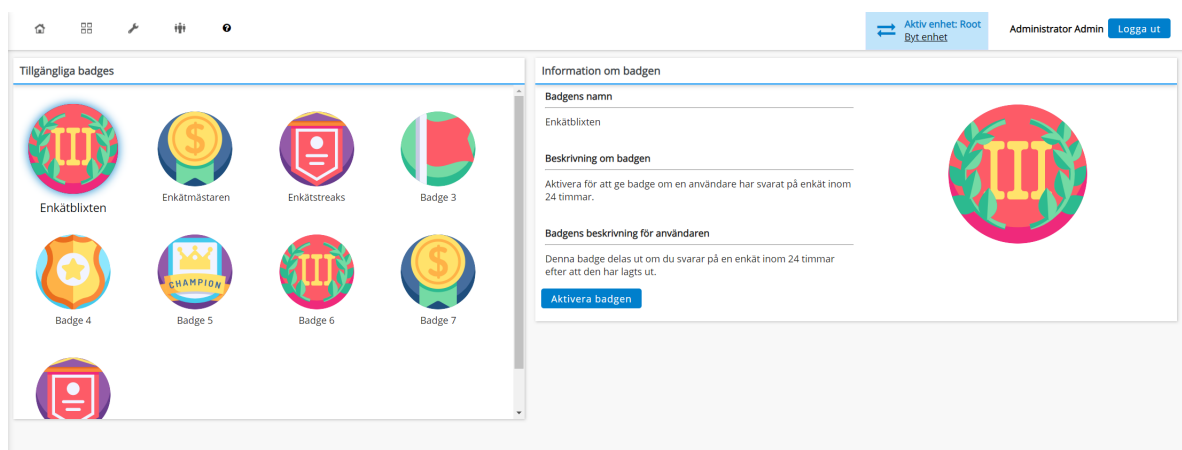
Figure 5.7: The way badges was originally thought to be administrated by activating a chosen pre-defined badge.

with units for different kinds of features. After discussing how a badge library would actually work, we came to the conclusion that the way it would be administrated would differ too much from the rest of the system. There was also an issue about what rules or milestones should be connected to the pre-defined badges. Since the rules that was implemented was dynamic in the form of e.g. courses and online courses, it would be difficult to create a badge library due to the fact that the courses Grade's customers offered to their employees naturally differed. Therefore, a decision was made to change the way badges was administrated by removing the badge library. Instead, the administrators would now have to create the badges by themselves and choose what rules or milestones would make up the badge. Figure 5.7 shows the way badges was originally thought to be administrated and Figure 7.7 in chapter 7 shows how the resulting prototype looked like.

5.3   User testing

As mentioned earlier, the HiFi phase used a mixture of feedback and user testing. After five iterations the feedback group did not have many comments about the current state of the prototype. Therefore, it was decided to perform user testing in order to receive feedback from people who had not been following the development of the prototype. The purpose was to get insights about the prototype's usability from novel eyes and hopefully bring light to overlooked design aspects.

The user testing process was very similar to the one used in the LoFi phase. The difference was mostly that the focus was more detail-oriented compared to the LoFi testing which had the focus of interaction flow. Other than that, the tasks were very similar.

Just as in the other user tests the test persons were employees at Grade. Two persons with different backgrounds at the company were chosen with; the product owner of the GRADE platform as well as a project manager who helps customers implement the platform into the customers' organizations. Both test persons naturally had experience working with the platform from both user perspective and from administrator perspective.

The test leader started asking the test person to use the prototype from user perspective, but did not give any background information about any of the features. The goal was that both the leaderboard and badge functionality would be self-explanatory with no outside help than smaller explanations of certain features. Each task was carried out by the test person and followed by an open discussion about how the task went and how the test person experienced the features involved.

In summary, the user testing resulted in a few bugs being exposed and feedback around how to make certain things even better or more understandable for the user. Other than that, the test persons carried out the tasks successfully and understood how the prototype worked, both from user perspective and administrator perspective.

Details about the results from the user testing can be found in section C.3 in Appendices.

Chapter 6

Usability Evaluation

In order to give Grade something to build upon after the end of the project, it was decided to do a proper usability evaluation at the end of the project. The information obtained is not a must for Grade to take action on but it may provide valuable insights to take into consideration for further development.

The structure of the usability evaluation has taken much inspiration from the course Usability Evaluation MAMF50, available on LTH. The course goes through many techniques to get a good and thorough usability evaluation. Several of these techniques have been selected to obtain a suitable usability evaluation for this project.

6.1 Purpose

The purpose of the test is to collect sufficient information to enable Grade to prioritize what they will further develop after the project is completed.

6.2 Framing of questions

The following questions were chosen to help fulfill the purpose of the usability evaluation.

- Grade Portal - User perspective

  1. Do the users feel more engaged in the product by using the gamification features?
  2. How easy is it for the users to see their placement in the leaderboards?
  3. How easy is it for the users to see which badges they have earned?
  4. How easy is it for the users to see which badges they are close to earn?
  5. What do the users think about the leaderboard page?

6. What do the users think about the badge page?

7. What are the users' feelings when they use the gamification features?

8. How much time does it take for the users to see their placement in the leaderboard?

9. How much time does it take for the users to see which badges they have earned?

10. How much time does it take for the users to see which badges they are close to earn?

11. How much time does it take for the users to see which badge they are closest to earn?

12. Do the users need some sort of guiding to get started with using the gamification features?

13. Is there any functionality that the users feel is missing?

- Grade Admin - Administrator perspective

1. What do the administrators think of managing badges or leaderboards?

2. What are the administrators' feelings when administrating the badges and leaderboards?

3. How easy is it for administrators to create badges or leaderboards?

4. How easy is it for administrators to edit badges or leaderboards?

5. How easy is it for administrators to add rules to badges or leaderboards?

6. How easy is it for administrators to edit rules for badges or leaderboards?

7. How much time does it take to create badges or leaderboards?

8. How much time does it take to edit badges or leaderboards?

9. How much time does it take to add rules to badges or leaderboards?

10. Do the administrators need guiding when administrating badges or leaderboards?

11. Is there any functionality that the administrators feel is missing?

6.3 Method

6.3.1 Selection of test subjects

Two persons were selected for the usability evaluation and due to lack of time this amount had to suffice. Better and more reliable data could have been provided with more people, but the information gathered still provided information that could be used to help further development of the gamification features. The test subjects chosen were the CEO of Grade AB as well as a Content Manager.

6.3.2   Test tasks

The test tasks were designed to give the test person a broad overview of the gamification features created. Most of the users never get to administrate the system and therefore the most natural way to design the test tasks was to make the test person start in the Grade Portal, the part of the system a regular user will use. The test person got to familiarize with the widget page, the leaderboard page and the badge page.

After the test person had completed the tasks in the Portal, the Admin part was next. First, a leaderboard was to be created with specified settings. Similar tasks was to be performed for badges. When a leaderboard and a badge had been created the test person also had to edit and delete rules for each object.

The tasks that were used for the evaluation can be found in Table D.1 and D.2 in Appendices.

6.3.3   Data to be collected

The data that was collected was collected in seven different ways.

1. Correctly completed task.

2. Expenditure of time.

3. Amount of given clues.

4. Behavioral analysis (notes).

5. Probing

6. Post-interview questionnaire.

7. Debriefing interview.

By using these methods of gathering data, both subjective and objective information could be gathered. It also made it possible to gather both quantitative and qualitative information.

Points 1, 2 and 3 were written down by the note taker to get a comparison between the test subjects and to get statistics of how it went.

Probing is an intra-test technique used to gather information from the test subjects during the tasks [35, p.45, pp.206-209]. It is valuable since it is possible to gather the test subject's impression as it happens.

Questionnaires can be used to help in understanding the gamification features' strengths and weaknesses [35, p.192].

The interview questions are used to get a deeper understanding of what the test persons think about the gamification features. According to Brinkmann and Kvale the interview questions are a good way to gain a deeper understanding of their thoughts [2, p.1].

An overview of what type of information that was to be gathered can be found in Table D.3 and D.4 in Appendices.

6.3.4 Execution of test

1. **Walkthrough of usability evaluation** - A quick review of what were to be done during the interview. The test persons were given information about what the data would be used for and they were asked to consent to the data being used and saved. It was also pointed out that the user should not feel embarrassed if the user did not understand the prototype and that it was allowed to take the time necessary.

2. **Execution of test** - The user went through the data specified in Table D.1 and D.2. During the execution of test the test leader used the probing, the test person asks questions while the test person is performing the tasks. This technique was used with great caution so as not to mislead the test person. In addition to this interview technique, the test person was encouraged to think aloud.

3. **Interview questions** - Questions that the test leader asked after all the tasks had been carried through. The purpose of the questions was to collect more qualitative data.

4. **Questionnaire** - After the interview a questionnaire was sent out to the participant, with the purpose of being a complement to the interview questions.

Each usability evaluation was planned to last for one hour where most of the time was allocated to the testing of the gamification features. Expected time for each part is as follows:

1. 5 minutes.

2. 45 minutes.

3. 10 minutes.

4. They decide how much time they want to spend on it, since they will do it after the usability evaluation.

6.3.5 Test environment

The tests were conducted in a room separate from other employees. The user had access to a computer that was prepared with data to conduct the tests. The tests were not recorded because there was not enough time to go through the videos afterwards. A notepad was used to take notes and a stopwatch was used to take time.

6.3.6 Roles

Test leader - The person that interacts with the users by reading the short introduction to the users and guiding them if they get stuck long enough on a task.

Note taker and timekeeper - Took notes of all of the useful information that could be gathered throughout the usability evaluation. This person also kept track of the time that each user spent on each task. If the time limit of a task was exceeded, the test leader was notified.

6.4 Result of usability evaluation

6.4.1 Tasks and time usage

The time taken to complete each task can be seen in Table 6.1. The test subjects manged to complete the tasks with time left and only a few clues had to be given. The clues were not issued because the time for the task was about to end, but they were issued because the test subjects were on the wrong path. The amount of clues given for each task can be seen in Figure 6.2.

By looking at the times a pattern can be found. Creating and managing leaderboards are quite similar to creating and managing badges. This mean that the users learned from creating and managing leaderboards and therefore task five took less time to complete than task three.

The total time for all the tests for each test person can be seen in Figure 6.1.

Table 6.1: Table showing the total time taken for each task for each test person. Also showing average time taken for each task.

Task	Test person 1	Test person 2	Average time
1 - Portal	40s	1m 30s	1m 5s
2 - Portal	8m 23s	3m 58s	6m 10s
3 - Portal	23s	30s	26s
4 - Portal	2m 4s	2m 22s	2m 14s
1 - Admin	1m 50s	2m 5s	1m 57s
2 - Admin	8m 1s	9m 39s	8m 50s
3 - Admin	20s	18s	19s
4 - Admin	5m 12s	4m 31s	4m 51s
5 - Admin	2m 10s	1m 31s	1m 50s
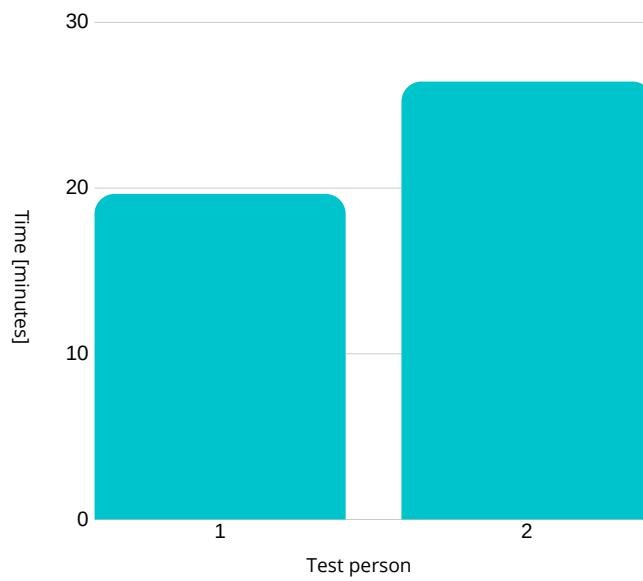
Figure 6.1: Chart displaying total time for all tasks combined for each test person.
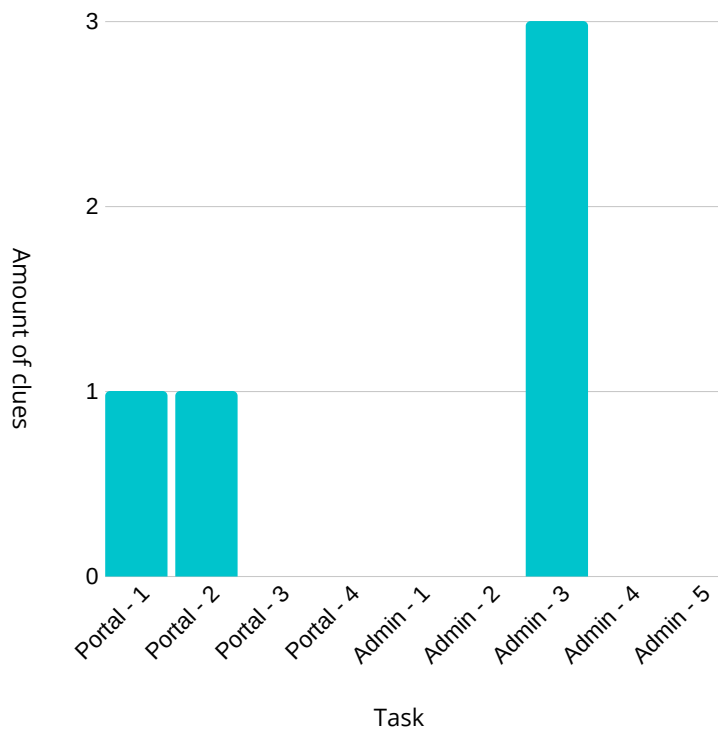
Figure 6.2: Total amount of clues given for each task for all test persons.

6.4.2 Questionnaire

Most questions in the questionnaire got the highest rating that could be given, except for three questions. The test persons thought it was hard to find which badges had been earned, which badges was in progress and how to get more points for the leaderboards.

The more open questions were answered with a positive tone as the test persons said that they felt comfortable using the gamification features.

The questions that were in the questionnaire and their answers can be found in section D.2.1 in Appendices.

6.4.3 Probing

The test leader had the questions, as seen in section 6.2, that would be answered using the usability evaluation in front of him during the test. The probing resulted in these questions being covered and answered sufficiently.

The result from the probing is summarized below.

Grade Portal

General impressions of the leaderboard page
The test persons thought it was a very good feature which made them feel more engaged and eager to see it used in reality. They especially liked that they could find their own placement in the leaderboards easily. There were some small details that made it a less good experience. For example it was quite hard to understand the concept of how points were calculated and therefore it was a bit difficult to know what they had to do to get a higher placement in the leaderboards. Otherwise, they were all mostly satisfied.

General impression of the badge page
The test persons said that this page was both easy and hard to understand at the same time. It was easy to understand since the title of each panel was well named, but hard to understand because the progressing badge panel was difficult to interpret. The test persons thought the progress bar on each badge was hard to understand. If a progress bar was empty, they did not know what it represented. One person thought the badge was disabled meanwhile the other thought that all rules had been completed. One of the test persons wanted there to be a text which informed the user the percentage of the rules that had been completed alongside with the progress bar.

Grade Admin

General impression of managing badges
They thought almost everything was logical and easy to use. One thing that was a bit complicated was the handling of participants that can achieve the badges, since it differed so much from how to handle the participants for leaderboards.

One of the test persons suggested that badges should be possible to enable for specific groups of users. There is a feature in the GRADE platform that allows for creating groups based on roles, units and teams. Being able to connect the badges to theses groups would

make the badge system even better.

General impression of managing leaderbaords
Managing leaderboards were as easy as handling badges and the test persons really liked the usability of it.

A feature that was missing was the possibility to edit many rules at the same time. Since it is possible to add multiple courses with the same amount of points simultaneously, it would be good to also be able to edit courses simultaneously.

6.4.4   Interview questions

The interview question's purpose was to give a deeper understanding of the test persons' thoughts about the gamification features. This part of the usability evaluation did proceed as planned. Because of the amount of information gotten from the probing technique, it seemed unnecessary to run the debriefing interview.

The interview questions that were supposed to be asked can be found in the lists D.2.2 and D.2.2 in Appendices.

Chapter 7

Final prototype

The result of the project was a working prototype where users can create and edit leaderboards and badges. They can be connected to rules that can be configured with points. This opens up the opportunity to create unique leaderboards and badges that will fit the different requirements of Grade's costumers.

The user testing carried out after the last iterations in the HiFi and implementation phase showed that the results were well appreciated. The test persons thought it was easy to administrate badges and leaderboards and they also liked the experience of the features as a user.

The usability evaluation resulted in mostly positive comments. It helped in bringing light to what parts of the prototype were well thought-out and what parts could be improved in the future.

The results of the prototype and the key features for administrator and user perspective are presented below. More detailed pictures of each page that was implemented can be found in section E in Appendices.

7.1 User perspective

The Grade Portal is the part of the system a regular user will use. The parts of the prototype available for a regular user are shown in the sections below.

7.1.1 Badges

The badge page ended up as a simplistic view where the user can see their badges in progress but also their earned ones. The badges in progress displays information of which milestones are included in the badge and how many of the milestones the user has completed. The progress is also visualized by a progress bar which helps the the user to get an overview of all the badges and their progress. Each milestone also contains more detailed information
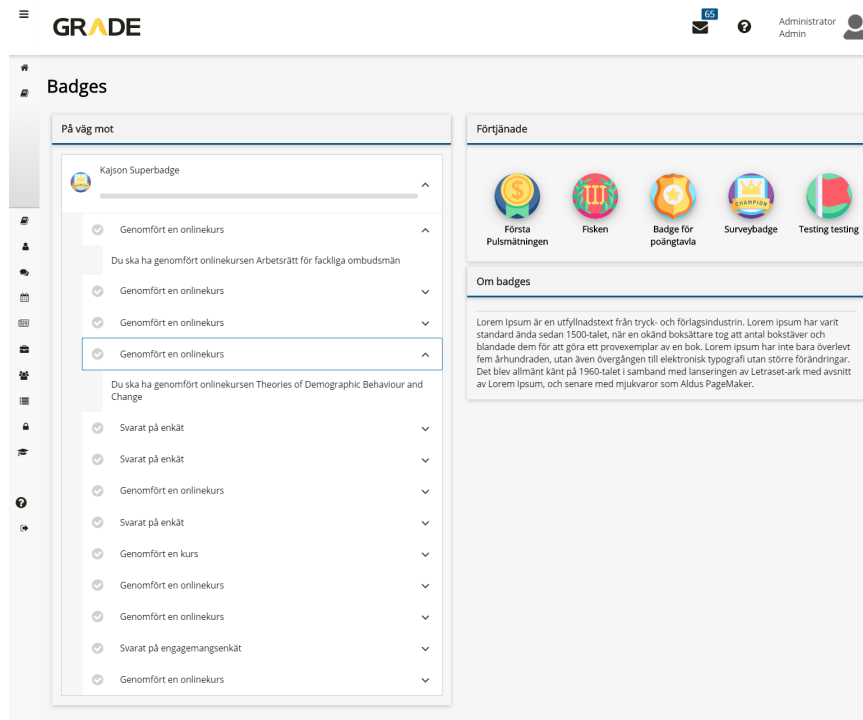
Figure 7.1: The finished badge page.

about what the user has to do in order to complete the milestones, for example the name of an online course or survey.

The earned badges are gathered in a seperate panel. When the user drags the mouse over an earned badge, an animation that affords the user to click on it is triggered. If the user clicks on the badge, a modal showing what milestones were completed is shown.

There is also an information panel about badges in general, which can help the user understands the badge feature.

Pictures of the badge page can be found in Figure 7.1 and 7.2. For more detailed pictures, see section E.1.1 in Appendices.

7.1.2 Leaderboards

In the leaderboard page the user can find the the leaderboards that they participate in and switch between them using a drop-down list at the top of the page. If the user is at placement five or lower in the leaderboard, a segment in the top of the leaderboard shows the user's placement. The accumulated points each user has is shown in two columns, where the heart icon represents engagement and the rocket icon represents competence. The total amount of points is shown to the right and the placements are sorted according to those points.

The prototype contains a panel with information about the type of leaderobard, how many placements are shown and a general description which can be set by the administrator.

There is also a panel displaying how to receive points and how many points each task is worth. In addition to that, users can also see how and when other users have earned points by looking at the event feed.

Pictures of the page can be found in Figure 7.3 and 7.4. For more detailed pictures, see
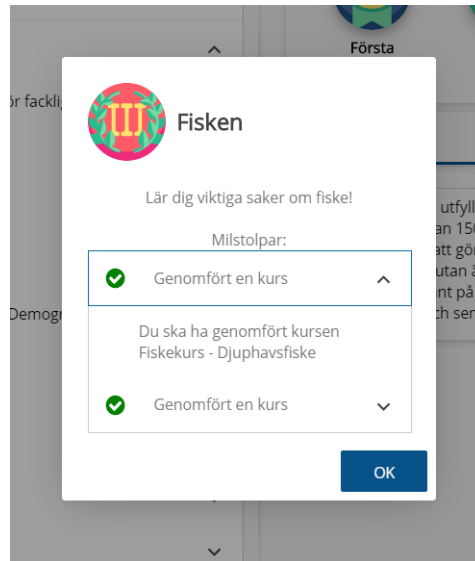
Figure 7.2: A modal showing more information about an earned badge.
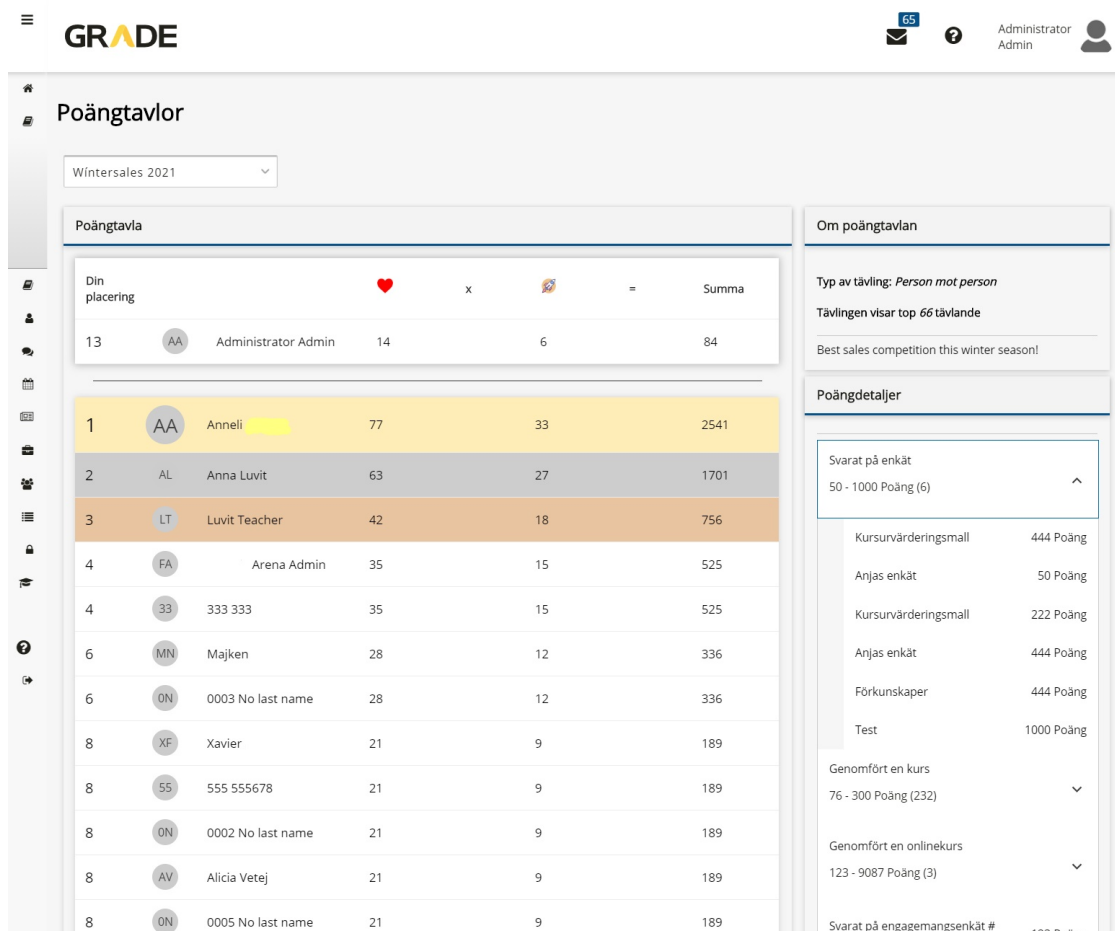
Figure 7.3: Figure showing the finished leaderboard page.

section E.1.2 in Appendices.
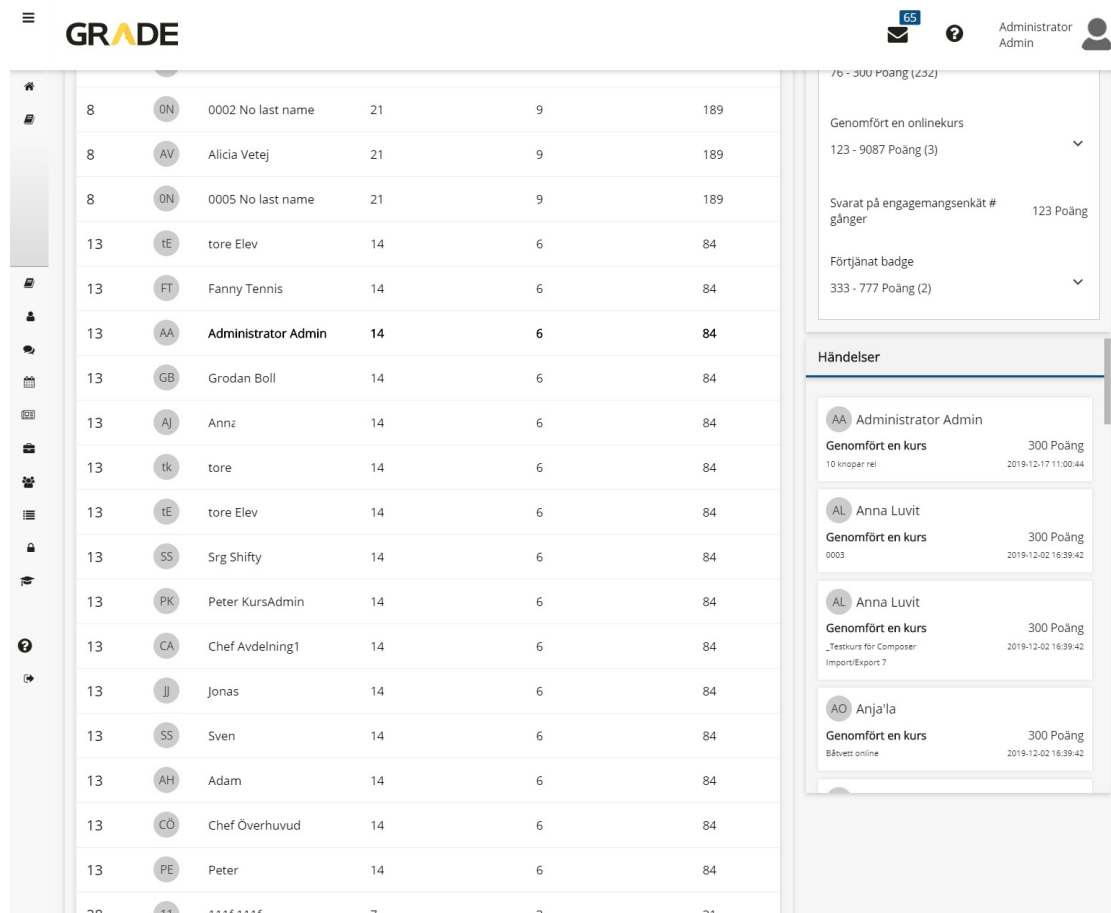
Figure 7.4: Figure showing the finished leaderboard page.

7.1.3 Widgets

To keep the widget page simple the widgets that were designed were made with as few details as possible. It was important that the users feel like the widgets had some significance for them. Therefore, the most important details were chosen to be displayed, but simplicity kept the widgets from being too cluttered.

The badge widget shows the user's badge with most progress and it can be expanded to display all the milestones the badge has.

The leaderboard widget shows the placements and total points of the participants. It is also possible to switch between the leaderbaords a user is part of.

Pictures of the widgets can be found in Figure 7.5. Note that it is only the leaderboard widget and the badge widget that have been created in this project. The other widgets in the figure was already part of the system. For more detailed pictures, see section E.1.3 in Appendices.

7.2 Administrator perspective

The Grade Admin is the part of the system where an administrator manages the system. The parts of the prototype available for administrators are shown in the sections below.
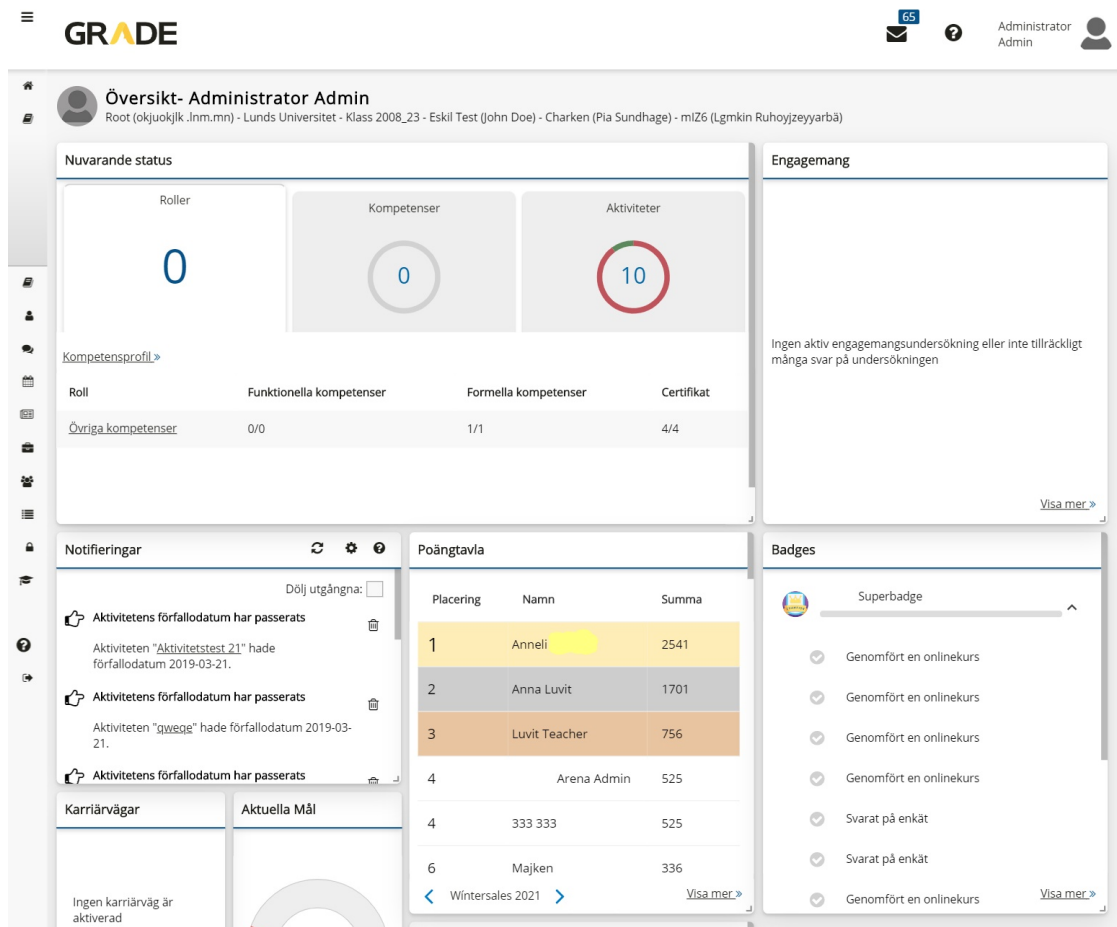
Figure 7.5: Figure showing the finished widget page.
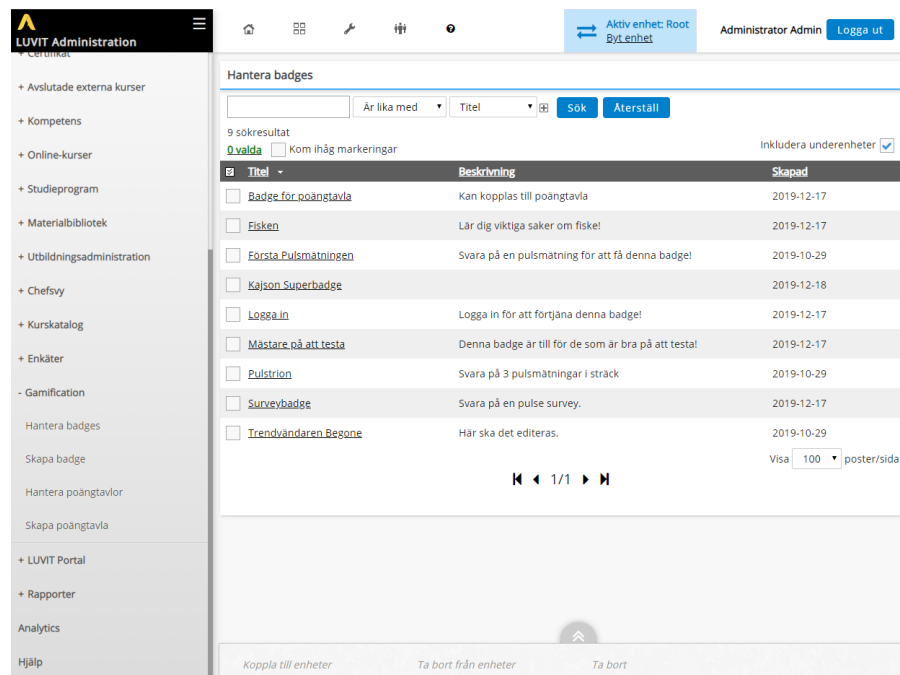
Figure 7.6: List of created badges.

7.2.1 Badges

The resulting prototype lets the administrator manage badges. Badges can be combined with milestones in many different ways due to the rule system. The way to create badges is basically the same as creating leaderboards. What differs is the absence of points in the rules and that badges can have images assigned to them. The administrator can also write a description for each badge as well as choose to have the badge active or inactive.

Pictures of the pages for administrating badges can be found in Figure 7.6 and 7.7. For more detailed pictures, see section E.2.1 in Appendices.

7.2.2 Leaderboards

By adding two pages, just as for badges, the administrator has the possibility to manage leaderboards. The administrator can create, edit and delete rules for leaderboards which provides flexibility.

It is possible to choose if the leaderboard should display individual names of participants or let the participants compete as units. The administrator can also choose what point type should be used; either total points or competence points and engagement points. In addition to that, it is possible to set a lifetime to points, which can be used to keep the participants working continuously to keep their placements. There is also a setting for how many placements are to be shown, e.g. for displaying the top three or top ten participants.

Managing the participants is possible through using a unit tree where units and subunits can be selected. The administrator can also decide which administrators at other units can manage the specific leaderboard.

Finally, a leaderboard has, just as badges, a description and can be set to active or inactive.
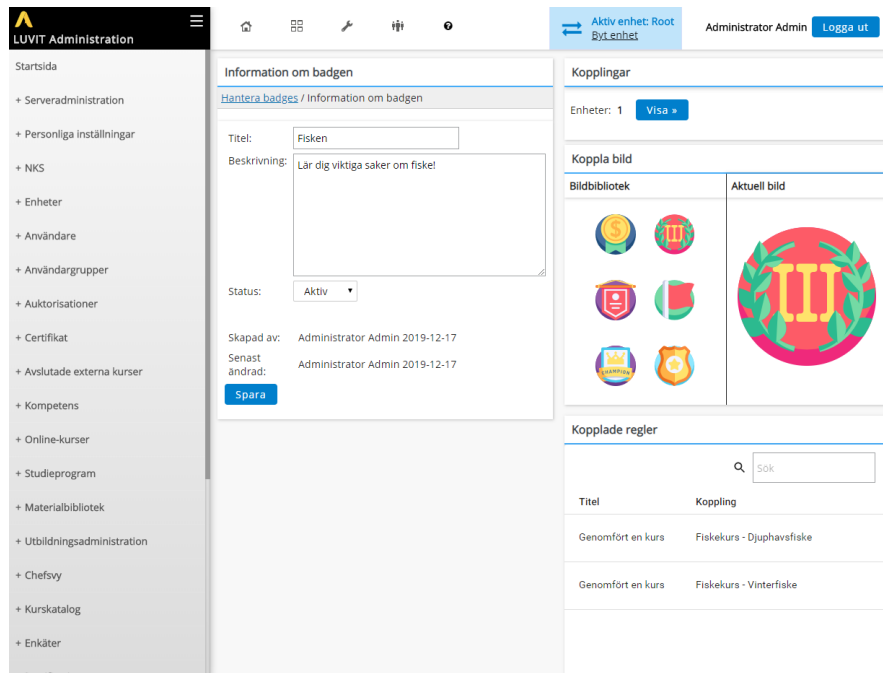
Figure 7.7: Page where an administrator can create badges.
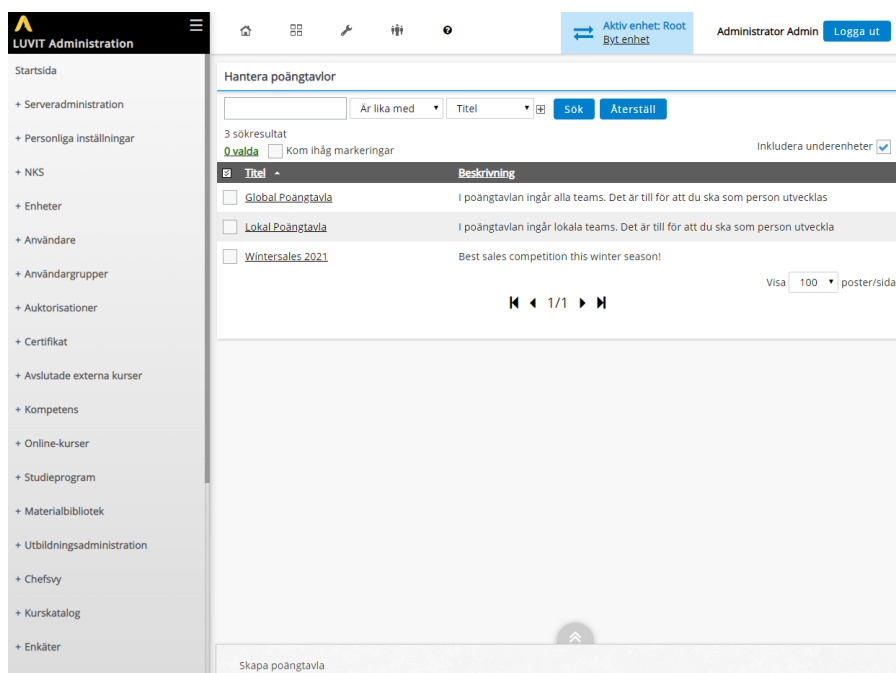
Figure 7.8: List of created leaderboards.

Pictures of the pages for administrating leaderboards can be found in Figure 7.8 and 7.9. For more detailed pictures, see section E.2.2 in Appendices.

Figure 7.9: Page where the administrator can create a leaderboard.

Chapter 8

Discussion

8.1   Preparations

8.1.1   Understanding end user's needs

When creating a new product or developing an existing product further, it is important to have knowledge about the end users' needs [26]. Without this knowledge the resulting product may not be valuable to the users and therefore may have been developed unnecessarily.

Looking at this project from a user needs perspective, it would have been very valuable to include some sort of user needs analysis in the beginning of the project. It would most likely be based upon interviews with Grade's current customers' employees, whose occupations largely differs, meaning a time consuming process. The study would however provide valuable data for us to base our gamification ideas on. Such an analysis could potentially be almost a whole master's thesis in itself if combined with creating gamification ideas on a conceptual or LoFi level.

Carrying out a user needs analysis would be optimal if unlimited time was given to us. However, since a major part of this project was aimed at actually implementing the gamification features into Grade's product, it would just not be possible to do within the given time frame. Therefore, the user needs analysis was replaced with continuous discussions and feedback sessions with the product manager, our supervisor at Grade, who knows their customers very well.

8.1.2   Brainstorming workshop

This section discuss thoughts about certain parts of the brainstorming workshop and what could have been done differently.

Time Pressure

After performing the first brainstorming session, the group had been given a better understanding of gamification. Before starting the second brainstorming session the group was asked about how they felt about the first one. There was a general consensus that they felt pressured by the three-minute time slots and could not really think their ideas through. Therefore, a decision was made to extend the iteration lengths in the second session while decreasing the number of iterations. Instead of performing the 6-3-5 Brainwriting exercise for three minutes with five rounds, we decided to only do three rounds for five minutes each. This gave the group more time to come up with ideas.

Discussions

The second session was supposed to be followed by a discussion of the new ideas, in the same way as after the first session. We understood that it was not possible to clarify and discuss every idea as the time started to run out. Instead, the ideas were read out loud and if anyone in the group was confused about any idea it was explained further. This was unfortunate, as it would be interesting do discuss the ideas with the group.

8.2 HiFi Iterations

8.2.1 Parallel iterations

The HiFi iterations was originally not meant to be divided into iterations for the user and administrator respectively. However, as the user part was implemented in React with very much freedom in creating the user interface, it was created considerably faster than the administrator part implemented in ASP.NET which required much more time to create mock data. When we realised this was the case, we took the decision to iterate the user part until completion before working on the administrator interfaces. This approach actually helped us in defining what should be possible to do for the administrator, since what the regular user could see would have to administered in some way.

8.2.2 Implementation time

Implementation of the prototype functionality took more time than expected, leaving us less time for other tasks. User testing was originally thought to be carried out after every or every other HiFi iteration, but this was just not possible since we did not always have testable features after every iteration or the time to do it. Regular feedback was still necessary in order to ensure that the project was going in a direction that satisfied both the needs of Grade AB and the project goals.

Since we decided not to use Marvel for the HiFi iterations but to actually implement the user interfaces into GRADE, the result of each iteration was not only visual but also functional. Looking back, it might have been more efficient to continue the use of Marvel and thereby spending less time on functionality implementation. Simultaneously, actually implementing functionality had to force us to think in the boundaries of the product from a tech-

nical perspective. Without the implementation work, the new unit connection as described in 5.2, might not have been recognised - it slipped through the LoFi iterations. Also, we probably would not have realised that the administrator interfaces could contain React components instead of only being based on ASP.NET. If we would have used Marvel, GRADE's current administrator interface would be the foundation of our *rule handling functionality*. That would probably have resulted in a less user-friendly and less easily-implementable design.

8.2.3   Building the leaderboard

When implementing the leaderboard three main perspectives had to be taken into consideration:

- What is the meaning of the leaderboard, i.e. what should it achieve?

- How should we display the user's placement in the leaderboard?

- How many users should appear at the same time in the leaderboard?

To come up with a relevant meaning of the leaderboard was not easy. The purpose of the leaderboard was of course to show the participants' placements, but what kind of emotions did we want the participants to feel? Should the leaderboard generate more negative emotions so that the participants have something to work for, or should the focus be on giving a positive emotion where the user gets a confidence boost when he or she sees the leaderboard? Both emotions can trigger feelings of engagement in competing for the highest placement in the leaderboards. However, it might be that a negative emotion results in more engaged users than a positive emotion would. Perhaps a company does not want to build a gamification culture based on negative emotions. It might make the employees perform worse because of the social comparison, or feeling bad about being low in a hierarchy. Companies want happy employees and therefore positive emotions could be better, even though it might not give the participants the same boost to improve in the leaderboard as negative emotions would. The emotions resulting from looking at the leaderboard depend a lot on the second question above.

According to us, the best way to display a participant's placement was to let the user see its own place at top of the leaderboard at all times. The user can also see its placement in the leaderboard compared to others, which means that the user can see participants placing both lower and higher. This will result in a positive feeling when the user sees that he or she is placed higher than other users. It will also result in a negative feeling which occurs when the user sees that it is placed lower than other.

Choosing how many participants should be displayed in a leaderboard was also an important decision. If there are a lot of participants displayed and a user is placed far down in the leaderboard, the user might lose hope in climbing. In the other case, if a user is placed far up in the leaderboard, the leaderboard can then increase the engagement for that user since it is higher placed than a lot of people. If there are many participants in a leaderboard, ranking higher has more prestige. If a leaderboard only displays a few participants, it might cause the user to think that there are few participants which can lead to the user being less engaged. As it is implemented in the HiFi, the administrator can set how many participants

that should be displayed in the leaderboard and can thereby try different settings out and evaluate what fits different teams.

8.2.4   LoFi in HiFi

A building block of this master's thesis was the use of agile methodologies combined with design iterations based on UCD. Even though the project process is iterative in its nature, the goal was to separate the LoFi and HiFi iterations as much as possible. We wanted the results of the LoFi iterations to be as complete as possible before beginning the HiFi iterations and implementation. This would ultimately save us time in the long run since the most fundamental design and feature decisions would have been made before too much detail was put into the concepts.

As a project proceeds and feedback is gathered after iterations, new ideas and perspectives often come to the surface. This was also the case in this project and an example of that is the feature for adding courses or online courses as rules for a leaderboard. More specifically, adding multiple courses or online courses simultaneously as described in section 5.2.1. Some of Grade's customers have more then 100 courses and if each of these courses had to be added separately it would be very time consuming and mundane. Therefore we decided to let the administrator add several courses which would give the users the same amount of points when completed. There were several options on how this possibility was going to be implemented and these were naturally first created as LoFi prototypes.

Conclusively, it is hard to isolate the stages of the process to LoFi or HiFi. It might be necessary to go back to LoFi if a new feature is being added to the HiFi concept. This can be a result of user feedback, as it was in our case.

8.2.5   Evaluating different solutions

Some of the features included in the administrator perspective could have been solved in several ways. When having more than one idea on how to design the feature, user testing would be a perfect way to compare the solutions to each other and then chose the best one. We would have liked to create prototypes for each concept of a feature and let users try them out in order to chose the concept most users think is the most intuitive and user friendly. Because of the time frame of the project this was not possible.

An example of a feature with several solutions was how the administrator can set the points for rules in leaderboards. If there was only one type of points it would be as easy as having an input box which handles numbers. The user could easily type in the amount of points received when triggering the rule. Since the point system used in the leaderboard was designed according to the two core words at Grade, *competence* and *engagement*, the points could be of two types; competence points or engagement points. This feature raised questions about how to administer the two types of points. It was ultimately decided to use an input box for a total number of points combined with a slider which handled how much of the points are of type engagement and of type competence. Before deciding to do it this way, two other types of solutions were discussed, as described in section 5.2.1. It would have been beneficial to evaluate those possible solutions before choosing.

Another example would be when choosing courses as rules for a leaderboard. We decided to let the user choose multiple courses and set the same amount of points to them. All the

rules were added as separate items to the list of chosen rules. When editing the rule you could only change the points, but not the course connected. It could have been made in other ways. For example, instead of adding multiple courses with the same points, each course could have had individual points but still be added in bulk. This could allow for only one item in the list of chosen rules and the possibility to edit the rules simultaneously. This is also a case where user testing would have been helpful.

8.2.6   Defining Rules

The foundation of our gamification solution is based on rules, which represents the *rule mechanics* in the MDE Framework described in chapter 2. Example of rules are completing an online course or answering a survey. To allow Grade's customers to tailor their own badges and leaderboards to their needs is, according to us, a powerful feature. In the beginning of the project, we did not focus on which rules should be included in the prototype.

Not deciding early on which rules should be part of the prototype can be tied to some of the challenges faced. A good example is the rule of connecting courses to a leaderboard or badge. The idea of implementing this rule came up as feedback during a HiFi iteration. A lot of time could have been saved if the rules were chosen in the beginning of the project.

Looking back to the early stages of the project, it is apparent that an analysis of rules should have been carried out. After defining how the gamification infrastructure should be built, what rules were to be included in the prototype should have been clearly defined. Also, a list of what kind of rules would be interesting in the future would be helpful when designing the user interfaces for managing rules as an administrator.

8.2.7   Usability evaluation

During the testing a lot of information have been gathered. Errors made by the test users when using the gamification features were observed, but there were many positive aspects as well. All of the questions, stated in section 6.2, were answered in some way.

In this test, there were only two test subjects. It would have been desirable to have more people, but unfortunately it was not possible to interview more people.

In this section, a discussion about the results obtained from the evaluation will be held. Answers to each question stated in section 6.2 will be provided.

Do the users feel more engaged in the product by using the gamification features?
The test subjects immediately stated that this will increase user engagement. It could also be observed that the test subjects felt engaged as they sat forward in a way that made them seem interested in what was displayed on the screen.

Was it easy for the users to see their placement in the leaderboards?
This was confirmed from the questionnaire and also by looking at the time each test subject spent looking for their placement.

Was it easy for the users to see which badges they had earned?
One of the test persons thought it was very easy to find, which can be seen in the questionnaires and the time that it took for the person to find them. However, the other test person

thought the opposite. The person found it after some time, but it was other things that distracted the person. First the test person started to look at the left most panel where the progressing badges were placed. The test person tried to figure out what badges that have been earned by looking at the progress bars for each badge.

There are two main problems that appear here. First, the progress bar is not clear enough on what it shows. The other problem is that the panel with badges you have received is not as big and clear as the panel with the progressing badges. Perhaps one way of solving this issue is by changing the order of how the panels are placed, since the earned badges panel sort of merges with the about panel.

Was it easy for the users to see which badges they were close to earn?
The same scenario as in finding the earned badges appeared here. One of the test persons found the panel for progressing badges quickly, but the other had a harder time finding it. According to what the note taker wrote down, the test person found it hard to understand the progressing badge panel. The test person did not know what anything meant and had to put in time figuring the whole panel out. The design of the progress badges panel is intentionally simplistic to keep a nice design, but as it turns out, more information may need to be added.

What did the users think about the leaderboard page in general?
The test persons were mostly satisfied with how the leaderboard page turned out. On thing that could be improved was how to find out what to do to earn points for in the leaderboard. One way to make it easier to find is by giving the panel which contains the information about points a better name. Both test persons were unsure of what the title of the panel, but after looking at the content of the panel they said out loud "Aha, that is what it meant.". They also said that it was quite hard to know that it was possible to click on the list to make more information appear. Something that would afford the user to click on the list could be implemented.

What did the users think about the badge page in general?
Here the user were mostly satisfied, but it took some time for one of the users to get familiar with the page. The reason for this was the progress bars. The test person could not differentiate between an empty or a full. One way to solve this is by adding text which describes the state of the progress bar. Perhaps a describing text could be added, describing the content of the panel, as well.

What were the users feeling when they used the gamification features?
According to the questionnaire, one test person felt comfortable and the other felt excited. In a way, these were the feelings that was wanted. It can indicate that the design of the gamification features are well-functioning and that they create a certain level of engagement with the users.

Was there any functionality that the test persons felt was missing in Grade Portal?
They were both very pleased with the amount of features in the prototype. One small thing that a test person felt was missing was being able to see more information about the tasks that could generate points in leaderboards. Adding links to the courses would save a lot of time for the users. The prototype did not support this and the user had to go to the course

page and search for the specific course there.

What did the test persons think of managing badges and leaderboards?
Handling of units connected to badges and leaderboards were not seen as intuitive. The handling of units differed between badges and leaderboards which was one of the reasons why the test persons thought it was hard to understand. The other reason was that the unit handling system is in general hard to understand. The way to handle units follows the unit system that is already in use in the rest of Grade's system. Changing how the units are handled is therefore quite complex would not fit in the scope of this project.

Was there any functionality that the test persons felt was missing in Grade Admin?
One thing that one of the test persons thought was missing was to handle specific persons when connecting them to badges and leaderboards. As it is now, the administrator can only connect specific units. In a situation were a certain person in a unit should not be participating in a leaderboard, it is currently impossible to exclude that person without excluding the whole unit. Another thing that the test persons felt were missing was more information on how the points in the leaderboards were calculated. When they first tested the features from a regular user perspective, it was hard to understand the point calculations. After working with the admin perspective they understood. Some sort of introduction to how the points system works would be good to add. Perhaps using a panel which explains it with words or a tutorial guiding the user through a step by step guide.

Chapter 9
Conclusion

This master's thesis aimed to investigate what gamification is, how it can be implemented into the GRADE platform and to ultimately implement a working prototype of some gamification features. A process based on literature research, competitor analysis and design iterations allowed for a solution that integrated two well-known gamification concepts; leaderboards and badges.

9.1   Summary

The project began with an openness to the range of features gamification might span. With no prior knowledge in the field, a broad literature study helped in building a deeper understanding of what mechanisms gamification is built upon. The MDE Framework worked as a foundation and a lens to see through when researching more concrete applications of gamification.

Since gamification can be applied to many different scenarios it was also important to shape a more specific understanding tied to the context of the GRADE platform. Therefore, looking at what competitors to Grade had done to gamify their products was a good way to gather concrete examples of how gamification could be implemented in a similar product. As seen in the key takeaways from the competitor analysis, both badges and leaderboards were part of some of the competitor's products. Hence, the competitor analysis was fundamental for the choice of what features would be part of the prototype.

Initially, the brainstorming workshop was believed to strongly influence the choice of features, but that was not the case. However, it was still an important part of the project since it resulted in insights about possibilities and limitations. Using sounds as feedback was for example a feature that the group identified as unwanted due to the intruding nature of sudden sounds in a work space. Looking back, choosing the features first and then conducting a brainstorming workshop might have been beneficial. Then, the focus could have been directed towards how the leaderboards and badges should work in the platform.

The LoFi and MidFi iterations was considered to be very successful for their purpose. The process was very time-efficient and brought focus to the important parts in the beginning of the prototype creation. Ignoring the details and instead gathering feedback about the bigger picture was crucial to not spend unnecessary time in the HiFi phase having to redo any of the detailed views.

The HiFi iterations and final implementation went very well. The prototype worked as intended in both administrator perspective and user perspective. The users could be part of the correct leaderboards and work towards earning badges that were available for them. The administrator could manage what rules should be connected to the leaderboard, as well as deciding which units should be participating. Badges could also be created, named and be provided a relevant image to represent the meaning of the badge. Milestones could be added to the badges to easily tailor each badge to relevant company goals or to encourage employees to complete certain tasks.

9.2   Research questions

The following section will answer the research questions this master's thesis was based upon.

R1: What is gamification?
As described in the theory chapter, gamification is a way of applying game mechanics to non game environments. The purpose is to increase the engaging behaviour in the users that uses the gamified system. It can also be used to make mundane tasks more interesting, for example through the use of competitions between coworkers or letting employees compete against themselves. Rewards, like badges, can also be used to make a mundane task more interesting.

R2: Can we find a model on how to implement gamification in Grade's product?
Many papers and articles write about gamification in very specific cases or are focused on the concrete features that can be part of a gamified system. The MDE Framework gave us a good foundation of understanding the bigger picture of gamification. Even though the MDE Framework helped in categorizing features it was not actively used when designing or implementing the prototype. However, it laid the foundation for the rule and milestones system used in the leaderboards and badges. *Rule mechanics*, that is part of the MDE Framework, helped in forming the idea of giving the administrator the choice of what should trigger points in the leaderboard or what milestones a badge should have. Without understanding the difference between *rule mechanics* that makes up the rules and *progression mechanics* that makes up the rewards, this idea would probably not have been uncovered.

R3: How can we implement gamification to increase engagement in Grade's product?
The purpose of creating a prototype based on the chosen features was to increase engagement. Finkelstein et al. mean that badges can be used to display progress which can help in creating engagement and motivation [8]. As Hamari shows, badges can help in increasing user activity in a system [14]. Leaderboards can also have a positive effect on engagement and motivation according to Çakıroğlu et al. [42].

Leaderboards naturally has social effects on the users involved and will create what the MDE Framework calls *dynamics* between the users. People who are drawn towards competi-

tion might therefore feel more engaged when there is a possibility to compete against others. However, as described in chapter 2, leaderboards may be positive only if the users involved wants to be part of it.

Badges, on the other hand, was chosen to encourage striving for rewards that is not directly connected to competition between people. The badges are only shown to the user who earned them and can be a personal reward that may increase the user's engagement.

Mixing these two types of progression mechanics increases the chance of every user feeling more engaged. If they are not prone to competition, badges might be more interesting for them. People who like to compete against others might be more engaged by the leaderboard.

R4: Is it possible to implement a gamification concept which spans two or more of Grade's product modules?
The answer to this question is yes, it was possible to do. Since the prototype included the idea of using rules to manage leaderboards and badges, those rules can be connected to different parts of the system. For example, a rule based on completing courses or online courses was implemented. This would make the module Grade LEARNING part of the gamified system. Another rule that was implemented was the rule based on answering surveys or engagement surveys. The engagement surveys are used as pulse surveys to measure the current state of engagement in a company and is part of the Grade ENGAGE module. With these two modules being part of the gamification solution the answer to the question clear. It is also worth to notice that Grade can at any point implement more rules which is connected to other parts of the system.

9.3 Future work

This section presents some ideas for future work in regards to the gamification prototype.

9.3.1 Ideas from usability evaluation

The usability evaluation resulted in two main ideas which are relevant to bring up.

Improved usability

The overview page for badges was experienced as difficult to understand. What badges are in progress and how much progress is made could be designed in a different way to increase the ease of understanding.

The administration page for managing leaderboards lets the user add several rules, like courses or online courses, at the same time. However, the added rules cannot be edited simultaneously. Adding this possibility would be beneficial in the sense that if the administrator wants to change the amount of points of all these rules, he or she would not have to edit them one by one. In this case, a feature like this would be saving lots of time.

Connections to user groups

The possibility to manage which users can earn a badge is currently limited to units. If a badge is connected to a certain unit, all users of the unit and subunits will be able to earn the badge. As described in section 6.4.4, there is a possibility to create groups based on units, user roles and teams. The badge system could potentially become much more powerful if it could be connected to these groups.

9.3.2 Our own ideas

Leaderboard improvemenst

There are several ways to further improve the leaderboard experience, some minor ones and some major ones.

Currently, the leaderboard simply displays the placement of each user or unit participating. By adding the possibility to display trends, the users' perception of how the leaderboard progresses could increase. Trends can be explained as the way in which participants climbs or falls in their placements of the leaderboard. For example, if a user's current placement is number five but works to earn more points, the user might climb to placement number three. If the other participants did not know that the user was previously at placement five, there is no way of knowing that the user has progressed in the leaderboard. By displaying trends in the leaderboard, the participants can see which users are progressing. The trends can be shown by putting a green, upwards-facing arrow next to the user who climbed from placement five to three. The users that fell from placement three and four would have a red, downwards-facing arrow next to them.

Another way to make the leaderboard more engaging is to seperate the placements into different leagues. For example, if the leaderboard shows the top 30 participants, they could be divided into three different leagues, each showing the top ten placements. The three leagues could be named Gold League, Silver League and Bronze League. If a user is placing at number one in the Bronze League and earns points that makes the user's points higher than the tenth user in the Silver League, the Bronze League user would now change league and receive placement ten in the Silver League. The other user would be downgraded to placement one in the Bronze League. This feature could potentially increase the engagement in the leaderboard, as it makes climbing the leaderboard seem easier and more valuable. For a user at placement 21, it would probably be more rewarding climbing to a new league than to only increase the placement to 22.

A minor thing to look into is how the points are working. Currently, the total points a user has is based on a multiplication of the user's competence points and engagement points. This makes it harder to grasp compared to adding the points into the total points.

Badge improvements

In order to further integrate the badges into the rest of the system, one idea would be to let badges be part of personal goals. Employees can currently set e.g. activities and courses as goals to strive for and adding badges to this functionality could be another way to integrate the gamification system into the rest of the system.

Currently, the badges are only visible to the user who earns them. Looking into the possibility of developing the badge system into a more social feature would be interesting. If users could see what other badges other users have earned it might make them feel more engaged and motivated to strive towards earning them. A feature like the event feed in the leaderboard but for badges could also make users more aware of which badges other users earn and when. Also, since badges can be part of the rules of leaderboards, the leaderboard could show the earned badges next to the points for each user.

9.3.3 Studying potential engagement increase

The scope of this project did not include any longer evaluation of the effects the gamification prototype has on the users. We could only base our choice of features on the theory at hand regarding gamification in general but badges and leaderboards in particurlar, as well as motivation and social theory. Something that would be of great interest is a longer study of the effects on engagement in some of Grade's customers. This study would optimally include two similar groups where one of the groups uses the gamification system to perform tasks, as well as a control group which is instructed to perform the same tasks without any gamification. During this study, the level of engagement in each group could be measured in order to examine if the gamification group has a higher level of engagement compared to the control group.

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Appendices

Appendix A

Brainstorming workshop

A.1   Mindmap
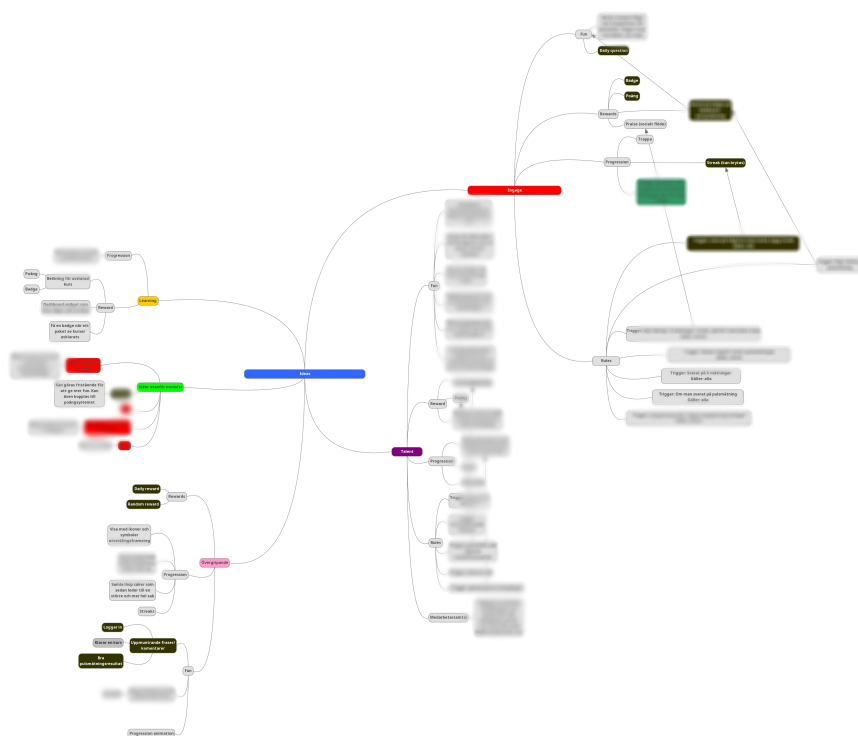
Figure A.1: The mindmap that was created to structure ideas. The text is blurred due to secrecy.

Appendix B

LoFi and MidFi

B.1   Iteration 1
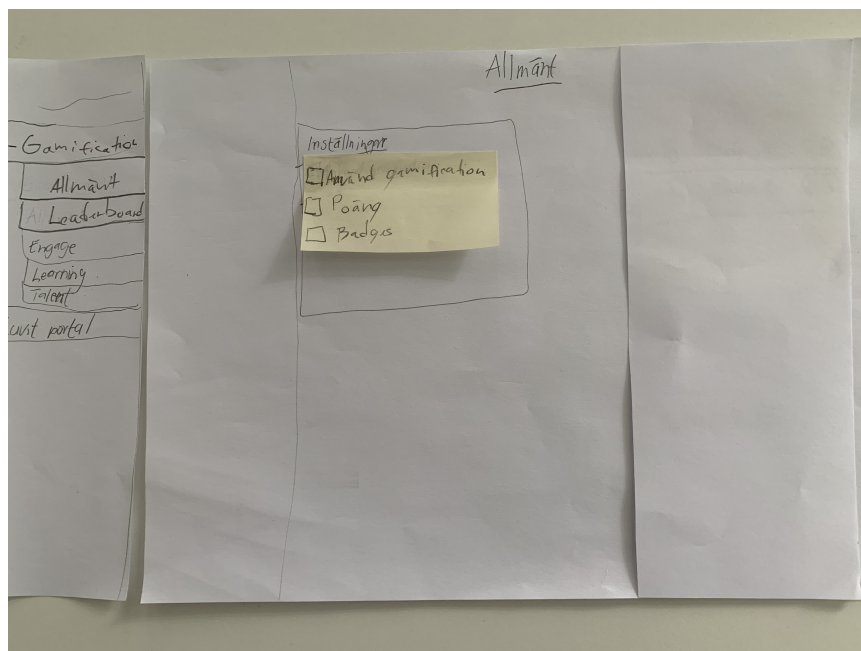
Figure B.1: General program settings page.
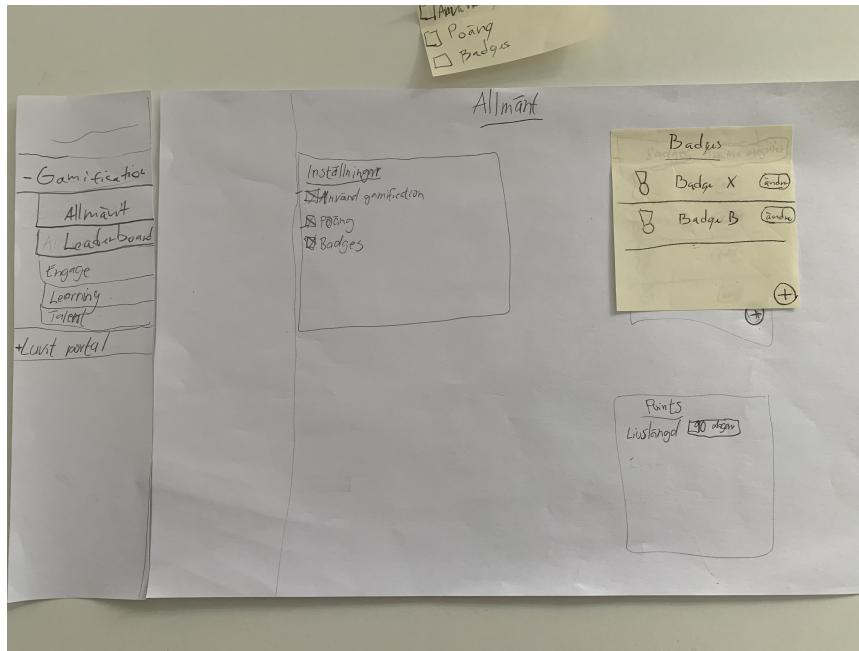
Figure B.2: General gamification settings page, variant number 1.
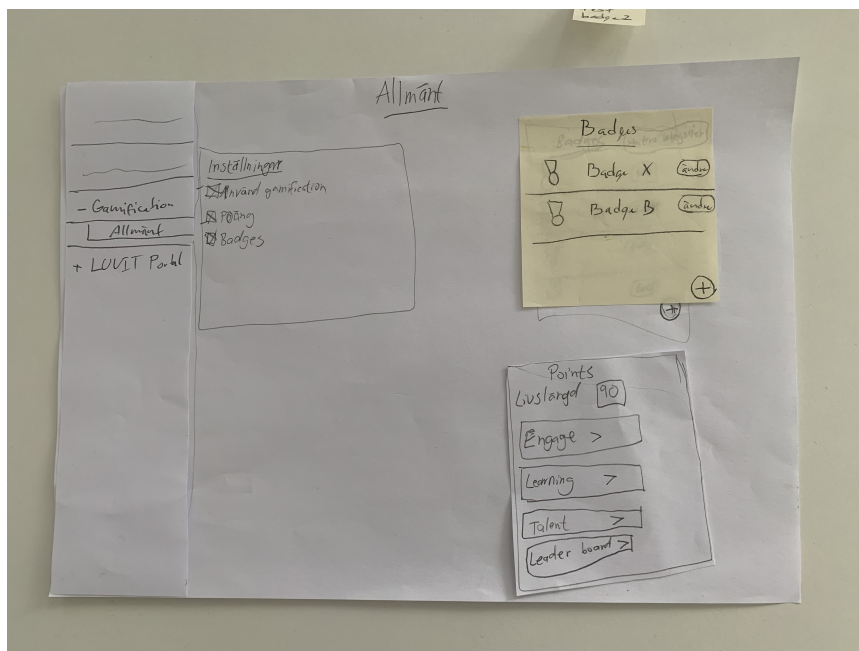
Figure B.3: General gamification settings page, variant number 2.
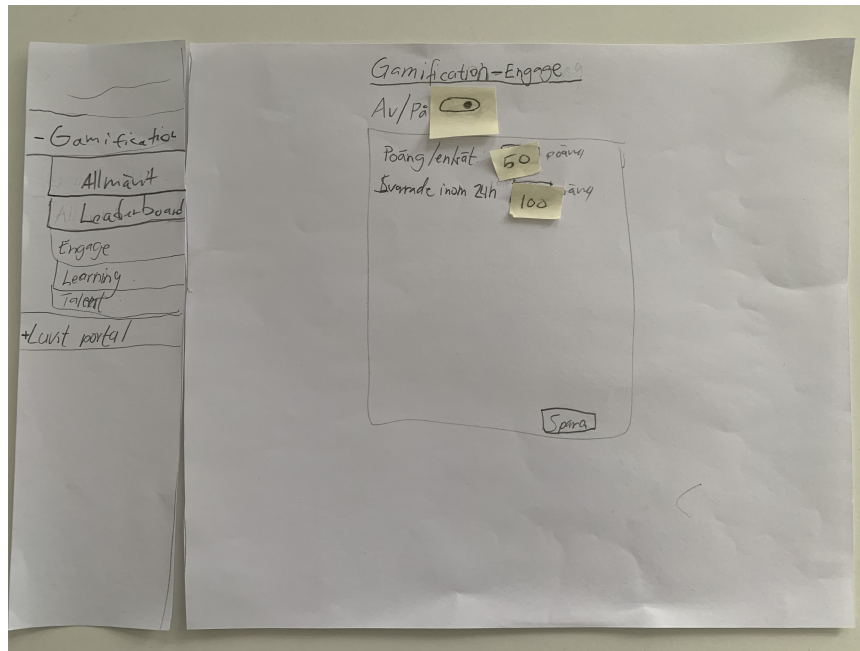
Figure B.4: Module specific settings page.
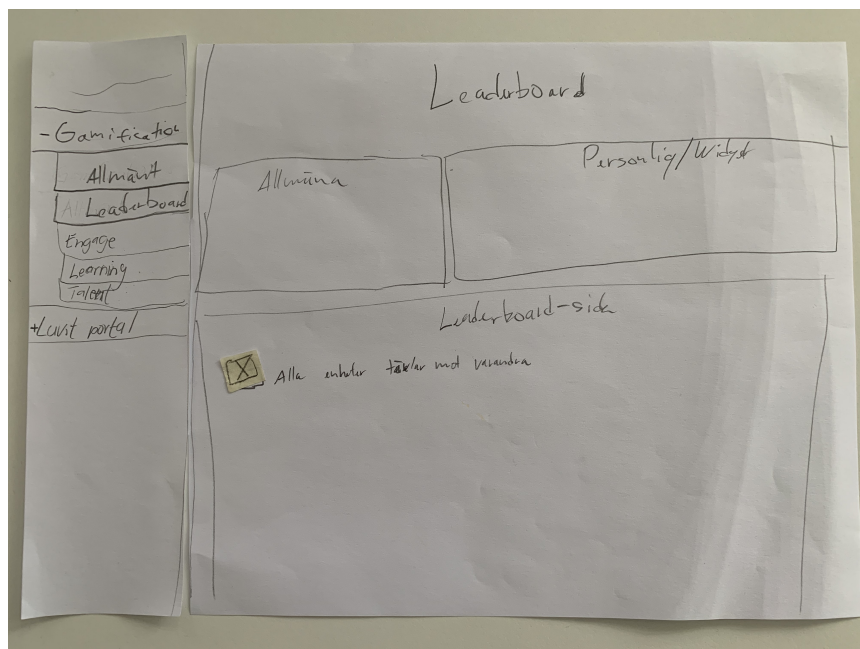
Figure B.5: Leaderboard settings page.
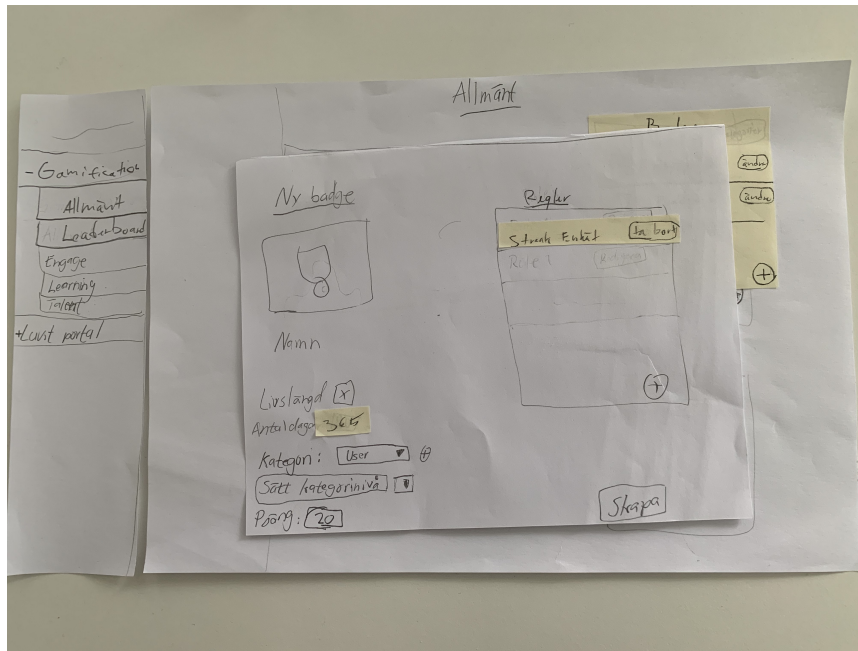
Figure B.6: Modal where the admin can create a badge, variant number 1.
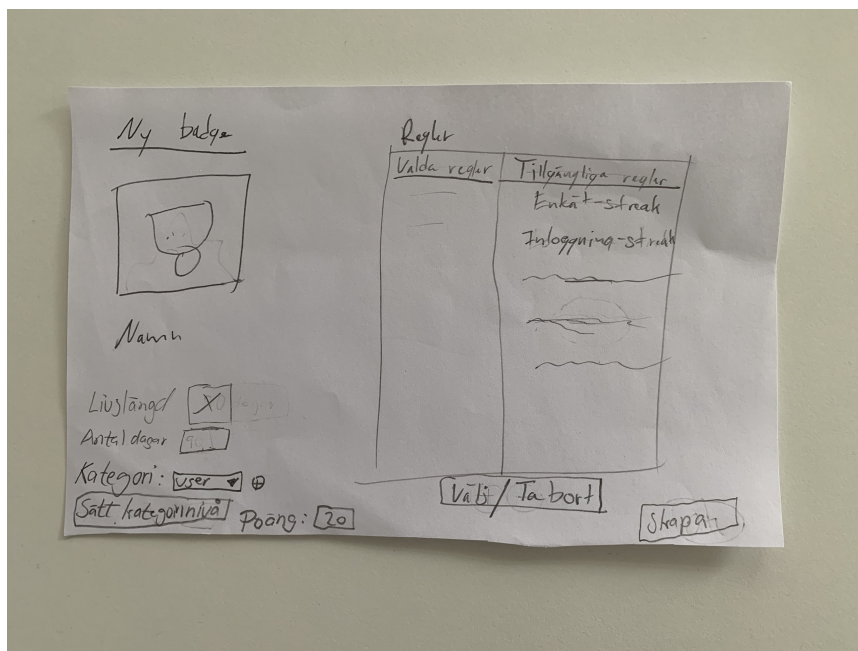
Figure B.7: Modal where the admin can create a badge, variant number 2.
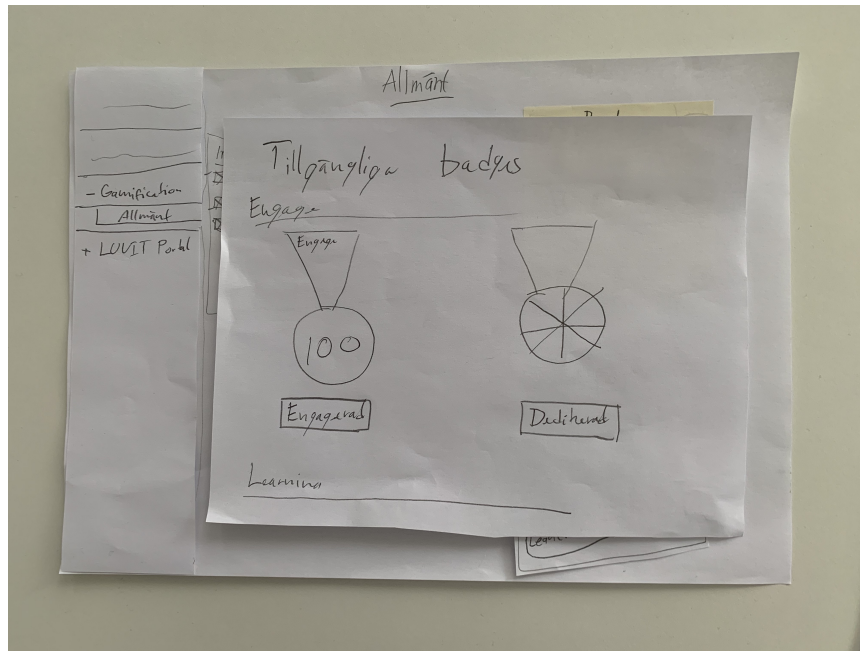
Figure B.8: Modal where the user can see its earned badges and progressing badges.
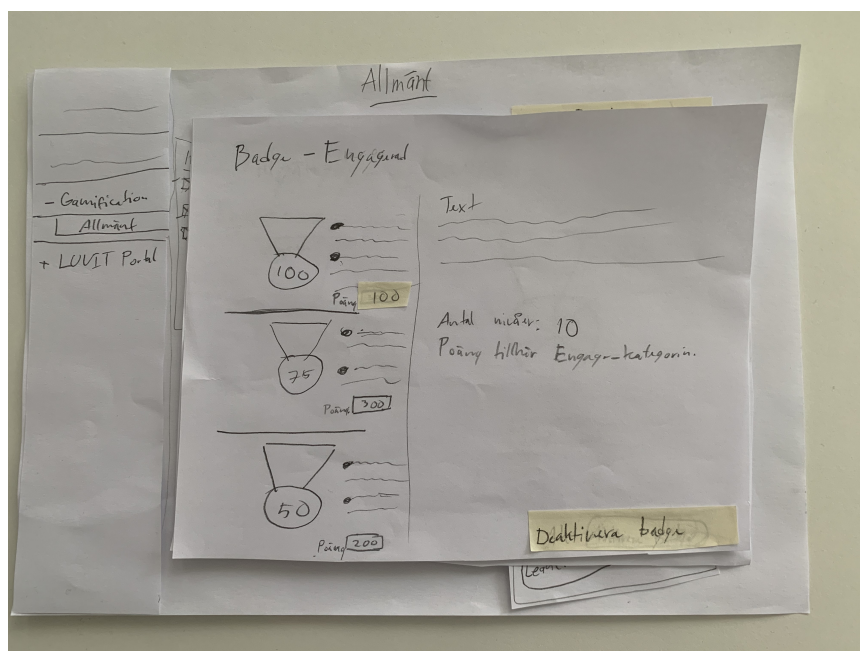
Figure B.9: Modal where the user can see information about a specific badge.
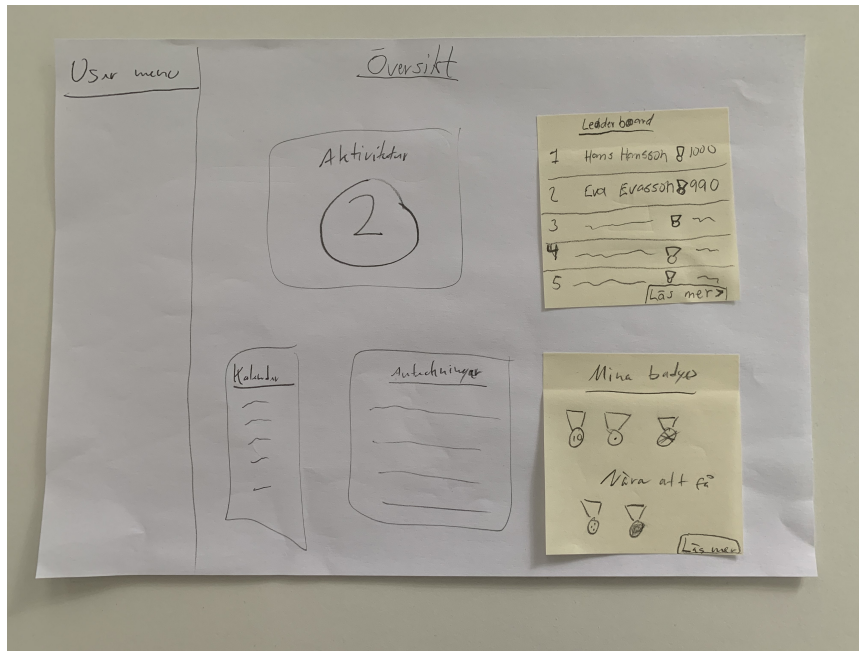
Figure B.10: Overview page where the user can see quick information about badges and leaderboard.
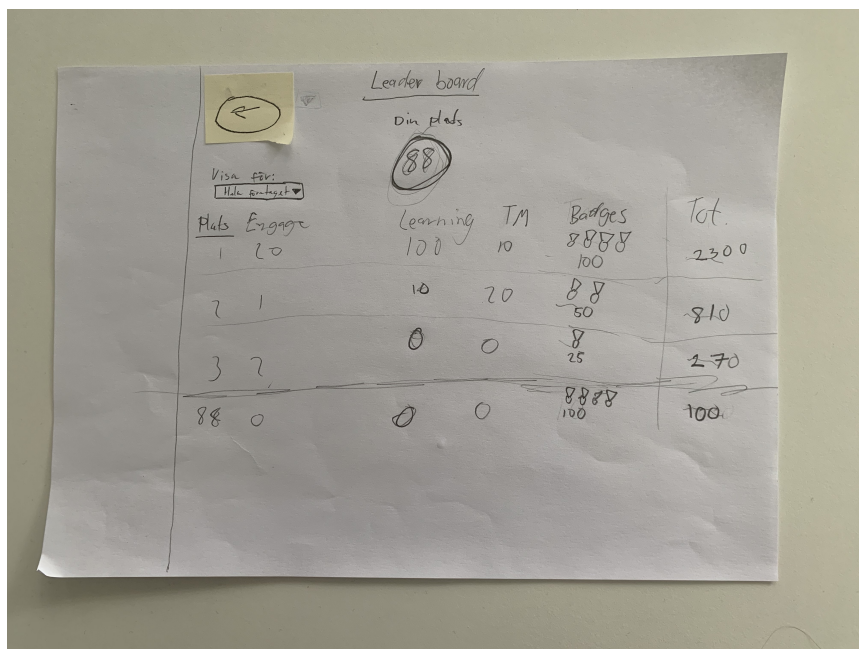
Figure B.11: Leaderboard page.
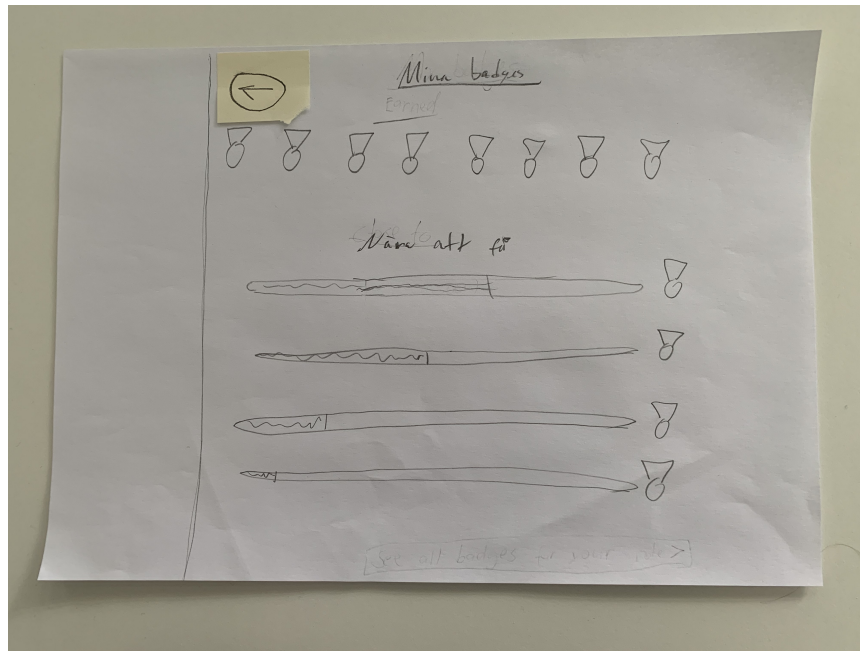
Figure B.12: Badge page.

B.2   Iteration 2
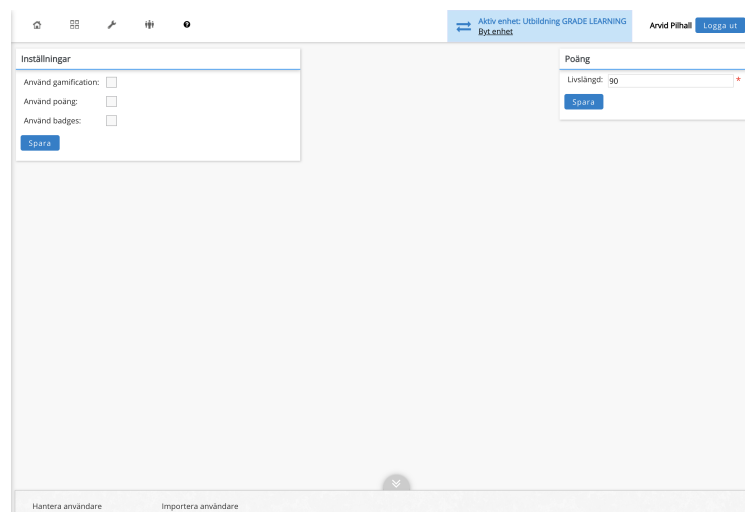
Figure B.13: General program settings page.
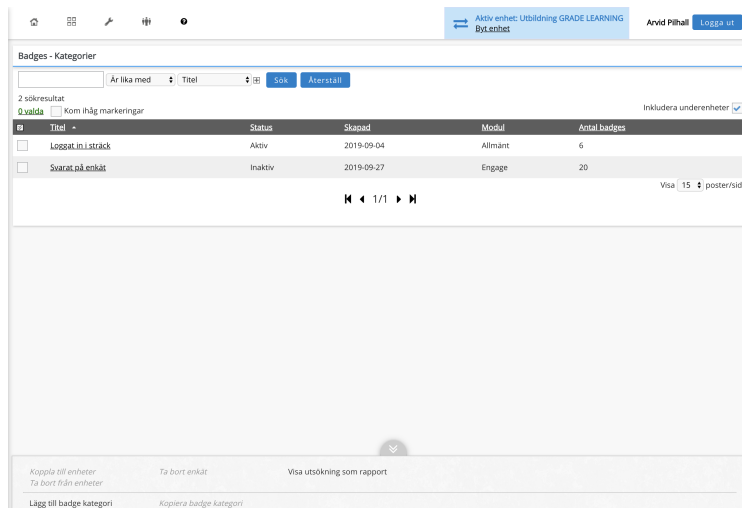
Figure B.14: List view containing badges categories.

Badgebibliotek

Engage

Kommenterat	Snabba svar	Årliga svar	Svarat på daglig fråga
Hittade enhörningen	Hittade sköldpaddan	Valde bort skattkistan	Vågade svara negativt

Engage

Figure B.15: Badge category library.

Badge - Svarat på enkät

- Svarat på enkät 10 gånger

Poäng: 300

- Svarat på enkät 5 gånger

Poäng: 300

- Svarat på enkät 1 gånger

Poäng: 300

Denna badge är en simpel badge, svarar användaren på en enkät så får den en badge. Efter att ha svarat på fler enkäter så kan användaren få snyggare och coolare badges.

Antal nivåer : 3

Kategori : Engage

Svårighetsgrad : Lätt

Deaktivera   Spara

Figure B.16: Modal where the admin can activate a badge category.

LUVIT Administration

Aktiv enhet: Utbildning GRADE LEARNING
Byt enhet

Fredric Billow   Logga ut

+ Certifikat

+ Kompetens

+ Online-kurser

+ Studieprogram

+ Materialbibliotek

+ Utbildningsadministration

+ Enkäter

- Gamification

Hantera gamification

Badges

Leaderboards

Engage

Learning

Talent Management

+ LUVIT Portal

+ Rapporter

Lägg till Leaderboard

Leaderboards / Lägg till Leaderboard

Titel:

Beskrivning (för admin):

Status: Design

Typ: Enhet mot enhet

Skapad av:

Senast ändrad:

Spara

Kopplingar

Enheter: 1   Visa »

Regler för poäng

Namn	Modul	Inställningtyp	Inställningsvärde	Poäng

Lägg till   Ta bort   Visa svar

Figure B.17: Page where the admin can add a leaderboard.
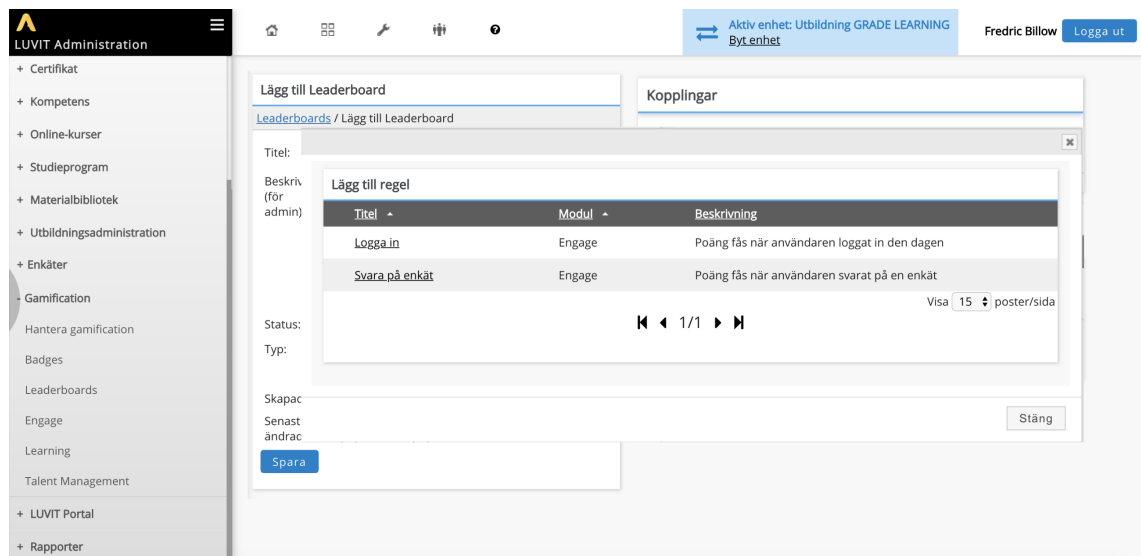
Figure B.18: Modal where admin can add rules to a leaderboard.
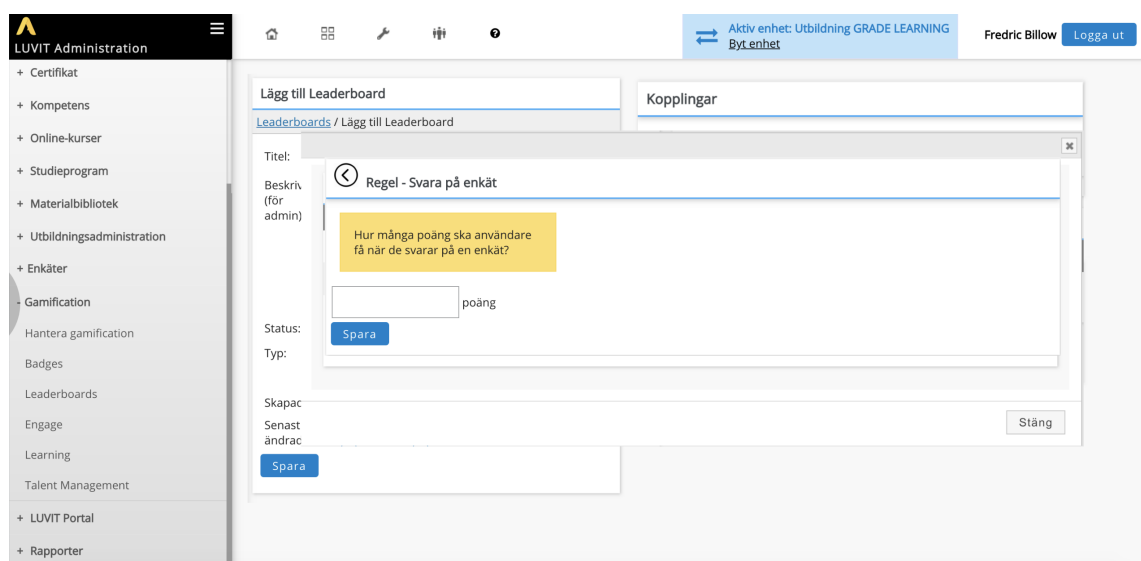
Figure B.19: Modal where admin can add points to a rule.

Välj enheter

☐ Automatiskt markera / avmarkera underenheter

▸ ☐ Utbildning GRADE LEARNING
　　☐ Underenhet A

« Tillbaka   Nästa »   Avbryt

Figure B.20: Page where admin can add participants to a leaderboard.

Enheter - test

Hantera enkäter / Redigera enkät / Enheter

▾ ☐ Utbildning GRADE LEARNING
　　☐ Underenhet A

Tillbaka   Koppla till enheter   Ta bort från enheter

Figure B.21: Page where admin can add administrators to a leaderboard.
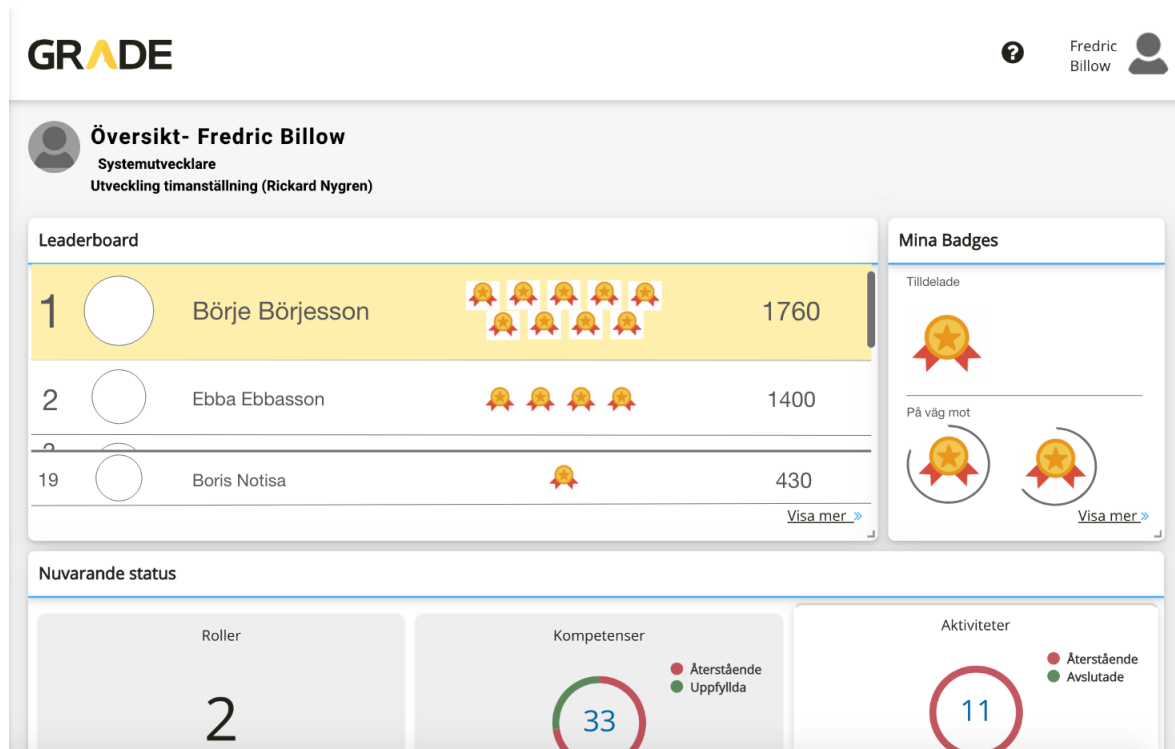
Figure B.22: Overview page where a user can see quick information of leaderboard and badges.
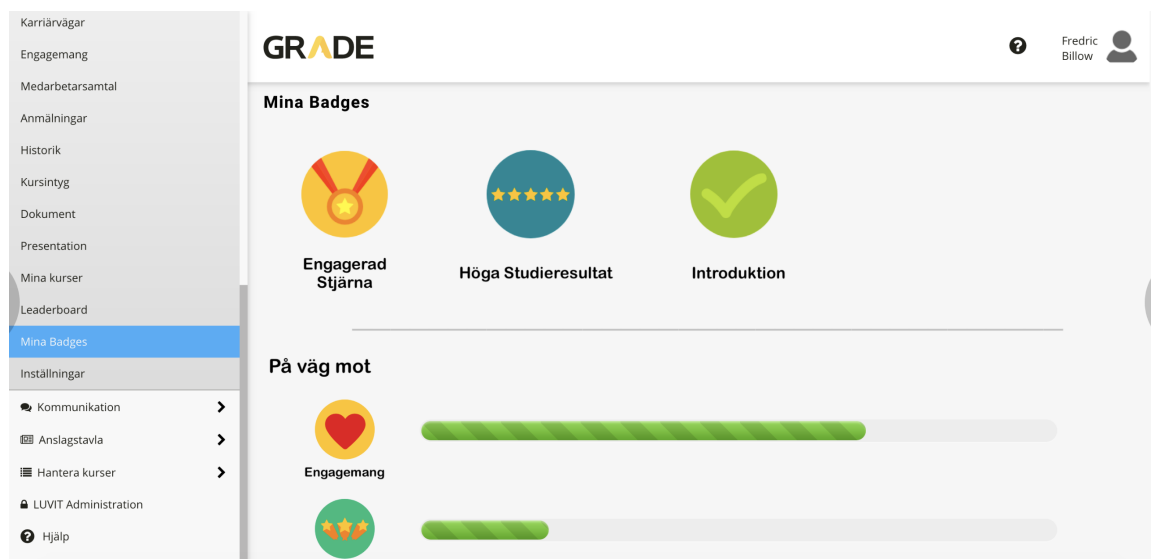
Figure B.23: Page where a user can see progressing badges and earned badges.

Figure B.24: Page where a user can see its leaderboard.

B.3   Iteration 3

Figure B.25: Mobile view of the overview page showing badges panel.
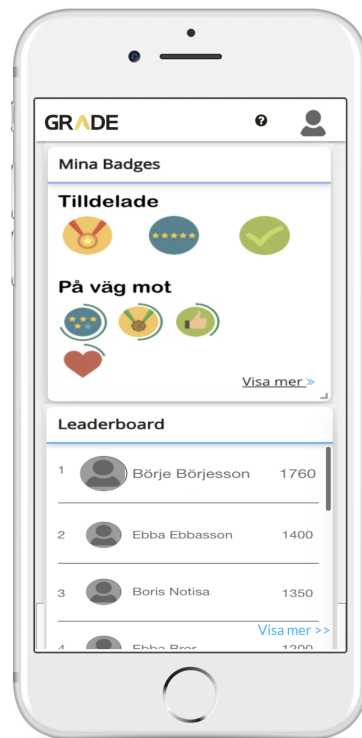
Figure B.26: Mobile view of the overview page showing leaderboard panel.
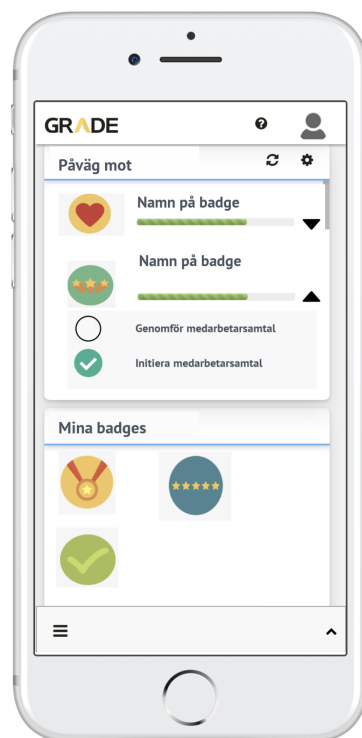
Figure B.27: Mobile view showing the badges page.
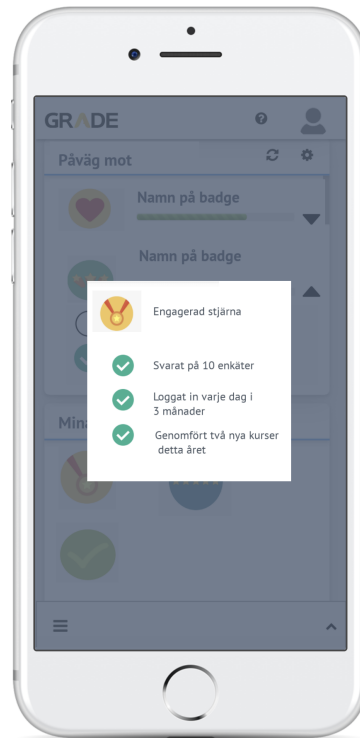
Figure B.28: Mobile view showing modal with information about earned badge.
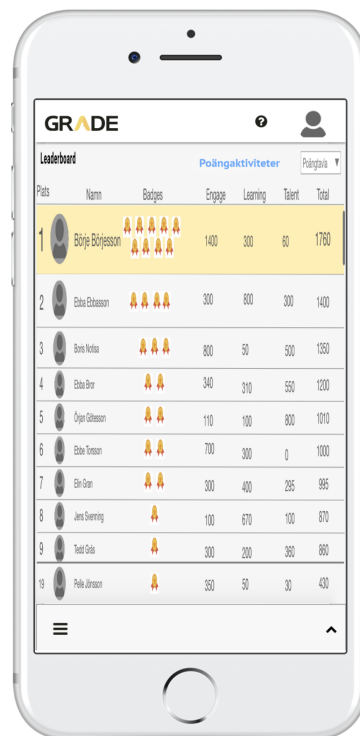
Figure B.29: Mobile view showing the leaderboard page.
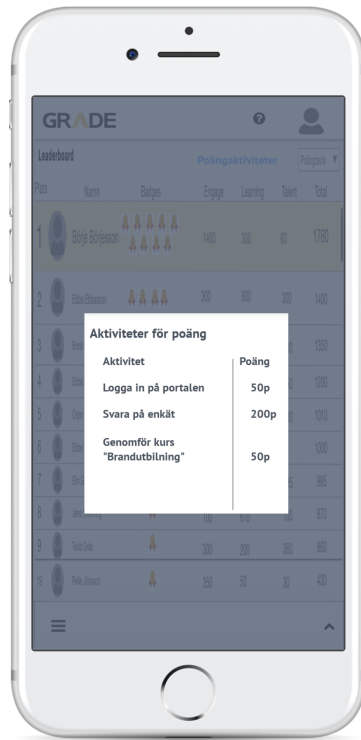
Figure B.30: Mobile view showing the modal which says what to do
to earn points for the leaderboard.

Figure B.31: Leaderboard page with added button to open modal
which shows how to earn points for the leaderboard.

Figure B.32: Modal showing how to get points for the leaderboard.

Appendix C

HiFi

C.1   User perspective

C.1.1   Iteration 1
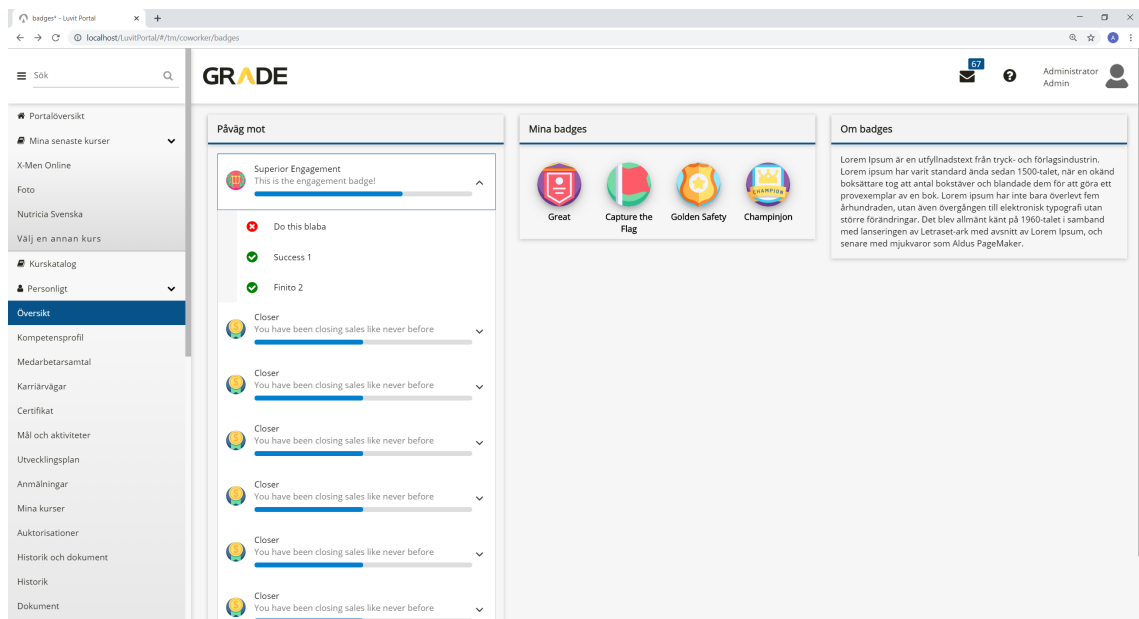
Figure C.1: Badges page.
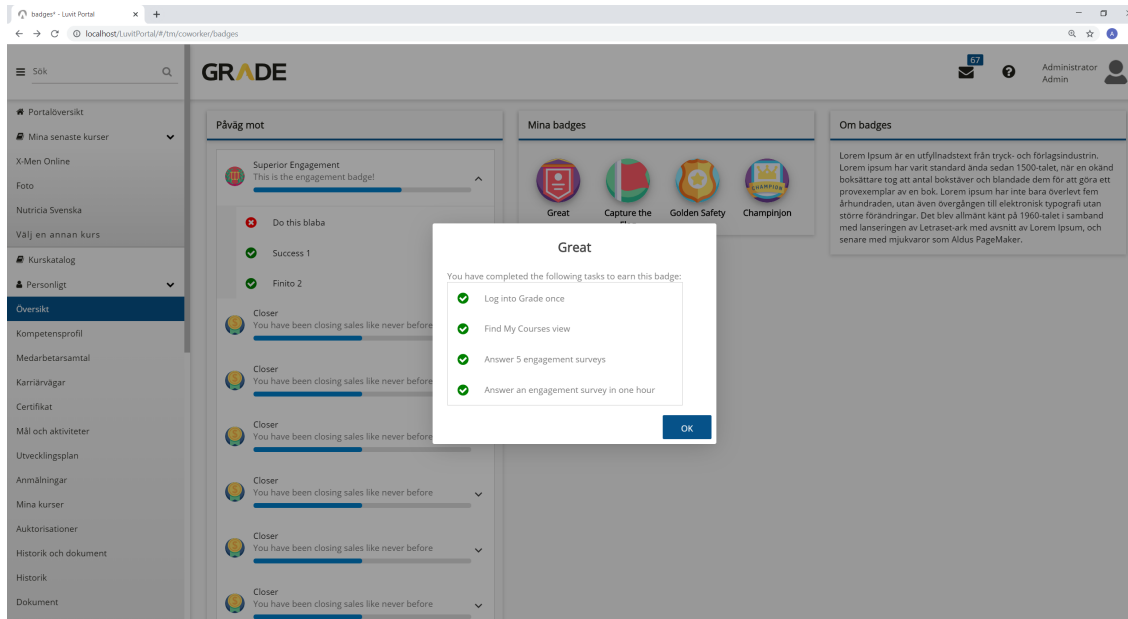
Figure C.2: Modal showing how a earned badge was earned.
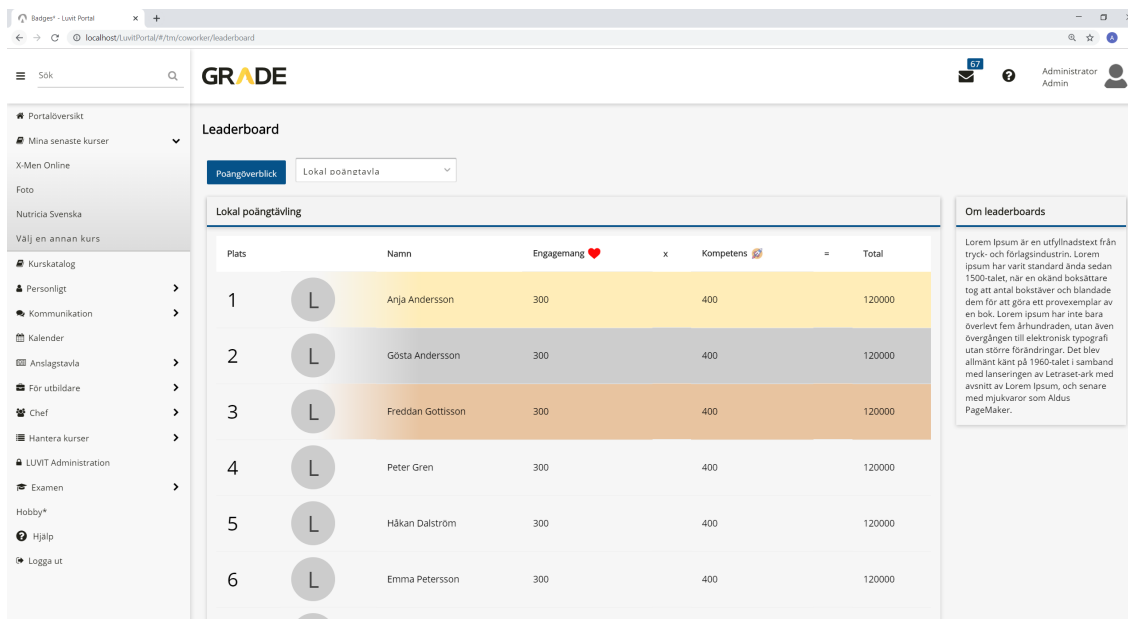
Figure C.3: Leaderboard page.
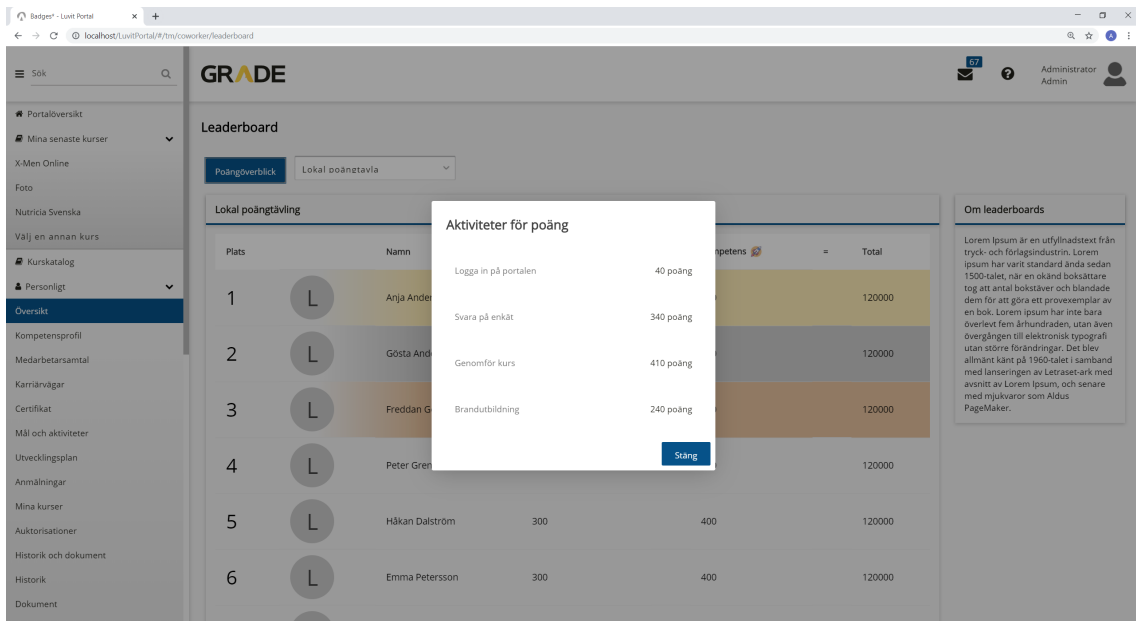
Figure C.4: Modal showing how to get points for a leaderboard.
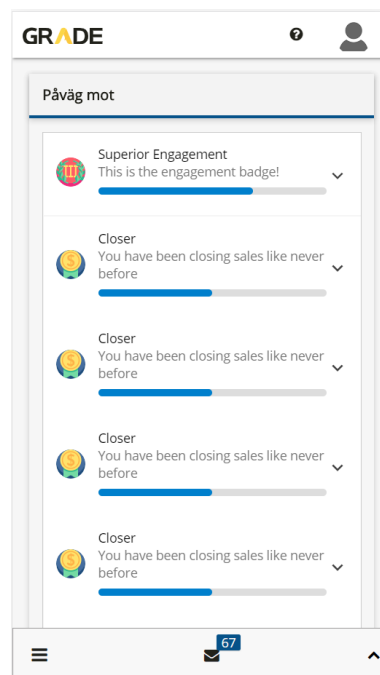
Figure C.5: Mobile view showing the badges page, showing progressing badges.
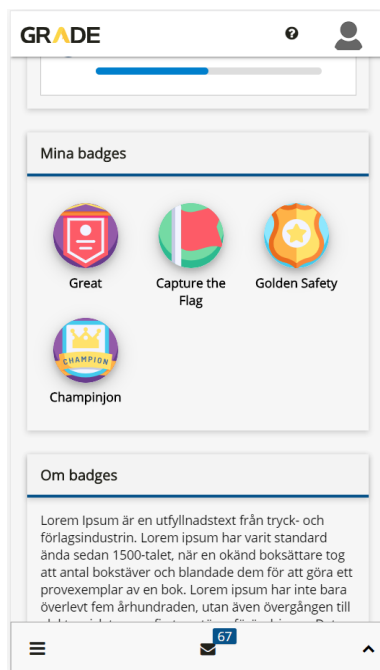
Figure C.6: Mobile view showing the badges page, showing earned badges.
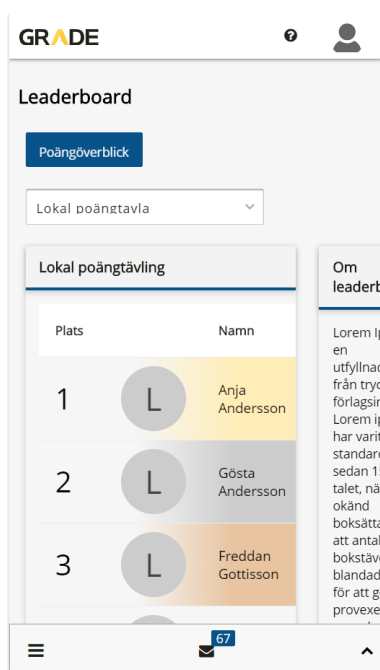
Figure C.7: Mobile view showing the leaderboard page.

C.1.2 Iteration 2
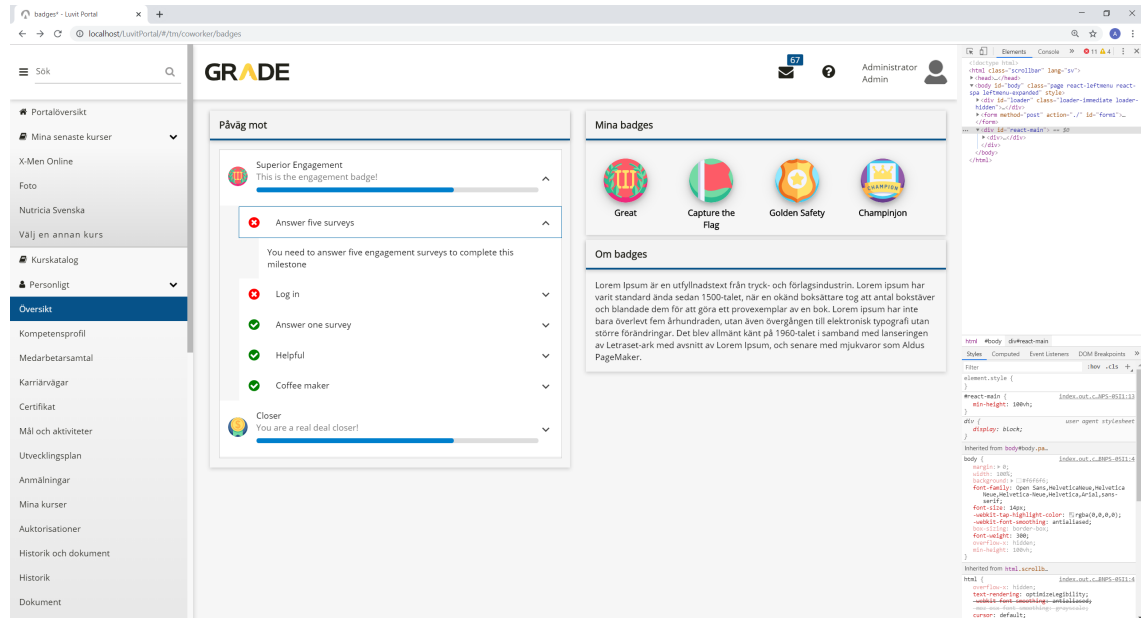
Figure C.8: Badge page.
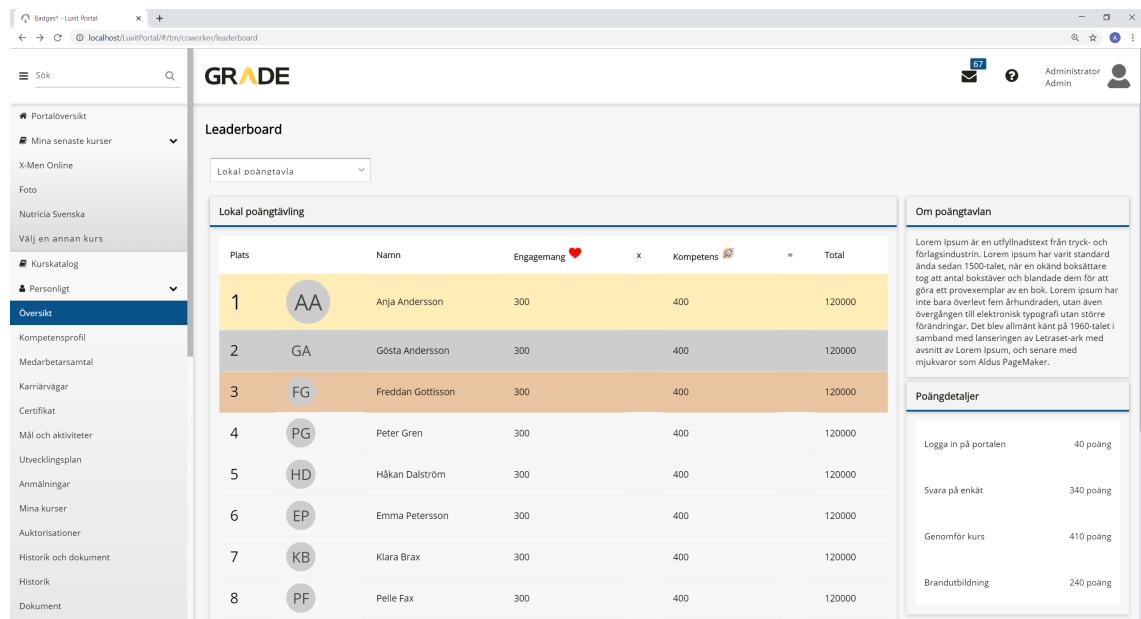
Figure C.9: Leaderboard page.
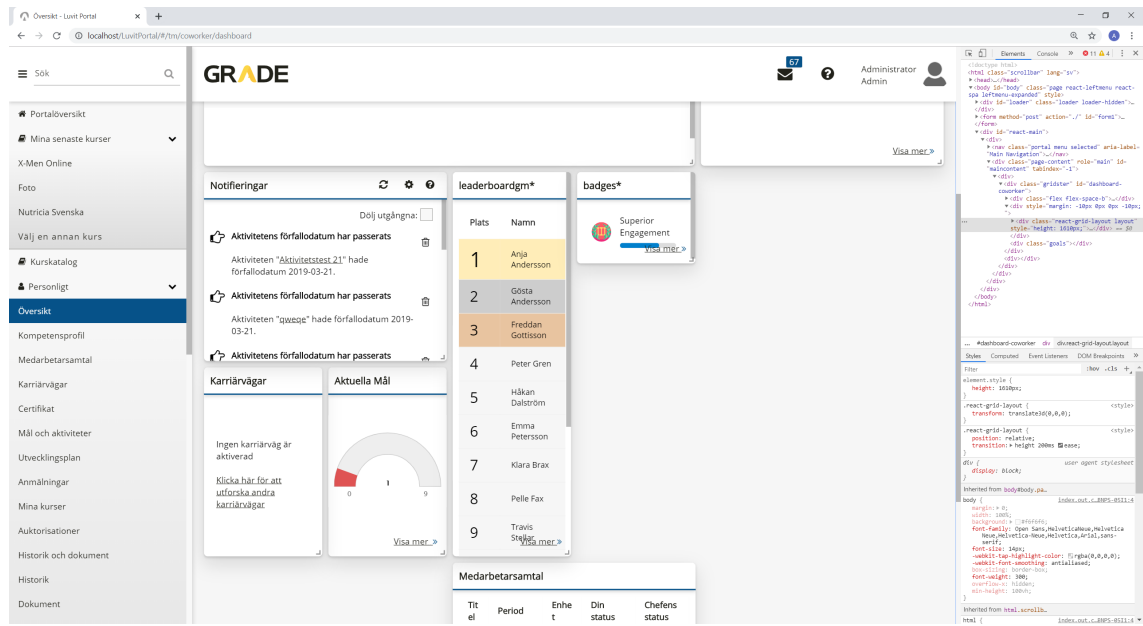
Figure C.10: Overview page.
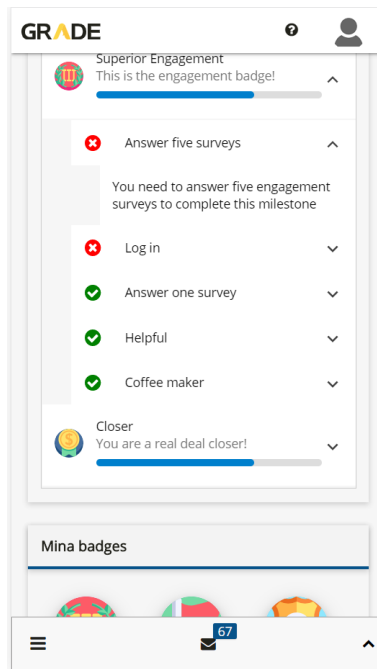
Figure C.11: Mobile view showing badge page, showing progressing badges.
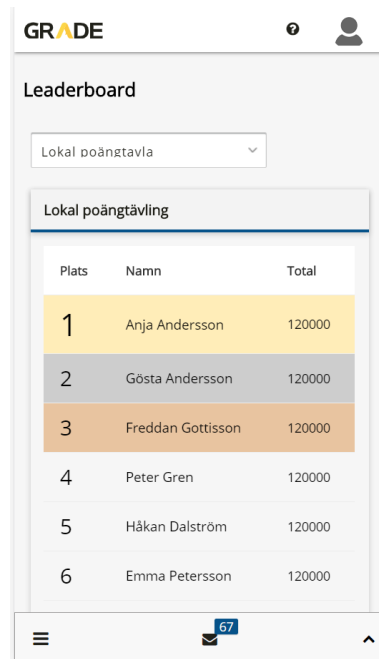
Figure C.12: Mobile view showing leaderboard page, showing leaderboard.
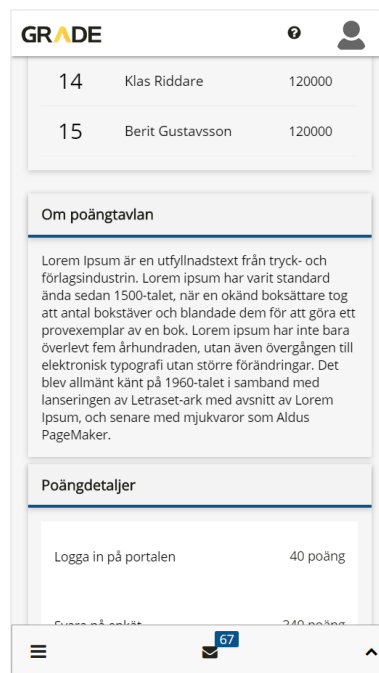
Figure C.13: Mobile view showing leaderboard page, showing points details.

C.1.3 Iteration 3
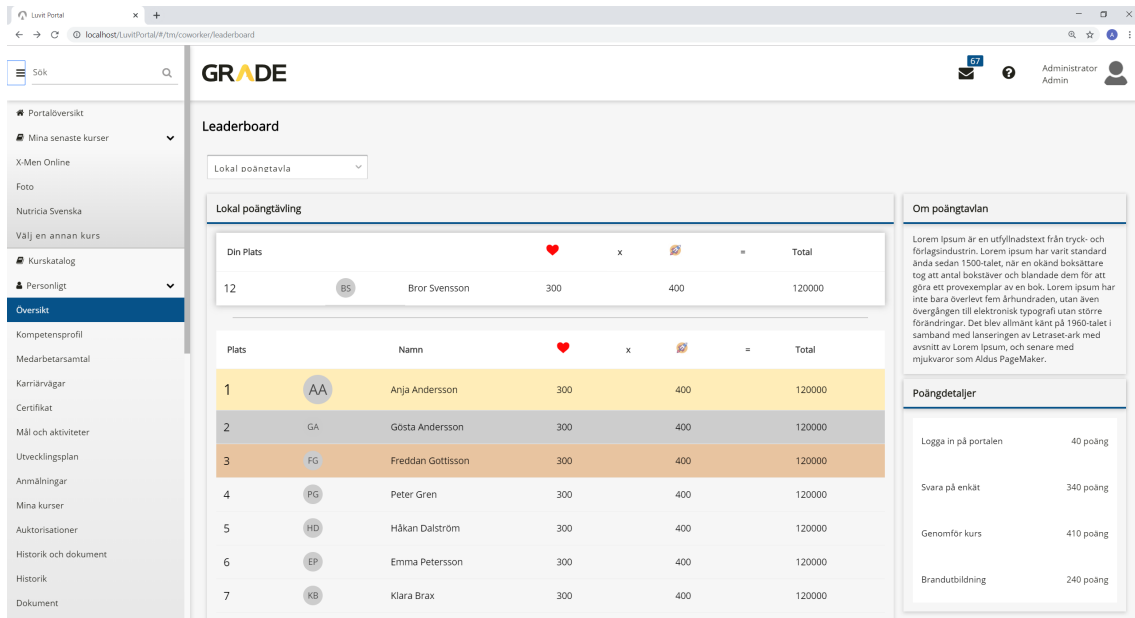
Figure C.14: Leaderboard page, now containing personal placement card.
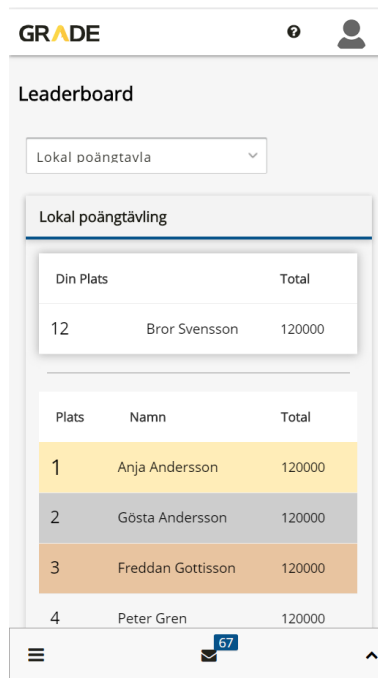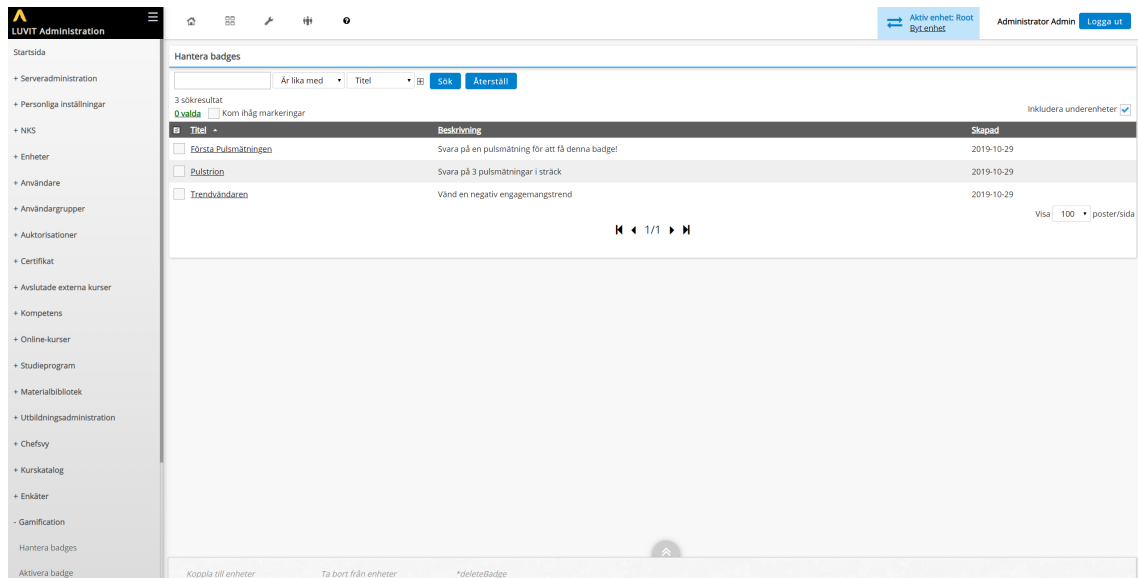
Figure C.15: Mobile view showing leaderboard page which contains personal placement card.

C.2 Administrator perspective

Figure C.16: Page showing list of activated badges.

Figure C.17: Page where admin can activate a badge.
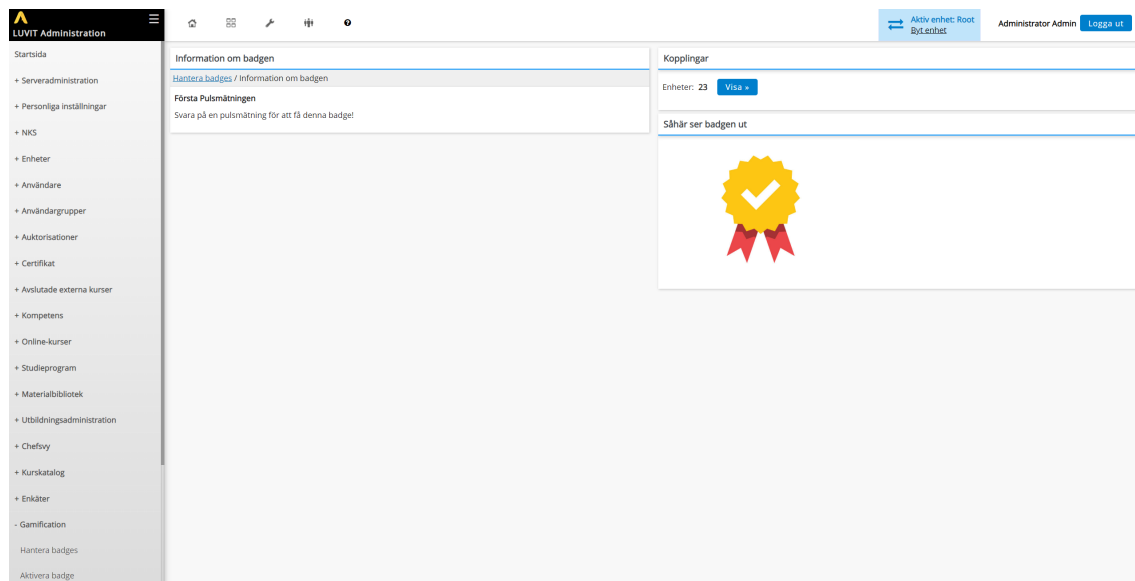
Figure C.18: Page where admin can edit a badge.
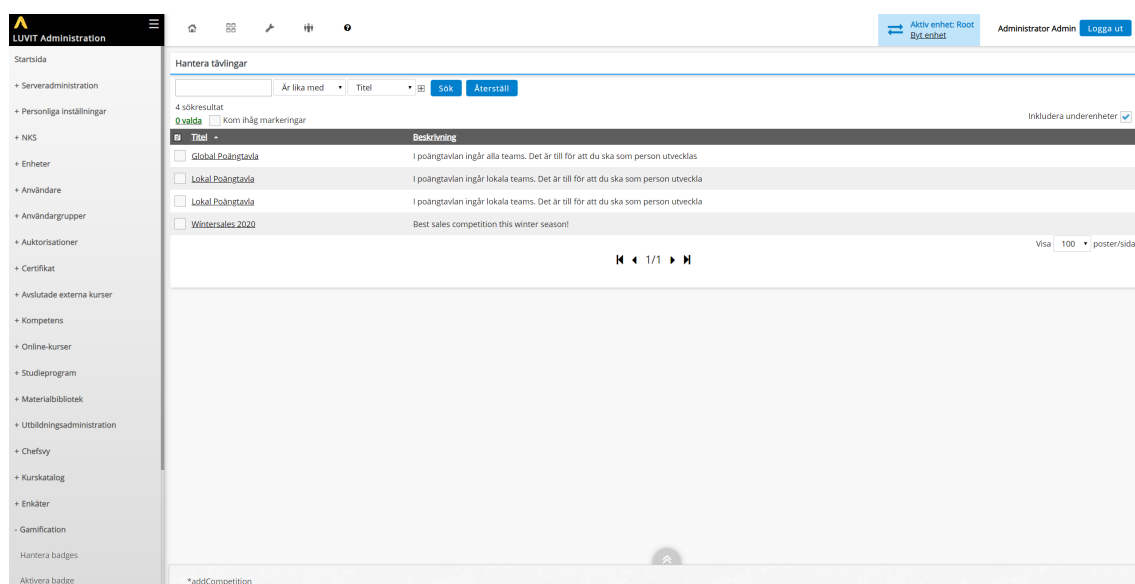
Figure C.19: Page showing list of created leaderboards.
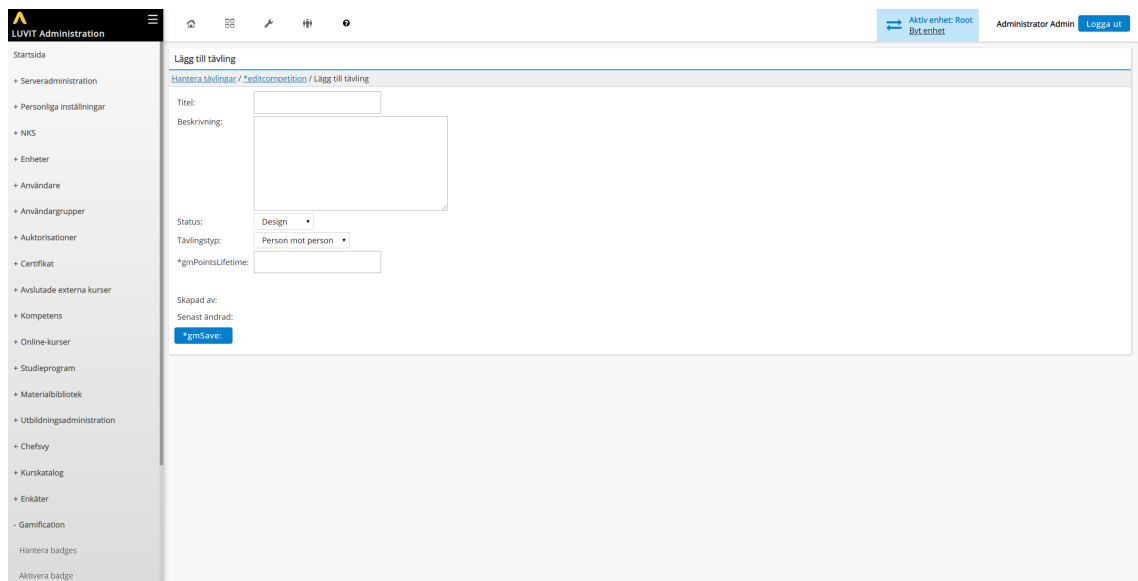
Figure C.20: Page where admin can create a leaderboard.
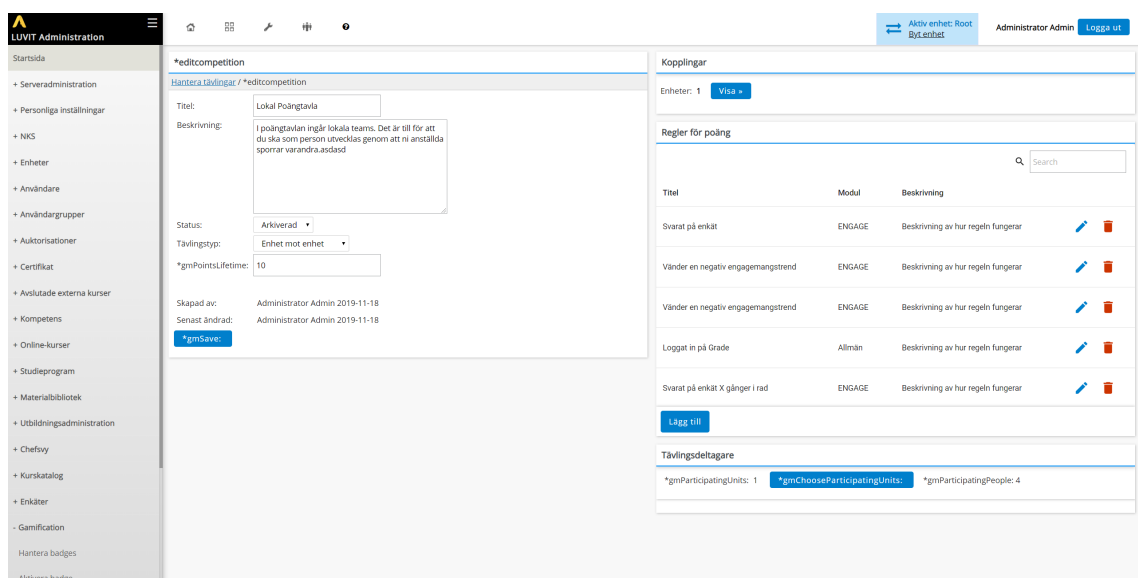
Figure C.21: Page where admin can edit a leaderboard.

C.3   User testing

This part of the appendix contains the result of the user testing carried out after the HiFi iterations. Section C.3.1 presents the result for testing the prototype from a regular user's perspective and section C.3.2 presents the result for testing the prototype from the administrator's perspective.

C.3.1   User perspective

. The user test results are divided into the two categories *Badges* and *Leaderboard*.

Test person 1 - product owner

Badges

- Widget: Understands that the blue progress bar indicates progress towards the badge.

- Widget: The larger widget is shown and the test person thinks that the green tasks are completed and the red tasks are failed.

- Main Badge page: Easily understands what badges are in progress and what badges are completed.

- Main Badge page: Understood how to find more information about each badge milestone. The test person wanted to be able to click on an unfinished milestone to be directed to that specific task in the system.

Leaderboard

- Widget: Didn't understand what kind of list was shown in the overview badge widget. We had to explain that it was a leaderboard with competing people.

- Main Leaderboard page: The test person could easily find the main page from the left menu.

- Main Leaderboard page: In this page the test person understands that it's a competition and can read information about the competition. Understands what tasks will generate points for the user.

- Main Leaderboard page: The competition was of type unit vs. unit but the activity feed showed individual tasks being completed. The test person was confused about if the activity feed showed points received for his specific team or for every team.

- Main Leaderboard page: The test person understood the color scheme used to display the first, second and third placements in the leaderboard.

Test person 2 - project manager

Badges

- Widget: Understands that he has some kind of progress towards a badge. The test person tries to enlarge the widget and now understands that he has completed some tasks but not all of them.

- Main Badge page: Easily understands what badges are in progress and what badges are completed.

- Main Badge page: Appreciates that the badges in progress is sorted by how much progress is made for each badge.

- Main Badge page: Wanted to more easily see how many tasks are finished for each badge in progress.

Leaderboard

- Widget: The test person understands that he sees competition and can find his placement.

- Main Leaderboard page: Knows how to navigate to the main leaderboard page.

- Main Leaderboard page: Immediately understands that he is part of different ledarboards by using the drop down list.

- Main Leaderboard page: Finds out how what he has to do to receive points, but is confused about what kind of points are received (e.g. engagement points and competence points). Also wants more information about were he can complete a survey that will generate points.

C.3.2   Administrator perspective

Test person 1 - product owner

Badges

- Quickly finds the administration section for handling gamification

- Understands how to create a badge

- Understands how to choose an image for the badge

- Understands how to add rules/milestones for a badge

Leaderboard

- Understands how to add or remove participants from a leaderboard

- Didn't understand how to make his unit the only unit to be able to change and manage the leaderboard.

- Understands how to change the leaderboard type from unit vs. unit to person vs. person.

- Understands how to add rules and how to divide the points between engagement points and competence points. Understands the purpose of different point types after an explaination.

- Like the visual feedback when adding rules.

- Understands how to change points for a specific rule.

- When removing a rule, he wanted some form of confirmation before it is removed.

Test person 2 - project manager

Badges

- When trying to find where to administer gamification, he doesn't look for a specific gamification section in the menu. Instead he looks in the sub-menus for managers and has to be guided to the correct place.

- Understands and really likes the way to set the image for the badge.

- Overall good impression of how administrating badges work.

Leaderboard

- When trying to add participanst to a leaderboard he thinks that it differs from the rest of the system. The visual panel for handling participants should also be moved higher up in the user interface.

- Understands how to change the leaderboard type from unit vs. unit to person vs. person.

- Understands how the types of points works.

- Intuitively understands how to add rules and divide the points between engagement points and competence points. The point slider's deafult value of 50% makes it easy to understand.

- When searching for a course when adding a course as a rule, he used the enter button on the keyboard which is necessary. A bug was found which made whole page reload.

- Understands how to edit points for a specific rule. A bug was found and the amount of points was not updated and shown to the user.

- Understands how to remove a rule but might like some form of confirmation before the rule is removed.

Appendix D
Usability evaluation

D.1   Test tasks

D.1.1   Portal

Table D.1: The tasks when working with the Portal that the test person went through during the usability evaluation.

Task	Sub Task	Correctly finished when	Max time
1. Go to the overview page and look at the badge and leaderboard widget	1. Press "Personligt" menu item in the main menu. 2. Press "Översikt" menu item in the main menu.	Has navigated to the overview page and told *TL* what he/she sees.	3 min.
2. Checkout which leaderboards are available, what the placement in them is and who have earned points to the leaderboards.	1. Press the dropdown and select different leaderboards	Told the *TL* which leaderboards they are a member of, what their placements are and who have earned points to the leaderboards.	5 min.
3. Checkout what can be done to earn points to be placed first in one of the leaderboards.	1. Go to the leaderboard page if not already there. 2. Press one of the arrows in the "Points details" panel.	Has found out what to do to earn points.	2 min.

4. Checkout which badges has been earned and which badges that are closest to being earned and see what needs to be done to earn the badges.	1. Press the "Gamification" menu item (If not already marked from earlier tasks). 2. Press the "Badges" menu item. 3. Press the arrow in each of the list items for earned badges.	Told the *TL* which badges that have been earned and which badge that is closest to be earned. Also told what the *TL* what needs to be done to earn the badge that is closest to be earned.	5 min.

D.1.2 Admin

Table D.2: The tasks when working with the Admin that the test persons went through during the usability evaluation.

Task	Sub Task	Correctly finished when	Max time
1. Create a leaderboard with the point type "Engagemang och kompetens".	1. Press the "Skapa tävling" menu item. 2. Write desired information in the panel. 3. Set point type to "Engagemang och kompetens". 4. Press "Spara" button.	Has created a leaderboard with point type "Engagemang och kompetens".	3 min.
2. Handle the recently created leaderboard to be displayed in the portal. Add 7 rules to it and connect two units.	1. Set leaderboard status to "Aktiv". 2. Press "Lägg till" button under the panel "Regler för poäng". 3. Press "arrow" button in one of the rows. 4. Fill in desired information in the inputs. 5. Press "Lägg till" button. 6. Repeat from step 2. 7. Press "Visa" button in the panel "Kopplingar". 8. Press "Koppla till enheter" button. 9. Check the checkbox for any unit and press "Nästa" button. 10. Press "Slutför" button. 11. Press "Välj deltagare" button in the panel "Tävlingsdeltagare". 12. Check the checkbox for root and press "Spara" button.	Has handled the leaderboard where correct settings have been set.	10 min.
3. Create a badge.	1. Press "Skapa badge" menu item in the main menu. 2. Write desired information in the panel. 3. Press "Spara" button	Has created a badge	3 min.

4. Handle the recently created badge. Add 7 rules to it, add 2 units and choose an image.	1. Press "Lägg till" button under the panel "Regler för poäng". 2. Press "arrow" button in one of the rows. 3. Fill in desired information in the inputs. 4. Press "Lägg till" button. 5. Repeat from step 1. 6. Press "Visa" button in the panel "Kopplingar". 7. Press "Koppla till enheter" button. 8. Check the checkbox for root and press "Nästa" button. 9. Press "Slutför" button. 10. Press on an image in the "Connected image" panel. 11. Press "Choose".	Has handled the badge where correct settings have been set.	10 min.
5. Edit the leaderboard that was created earlier. Edit 2 of the rules and remove 1 of the rules.	1. Press on one of the rules in "Regler för poäng" panel. 2. Update the poits to a desired value. 3. Press "Spara" button. 4. Repeat once from step 1. 5. Hover over a rule in "Regler för poäng" panel. 6. Press the trash can symbol.	Has edited two rules and removed a rule.	4 min.

D.2 Data to be collected

Portal

Table D.3: The different varieties of data obtained for Portal are specified in the list in section 6.3.3

Question	Objective & Quantitative	Objective & Qualitative	Subjective & Quantitative	Subjective & Qualitative
1		Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
2	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview

3	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
4	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
5			Post interview questionnaire	Debriefing interview
6			Post interview questionnaire	Debriefing interview
7		Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
8	Expenditure of time			
9	Expenditure of time			
10	Expenditure of time			
11	Expenditure of time			
12	Expenditure of time Amount of faults Amount of clues given	Behavioral analysis (notes)		
13		Behavioral analysis (notes)		Debriefing interview

Admin

Table D.4: The different varieties of data obtained for admin from the various tasks specified in the list under section section 5.1

Question	Objective & Quantitative	Objective & Qualitative	Subjective & Quantitative	Objective & Qualitative
1			Post interview questionnaire	Debriefing interview
2		Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview

3	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
4	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
5	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
6	Correctly completed Expenditure of time Amount of clues given	Behavioral analysis (notes)	Post interview questionnaire	Debriefing interview
7	Expenditure of time			
8	Expenditure of time			
9	Expenditure of time			
10	Expenditure of time Amount of faults Amount of clues given	Behavioral analysis (notes)		
11		Behavioral analysis (notes)		Debriefing interview

D.2.1 Questionnaire

Det var lätt att se sin plats i poängtavlorna

2 responses

Det var lätt att förstå hur man navigerade mellan de olika poängtavlorna

2 responses

Det var lätt att se vilka personer som är aktiva i de olika poängtavlorna

2 responses

Det var lätt att se vad man kunde göra för att få mer poäng i poängtavlorna
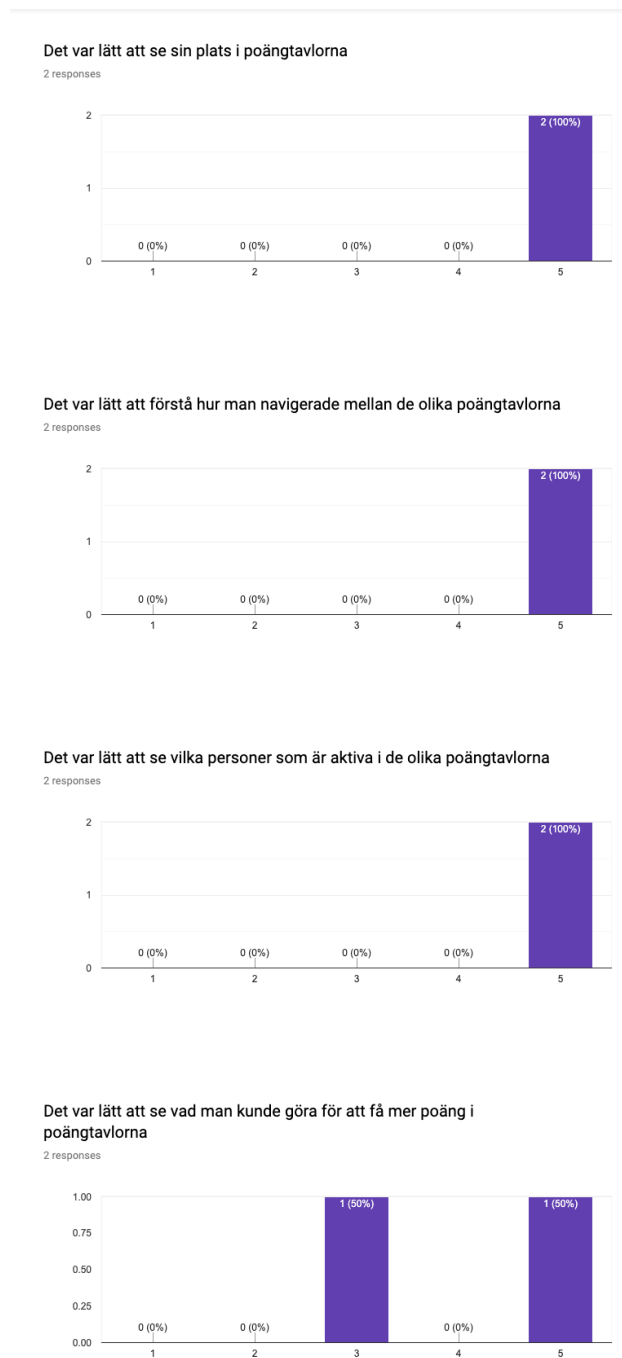
2 responses

Figure D.1: Questions from the questionnaire used in the user evaluation with their answers.

Poängtavlesidan var i allmänhet bra designad
2 responses
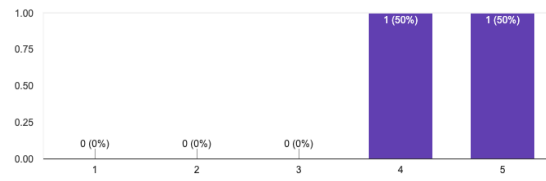
Det var lätt att se vilka badges man har fått
2 responses
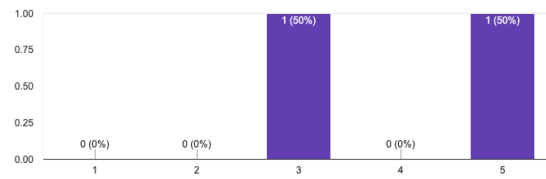
Det var lätt att se vilka badges man var på väg att få
2 responses
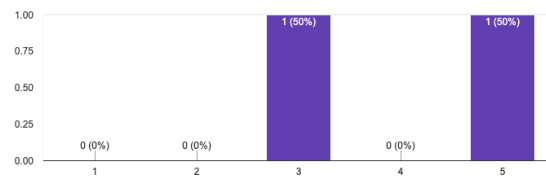
Badgesidan var i allmänhet bra designad
2 responses
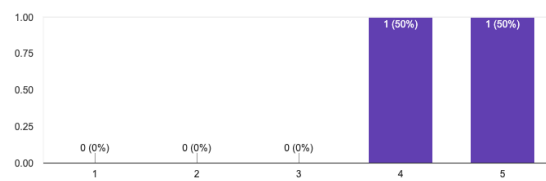
Figure D.2: Questions from the questionnaire used in the user evaluation with their answers.

Jag kände mig _____ när jag använde gamificationdelen

2 responses

Lekfullt upplägg med bra backend kopplingar, i en optimal värld koppla aktiviteter/mål till Badge..

sugen på att köra igång gamificationdelen skarpt

Gamificationdelen kommer att öka engagemanget hos användarna

2 responses

Post user testing (Admin)

Det var lätt att skapa poängtavlor

2 responses

Det var lätt att editera poängtavlor
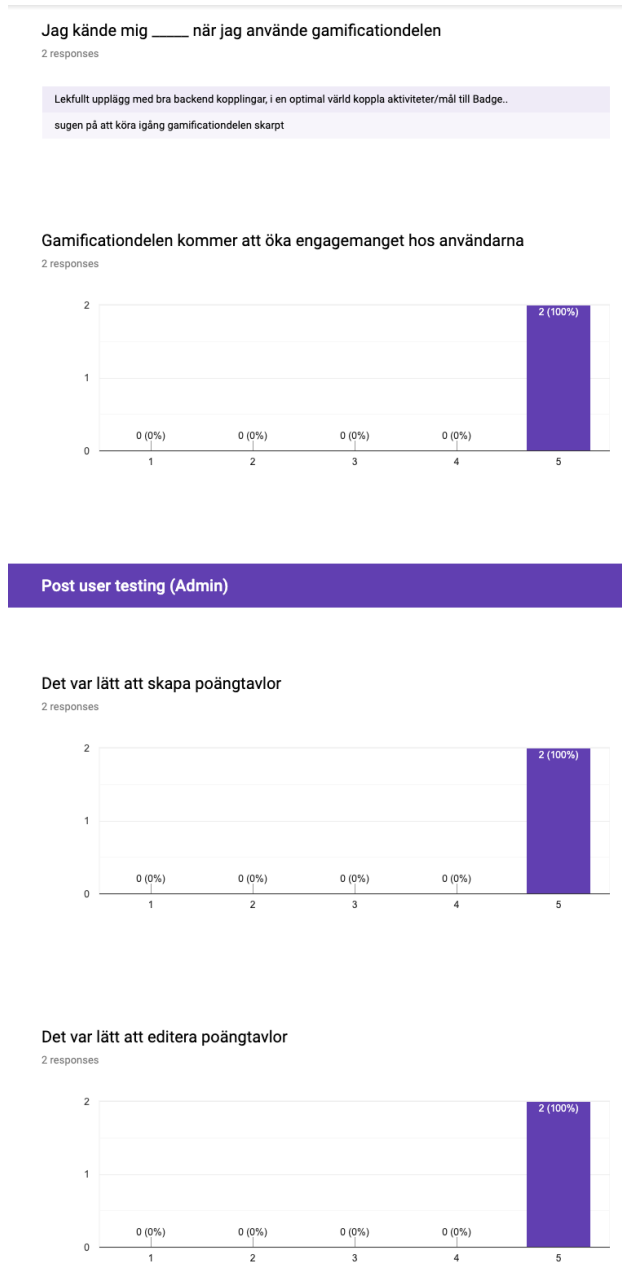
2 responses

Figure D.3: Questions from the questionnaire used in the user evaluation with their answers.

Det var lätt att lägga till regler till poängtavlor

2 responses
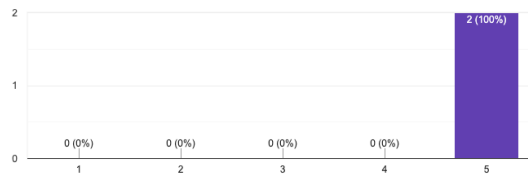
Det var lätt att editera regler för poängtavlor
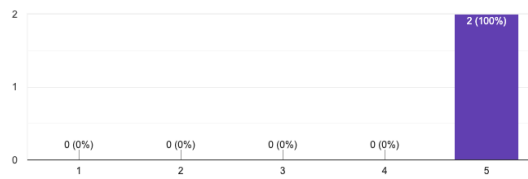
2 responses

Det var lätt att ta bort regler för poängtavlor
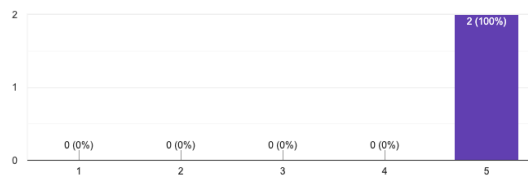
2 responses

Vad tyckte du allmänt om att administrera poängtavlor

2 responses

Enkelt och mycket fungerar likt övriga Admin.

Jag tyckte att det fungerade ungefär likadant som övriga delar i plattformen, så om man är van användare var det väldigt logiskt och självinstruerande.

Jag kände mig ____ när jag administrerade poängtavlor

2 responses

Figure D.4: Questions from the questionnaire used in the user evaluation with their answers.

Jag kände mig ____ när jag administrerade poängtavlor

2 responses

Det gick snabbt och enkelt, nomenklatur var likt det vi tidigare använt.

trygg

Det var lätt att skapa badges

2 responses
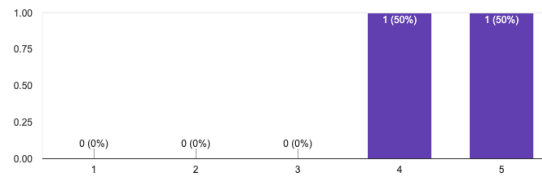
Det var lätt att editera badges

2 responses
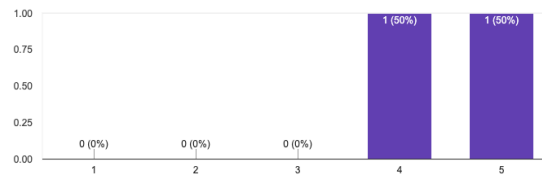
Det var lätt att lägga till regler till badges

2 responses
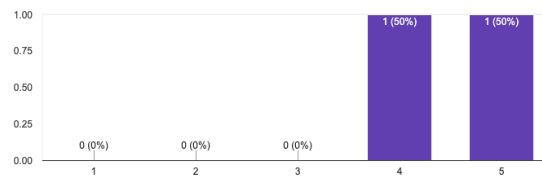
Det var lätt att editera regler för badges

2 responses

Figure D.5: Questions from the questionnaire used in the user evaluation with their answers.
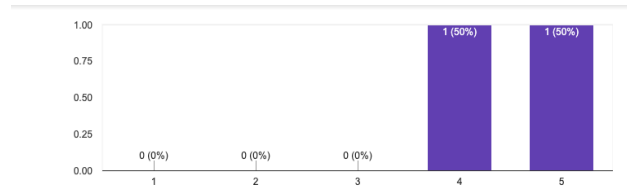
Det var lätt att editera regler för badges
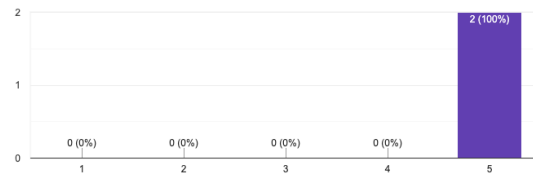
2 responses

Det var lätt att ta bort regler för badges
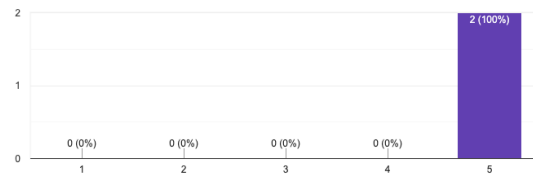
2 responses

Vad tyckte du allmänt om att administrera badges

2 responses

Regler eller är det milstolpar?

Det mesta var logiskt och enkelt.

Jag kände mig ____ när jag administrerade badges

2 responses

Löser stora behov hos våra kunder och kan i mångt och mycket nyttjas för att administrera studieprogram

trygg

Figure D.6: Questions from the questionnaire used in the user evaluation with their answers.

D.2.2   Interview questions

Portal

- Did you feel more engaged in the product by using the gamification features?

- Was it easy to see your placement in the leaderbaords?

- Was it easy to see which badges that had been earned?

- Was it easy to see which badges that were close to being earned?

- What was your general impression of the leaderboard page?

- What was your general impression of the badge page?

- How did you feel when using the gamification features?

- Do you feel like there is any functionality that is missing when using the gamification features?

Admin

- What do you think about managing badges?

- What do you think about managing leaderbaords?

- How did you feel when managing badges?

- How did you feel when managing leaderbaords?

- Was it easy to create badges? Why? Why not?

- Was it easy to create leaderbaords? Why? Why not?

- Was it easy to edit badges? Why? Why not?

- Was it easy to edit leaderboards? Why? Why not?

- Was it easy to add rules to badges and leaderboards? Why? Why not?

- Was it easy to edit rules for badges and leaderboards? Why? Why not?

- Do you feel like there is any functionality that is missing when managing badges and leaderboards?

Appendix E

Results

E.1 User's perspective

E.1.1 Badges
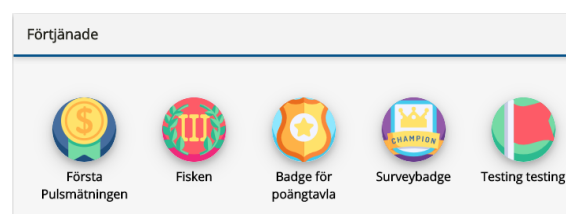
Figure E.1: Panel showing earned badges.
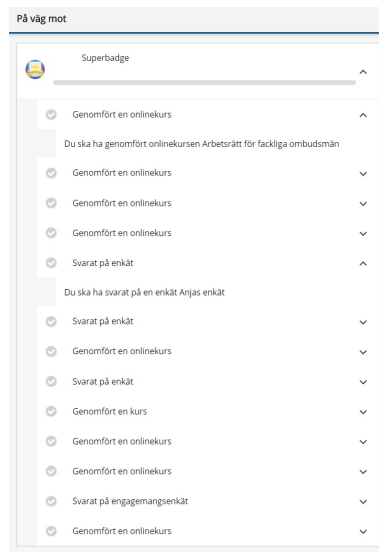
Figure E.2: Panel showing progressing badges.

E.1.2 Leaderboards

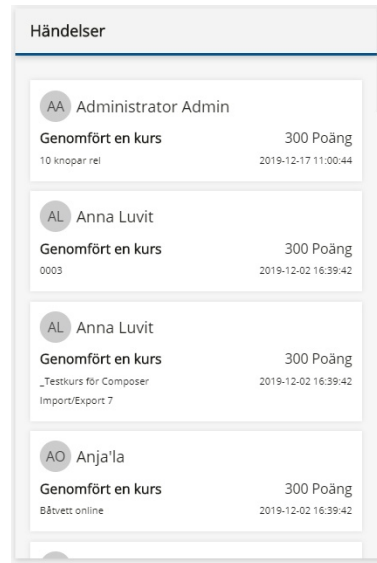**Figure E.3:** Panel showing points details in the leaderboard page.

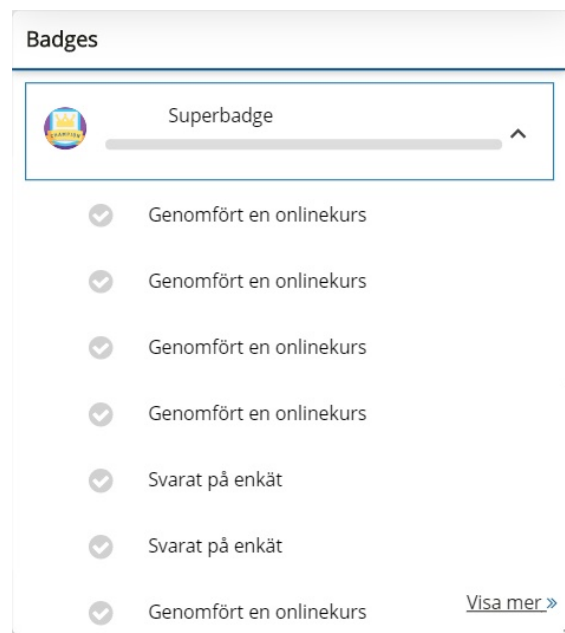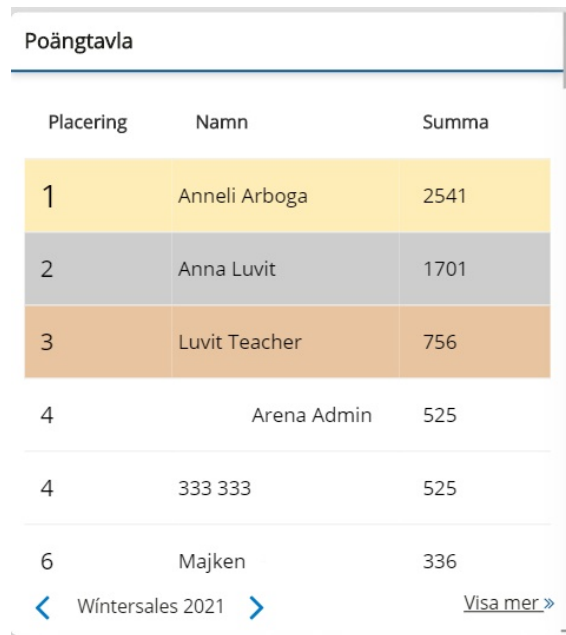**Figure E.4:** Panel showing the feed in the leaderboard page.

E.1.3 Widgets

Figure E.5: Badge widget in the widget page.

Figure E.6: Leaderboard widget in the widget page.

E.2 Administrator's perspective

E.2.1 Badges
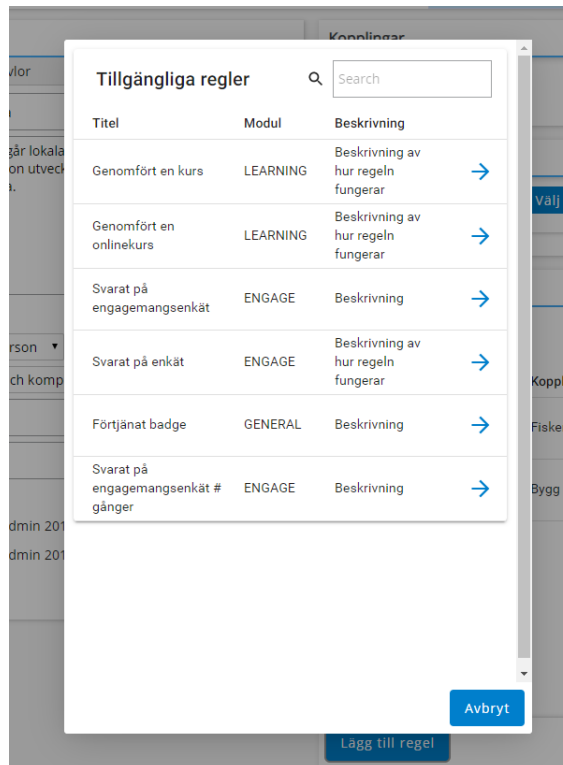
Figure E.7: Modal for selecting a rule when adding rule to a badge. This modal looks the same when selecting rule for a leaderboard.
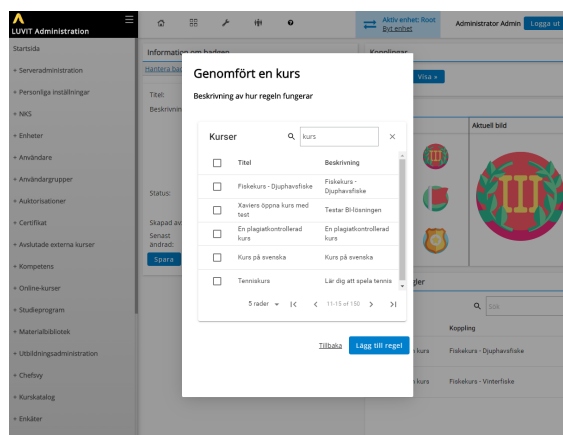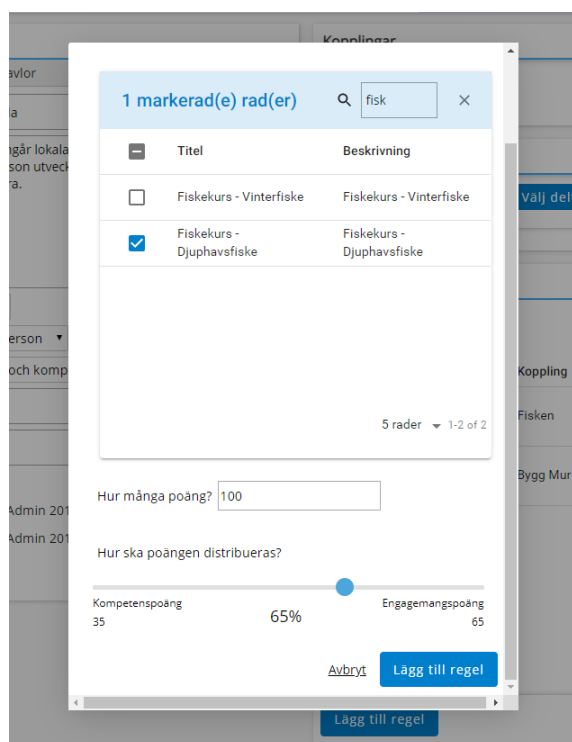

Figure E.8: Modal for adding rule to a badge.

E.2.2 Leaderboards

Figure E.9: Modal for adding rule to a leaderboard.

EXAMENSARBETE Designing and implementing a gamification prototype: Increasing engagement in Grade's platform
STUDENTER Fredric Billow, Arvid Pilhall
HANDLEDARE Kirsten Rassmus-Gröhn (LTH)
EXAMINATOR Joakim Eriksson (LTH)

Skapa engagemang med Gamification

POPULÄRVETENSKAPLIG SAMMANFATTNING **Fredric Billow, Arvid Pilhall**

I en värld där digitala tjänster finns i överflöd måste bolagen bakom tävla om vår uppmärksamhet. Ett sätt att få användare att komma tillbaka är att applicera spelprinciper i produkten - något som kallas för gamification. Detta arbete visar hur en gamification-prototyp designades och integrerades i en välanvänd mjukvaruplattform.

Gamification kan beskrivas som att spelmoment läggs till i en produkt som inte är ett spel. Detta använder företag för att få ett ökat engagemang hos sina användare. Ofta så lägger man till gamification-funktioner först när en produkt har mognat, istället för att inkludera dem i den ursprungliga produktdesignen. Denna masteruppsats har gjorts i samarbete med företaget Grade AB. De erbjuder mjukvara som syftar till att bland annat höja kompetens och engagemang i kunders verksamheter. Till exempel är det möjligt att skapa e-learning-kurser som användare kan genomföra eller sätta upp personliga mål att arbeta mot.

Målet med projektet var att undersöka vad gamification är och hur det fungerar, för att sedan skapa en prototyp som fungerade tillsammans med Grades mjukvara. Syftet var att med hjälp av denna prototyp skapa ett högre engagemang hos användarna.

Processen från idé till prototyp inkluderade bland annat att undersöka hur Grades konkurrenter har använt gamification. Vissa hade till exempel använt belöningar av olika slag. Andra hade försökt öka team-känslan. Efter att idéer valts ut skapades prototyper med papper och penna. Dessa utvecklades med tiden till digitala prototyper och blev slutligen integrerade i Grades system. Prototyperna blev bättre och bättre genom en iterativ process baserad på användartestning.

Efter att prototypen var av tillräckligt hög kvalitet implementerades alla nödvändiga funktioner i databasen, servern och i användargränssnittet för att prototypen skulle bli funktionell.
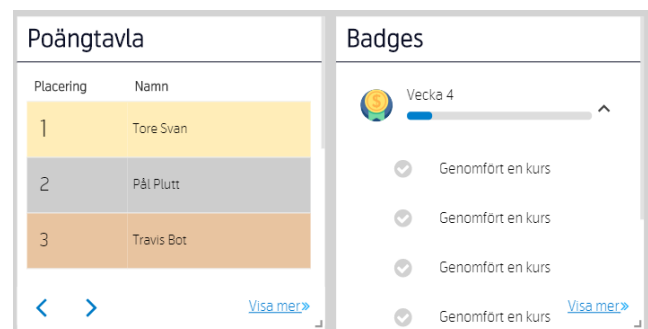
Resultatet av projektet blev en prototyp som innehöll funktionalitet för att skapa poängtavlor och utmärkelser. I en poängtavla kan man som användare tävla mot andra och samla poäng genom att genomföra vissa uppgifter. En utmärkelse får man tilldelad sig om man genomför alla milstolpar som bygger upp utmärkelsen. Till exempel genom att gå en viss kurs eller svara på en enkät.

I bilden ovan syns en väldigt liten del av det slutgiltiga resultatet.