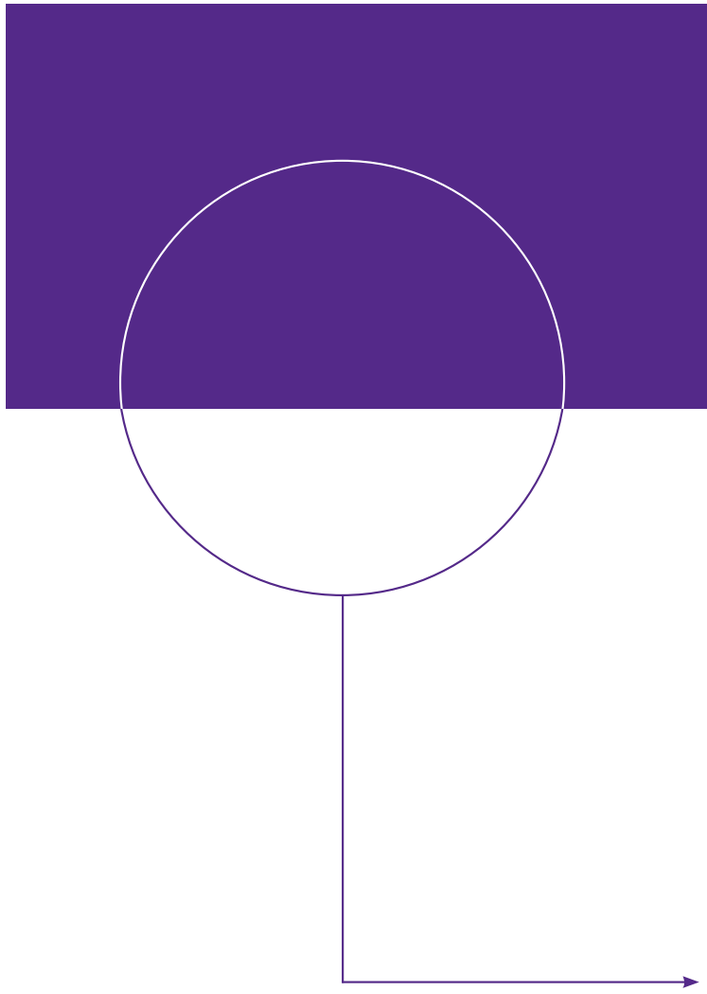

Master's thesis

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Game feedback mechanisms supporting reflection and self-efficacy in learning work-related soft skills

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Game feedback mechanisms supporting reflection and self-efficacy in learning work-related soft skills

Master of Science in Informatics
Submission date: June 2019
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Abstract

Young adults new to the working life often possess skills developed through education, certification and other means that will help them with getting a specific job. However, interpersonal skills such as ability to communicate and personal attitudes such as professionalism and integration are scarcely consciously taught at universities. These qualities are called soft skills, and they are in high demand in an employee. They are not easily measured or learned in a traditional setting. Acquisition of such skills often involves trial and error, making it experience based. Thus there is a need for methods teaching such skills to young adults lacking experience and knowledge in this matter.

Company Læringsliv AS is developing a mobile educational game teaching soft skills related to being an employee. The game acts as a simulator of everyday experiences of a new employee. This master thesis explores possibilities of utilizing various game feedback mechanisms to effectively teach soft skills in an informal setting. Focus in the thesis is on two crucial aspects of learning in a workplace: reflection including the collaborative variant and self-efficacy.

In this master thesis two user evaluations were conducted, one of the game prototype that existed prior and one of the proposed feedback mechanisms and user interface improvements. The proposals were based on requirements elicited from the first evaluation and a co-design workshop. Proposed feedback mechanisms were not fully functional due to limitations posed by the prototyping tool.

Findings from the final evaluation suggest that several proposed feedback mechanisms have potential with regard to supporting reflection and increasing self-efficacy. The most prominent ones focused on providing context and detailed feedback to consequences of choices made in the game by the player, as well as introducing relations with individual characters in the game. These findings might however be superficial due to several limitations. Functional prototypes of the feedback mechanisms need to be developed for further evaluation.

Sammendrag

Unge voksne som er nye til arbeidslivet har ofte ferdigheter utviklet gjennom utdanning, sertifisering eller andre aktiviteter, som vil hjelpe dem med å få en bestemt jobb. Det er derimot uvanlig å undervise mellommenneskelige ferdigheter som evnen til å kommunisere eller personlige holdninger som profesjonalisme og integrasjon, ved et universitet. Slike egenskaper kalles myke ferdigheter, og de er sterkt ettertraktet hos en ansatt. De er ikke lett å måle eller lære på en tradisjonell måte. Tilegnelsen av slike ferdigheter innebærer ofte prøving og feiling, noe som gjør de erfaringsbaserte. Det finnes dermed et behov for en metode som opplærer unge voksne som mangler både erfaring og kunnskap i denne sammenhengen.

Læringsliv AS er en bedrift som utvikler et mobilt læringsspill som gir opplæring av jobbrelaterte myke ferdigheter. Spillet er en simulator av hverdagslige situasjoner en ny ansatt kan møte på. Denne masteroppgaven utforsker muligheter for bruken av ulike spillbaserte tilbakemeldingsmekanismer til å effektivt lære bort myke ferdigheter i en uformell setting. Masteroppgaven vil fokusere på to essensielle aspekter av læring på en arbeidsplass: refleksjon inkludert samarbeidsvarianten og mestringstro.

I denne masteroppgaven ble det gjennomført to brukerevalueringer, en av spillprototypen som eksisterte fra før av og en av de foreslåtte tilbakemeldingsmekanismene og forbedringene av brukergrensesnittet. Forslagene ble basert på krav fremstilt fra den første evalueringen og co-design workshop. Foreslåtte tilbakemeldingsmekanismer var ikke fullt funksjonelle grunnet begrensninger fremstilt av prototypingsverktøyet.

Resultater fra den endelige evalueringen tyder på at flere foreslåtte tilbakemeldingsmekanismer har potensial med hensyn til å støtte refleksjon og øke mestringstro. De mest fremtredende fokuserte på å gi kontekst og detaljert tilbakemeldinger på konsekvensene av valgene som er tatt i spillet av spilleren, samt å introdusere relasjoner med individuelle personer møtt i spillet. Disse funnene kan imidlertid være overfladiske på grunn av flere begrensninger. Funksjonelle prototyper av tilbakemeldingsmekanismene må utvikles for videre evaluering.

Abbreviations

AI	Artificial Intelligence
GBL	Game Based Learning
DGBL	Digital Game Based Learning
DI	Diversity Icebreaker
IDI	Department of Computer and Information Science
NTNU	Norwegian University of Science and Technology
UI	User Interface

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- all the evaluation and workshop participants,
- My parents, sister and Lars Henrik Grytten for unequivocal support during my studies.

1. Introduction

This chapter summarizes thesis' motivation, context, scope, contribution, research questions and content.

1.1. Motivation

Starting at a new job for the first time is a complex experience for a young adult. At the end of 20th century the need for a knowledge worker emerged, a worker that thinks critically, is adaptive to various contexts and able to cooperate in teams [36]. Thus arose the necessity for workers to acquire not only technical skills relevant to the job, but soft skills as well: a set of attitudes and behavior occurring in interactions with others affecting the outcomes of their working life [97]. There are several challenges to overcome and norms to learn in a short span of time, such as adjusting to new responsibilities, managing work relationships and learning to compromise. Survey conducted by Independent showed that 47% of surveyed young people said they did not feel they were confident enough or had enough soft skills to succeed as an employee. Additionally, 62% said that having soft skills would help them with getting a job [62]. Fresh employees might not have the valuable experience that would help them with tackling everyday challenges and often need guidance in new situations. When encountering a new situation, they might be forced to take an action without realizing the subsequent consequences. There is therefore a need for being prepared for facing these challenges before they occur and learn how to act in certain situations and why. However, plain working experience might have opposite effect - students that work while studying might feel less confident about the employability due to suddenly being aware of work-related challenges [58]. One of the identified career management aspects that affect employability is self-efficacy - believing in one's abilities [59].

Gaining experience that would guide an employee through different situations is a slow and often painful process, involving trial and error. Additionally, there are multiple aspects of a workplace to take into account when making decisions. An employee needs to be aware how their behavior affects their relations with their supervisors, colleagues, customers, the environment itself. This calls for well developed social skills and ability to cooperate. It is crucial for new employees to have an opportunity to get familiar with work-related challenges in a safe environment, where they can make mistakes, receive insight into potential consequences and learn in a way that is most effective for them. Feedback has a significant impact on learner's development of skills and constructing knowledge, as well as motivation to learn [92]. There is therefore a good reason to uti-

lize meaningful feedback that stimulates learning in the context of acquiring soft skills in a workplace. New employees need to know why they act in a certain way, draw conclusions from previous encounters and eventually understand how to improve their behavior, decision-making process and attitude. This makes reflection a vital component of the learning process [28, 98]. Learning in a workplace often takes place in casual settings, based on personal experience [41]. Reflection has been shown to be an important component of the learning process in this context [66, 20], individual or collaborative. Additionally, self-efficacy of tackling everyday challenges at work are an important factor of learning in the workplace [41]. These tendencies could be utilized to teach soft skills in an informal setting.

1.2. Context

This master thesis was carried out in collaboration with Læringsliv AS. Læringsliv AS is a company developing a serious mobile game for young adults that would help them with experiencing what it is like be an employee, preparing them for real world challenges. The goals of the game include:

- teaching work-related soft skills, such as management of the relationship between the player and their supervisors, customers and colleagues
- acting as a coach to increase player's confidence in their work-related soft skills
- guiding the player through hypothetical situations that an employee could stumble upon in real life
- motivate the player to reflect on their experience of the game and their soft skills

At the beginning of the project there existed a prototype of the game, developed by a subcontractor Pineleaf AS. The existing prototype is discussed in chapter 2.

1.2.1. Actors

Table 1.1 provides an overview of company actors involved in the project and their role. Table 1.2 provides a list of individuals involved, including their affiliation and role.

Table 1.1.: Company actors

Actor	**Role**
Læringsliv AS	owner of the game; provided description of the game, its purpose and input in planning of various activities
Pineleaf AS	subcontractor to Læringsliv AS; developer of the game; developed all full game prototypes presented in the thesis; provided information on game's architecture and core functionality

Table 1.2.: Specification of individuals involved

Person	**Affiliation**	**Role**
Sobah Abbas Petersen	NTNU	thesis supervisor
Andreas Seim	Læringsliv AS	thesis co-supervisor; participation in: evaluation plan workshop, game development workshop, co-design workshop planning and co-design workshop
Sverre Kondrad Nielsen	Læringsliv AS	participation in evaluation plan workshop and game development workshop
Fredrik Chrislock	Pineleaf AS	development lead for the game; organization of game development workshop
Anders Ottesen	Pineleaf AS	main contact with Pineleaf AS; participation in game development workshop

1.3. Scope

This thesis focused on exploring game feedback mechanisms that could be implemented in the game, and evaluating their influence on two aspects of learning work-related soft skills: self-efficacy and reflection, as well as ability to spark collaborative reflection. In this context a game feedback mechanism is a loop system contained within a game, where the game responds to player's input in a specified manner. Terms "game feedback mechanism" and "feedback mechanism" will be used interchangeably throughout this thesis. The activities involved evaluation of the existing game prototype, design of feedback mechanisms and evaluation of the proposed feedback mechanisms. Feedback mechanisms will be constructed in a way that takes into account both game design theory related to feedback and feedback's role in learning.

1.4. Contribution

This thesis' contribution will consist of the following:

- requirements specification related to , feedbk in a learning gameacavailable in section 8.2
- proposals of feedback mechanisms that would enhance a game for learning soft skills with regard to reflection and self-efficacy, presented in chapter 8

1.5. Research Questions

Based on the motivation and existing prototype, following question emerged: how can feedback in a game support learning of work-related soft skills? Given the focus on reflec-

tion and self-efficacy in acquiring soft skills, following research questions were formulated:

RQ1 What feedback mechanisms can support reflection in learning work-related soft skills?

RQ2 What feedback mechanisms can support self-efficacy in learning work-related soft skills?

RQ3 What feedback mechanisms can spark collaborative reflection in learning work-related soft skills?

1.6. Document Content

This thesis consists of following chapters:

- Chapter 1: Introduction
- Chapter 2: Existing prototype, presenting the game prototype created before the thesis was set in motion and served as a starting point for the research.
- Chapter 3: Research methodology, presenting methods and procedures practiced in order to gather, organize and analyze information relevant to the thesis.
- Chapter 4: Literature review, giving an overview of relevant work by other researchers.
- Chapter 5: Feedback in games review, presenting a selection of feedback mechanisms in both leisure and educational games.
- Chapter 6: Initial evaluation, presenting planning and results from the evaluation of the existing game prototype.
- Chapter 7: Co-design workshop, presenting planning and results from a co-design session for idea generation.
- Chapter 8: Design, detailing proposed designs of UI and feedback mechanisms based on initial evaluation and co-design workshop results.
- Chapter 9: Final evaluation, presenting planning and results from evaluation of the proposed designs.
- Chapter 10: Discussion of findings and results gathered in the master thesis, utilized methods, lessons learned throughout the process and suggestions for future work.
- Chapter 11: Conclusion summarizing significant results, effectively concluding the master thesis.

2. Existing Prototype

Before the project started, Pineleaf AS has already created a basic prototype of the game that could be installed on a mobile device. One of the first steps of the project was to become familiar with the prototype and determine possibilities for contribution. This chapter details results from this process.

2.1. Design and Gameplay

The game is inspired by a mobile game Reigns [7, 8]. It acts as a simulation of the working life from a new employee's perspective. The player being the new employee encounters work-related situations mimicking incidents that could happen in the real world. The player has to make a choice of how they react to the situation. Figure 2.1 shows what the player sees when the game starts:

- **Situation:**
  - (1) trigger of the situation (a colleague, a supervisor, a customer etc.)
  - (2) textual description
- (3) **Categories:** four icons at the top of the screen. Each represents an aspect of the working life: customer, people, work environment and economy. They act as the main feedback mechanism.
- (4) **Time measure:** shows how many days have past since you started at the new job. A day passes with each situation.

The game is played by choosing what to do in multiple situations. There are three **choice alternatives** in each situation, as presented in figure 2.2, available by swiping left, right or down. Each choice alternative results in different consequences, usually in form of a trade-off. When the player picks a choice alternative, the consequences are captured through adding or deducting points in certain categories. Figure 2.3a shows that the score is increased when the color of a category icon is changed to green. Figure 2.3b shows that the score is decreased when the color of a category icon is changed to red. Each of the categories can be clicked, presenting score and name of the category (see figure 2.3c).

Additionally, the choice alternatives can be first previewed by swiping left, right or down without releasing the touch, followed by swiping back. An option is picked by not swiping back and releasing the touch.

In this prototype, the situations are picked at random, with a chance of being presented with the same situation multiple times. Consequences of the choices affect scores in the categories only.

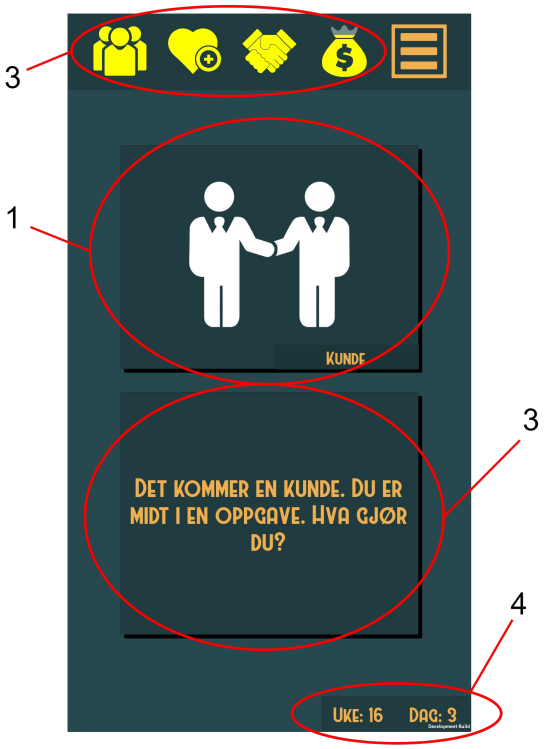


Figure 2.1.: The game

(a) Choice 1 (b) Choice 2 (c) Choice 3

Figure 2.2.: Choices in a situation

(a) Points increase

(b) Points deduction

(c) Economy category after it as been clicked

Figure 2.3.: Multiparameter - categories

2.2. Game Develompent Workshop

On 26.09.18 I participated in a workshop organized by Fredrik. The overarching goal of the workshop was to elicit the core components of the game taking into account input from different stakeholders, starting with a presentation of the current components comprising the game and the logic behind it. The participants were Andreas and Sverre Kondrad from Næringsliv AS, three representatives from Pineleaf AS, Sobah and me. In this context, the core consists of the main components of the game, that could be extended to subsequent versions of the game depending on requirements of different customers. E.g., the game would have a different version for a company customer that would use the game to support learning of soft skills by the employees, and a different version if the customer is a teacher that would like to educate the students on a specific topic. As such the core would compose of the elements that are fundamental to the game along with their fundamental properties. In the workshop, first implicit models would be agreed upon. The end-goal was to decide on the explicit model based on the implicit ones.

In the context of this thesis, there were two goals for participating in this workshop: identify what kind of feedback support exists in the game as of now, how it is supported, and what are the possibilities for feedback support in the subsequent prototypes. Figure 2.4 presents logic behind the game, including abstract components (green boxes, dashed connectors) and objects (blue and yellow boxes, solid connectors). The game consists of situations represented by Play Cards comprising relevant information, such as title, description and choice alternatives. Player's task is to select alternatives in order to accumulate points, contributing to player's score, which is used to determine next situation.

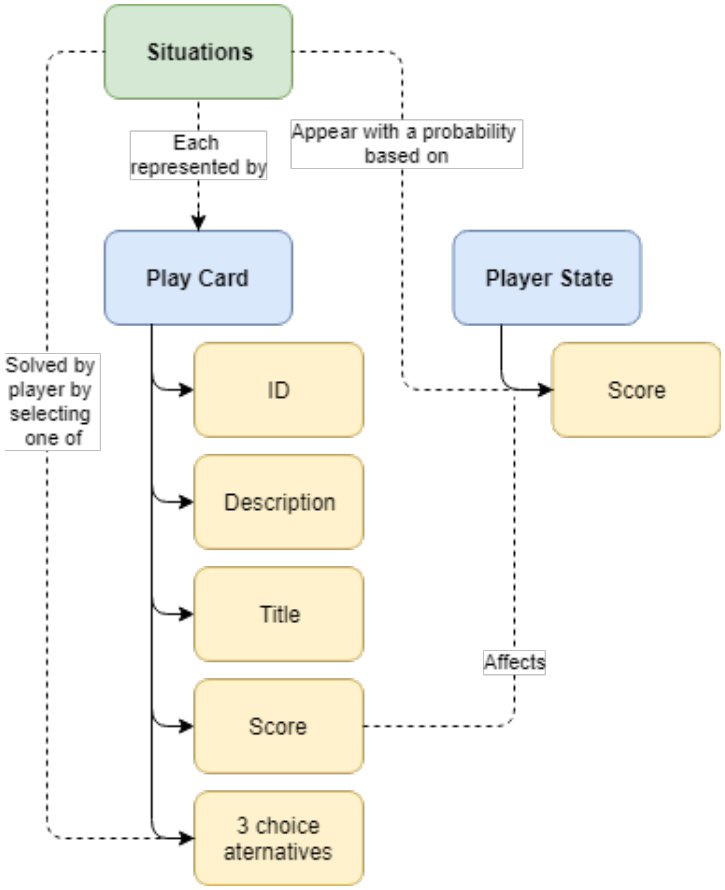


Figure 2.4.: Game Components

As figure 2.5 represents, following core entities exist in the current prototype: Game, Card Deck, Play Card, Option and Score. Game consists of multiple Card Decks, Card Deck includes multiple Play Cards and Feedback Cards, while Play Card includes three Choice alternatives.

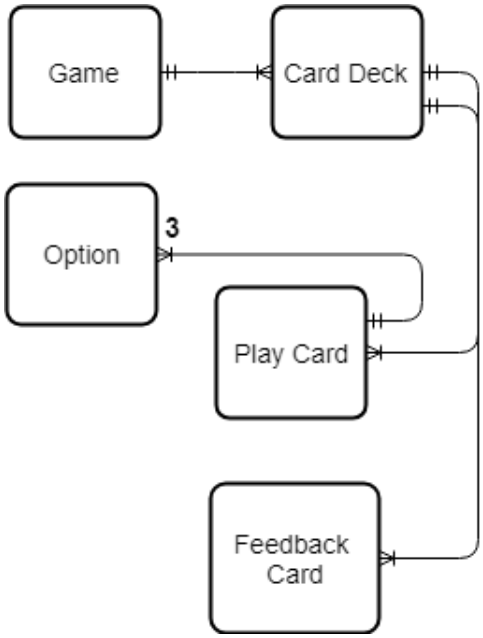


Figure 2.5.: Entities and relation in the game

2.2.1. Feedback Support

The main type of supported feedback is Score as a part of the game state. Score consists of a multiparameter score measurement in form of several categories. Each category keeps track of its score, which can be increased or decreased based on the Choice alternative selected by the player in each Play Card. Each category is divided into subcategories, not visible to the player. A choice alternative can affect the score in none or more categories. When score is affected, the player is informed through visual cues which category was affected. Score might consist of up to four categories, which might consist of total of 20 subcategories.

Feedback Card is the second component supporting feedback. It provides the player with textual feedback in a popover window. At the time of the workshop, instead of feedback the cards provided tips on how to play the game, such as swiping to see all the available options, and tips on how to interact with coworkers. The tips would show up in random intervals, after the player chooses a choice alternative. The Feedback Cards are not related to any specific Play Card or a choice taken by the player. Based on the current implementation, the frequency of appearance of Feedback Cards could be adjusted. Their content could relate to player's choices, history or score, inspiring improvement of their performance and reflection on their choices.

There exists support for implementing choice alternatives to affect relations with the character initializing the current Play Card and maximum one character mentioned in

the description. The relations would be connected to some of the subcategories. This mechanism is however not implemented in the game.

After the workshop, Andreas, Sobah and I discussed Andreas' thoughts on feedback support in the game. Andreas would like to include following types of feedback in the final version of the game:

- Score - quantitative feedback on player's performance in several categories and subcategories
- Feedback Cards - both generic and personalized textual feedback, informing player of what they are doing well in the game and what they should work on. The content can be based on several other elements in the game, such as score and choices.
- Analysis - a more detailed analysis of player's performance the player would receive outside of the game, e.g. as an e-mail or a document they could print out.
- Achievements - smaller goals not connected directly to the main goal the player would try to achieve, represented by badges. Examples include improving their score by a specific amount in a specific category in a specific amount of Play Cards in a row.

3. Research Methodology

This chapter presents research process utilized in the project, as well as details regarding strategy and data generation methods.

3.1. General Research Process

Selection of steps for the research process had its starting point in Oates' overview [79]. This overview has been modified to accommodate for additional activities involved: evaluation planning workshop, initial evaluation of the existing game prototype, game development workshop, co-design workshop, and final evaluation of the prototyped proposals. Figure 3.1 shows the final selection of activities in the modified Oates' overview. In this thesis an iterative approach was utilized. Figure 3.2 presents the complete research process.

Experiences and motivation and literature review acted as a foundation for defining research questions and the conceptual framework. I have participated in a game development workshop to determine current state of the game and feedback support. Evaluation planning workshop was conducted to decide the scope of the initial evaluation of the existing prototype. The research strategy consisted of design and creation to prototype UI and game feedback mechanism. Data the prototype was based on were generated through questionnaires, observation and focus group involving potential users and a co-design workshop. Evaluation of the prototypes generated data through questionnaires, observation and focus group as well. Contents of the questionnaires and focus group interview guides were based on discussions with Læringsliv AS and supervisors, and were rooted in relevant literature, such as heuristics for development of games for learning. Data analysis consisted of qualitative and quantitative methods.

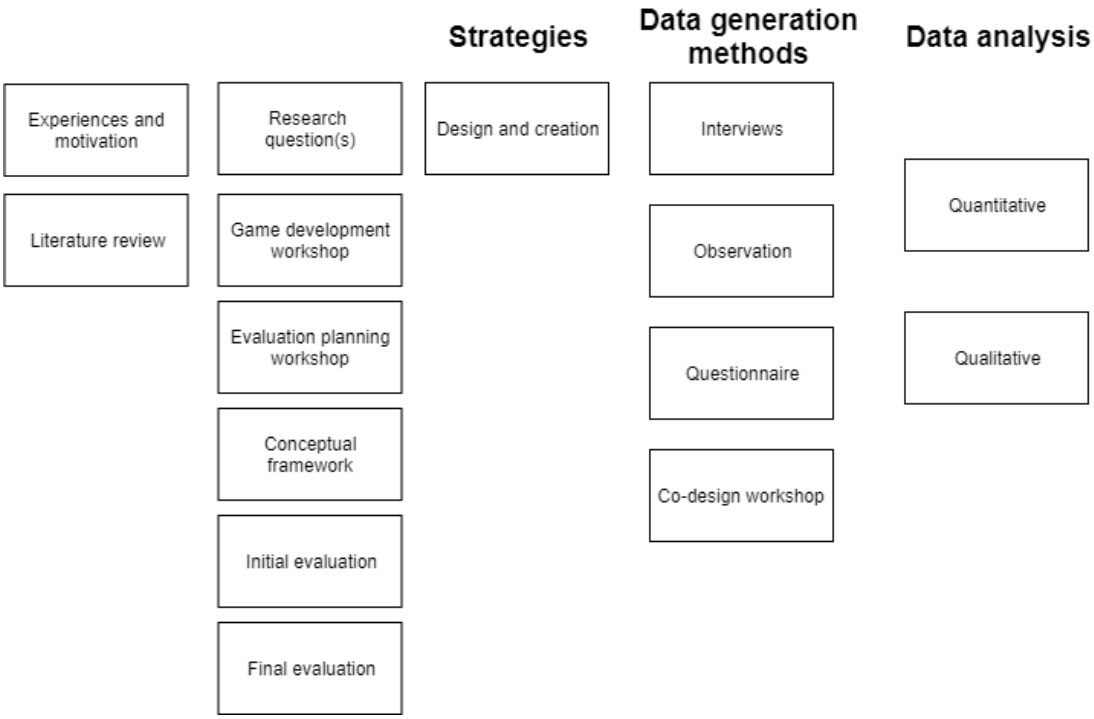


Figure 3.1.: Modified model of the research process, adapted from Oates [79]

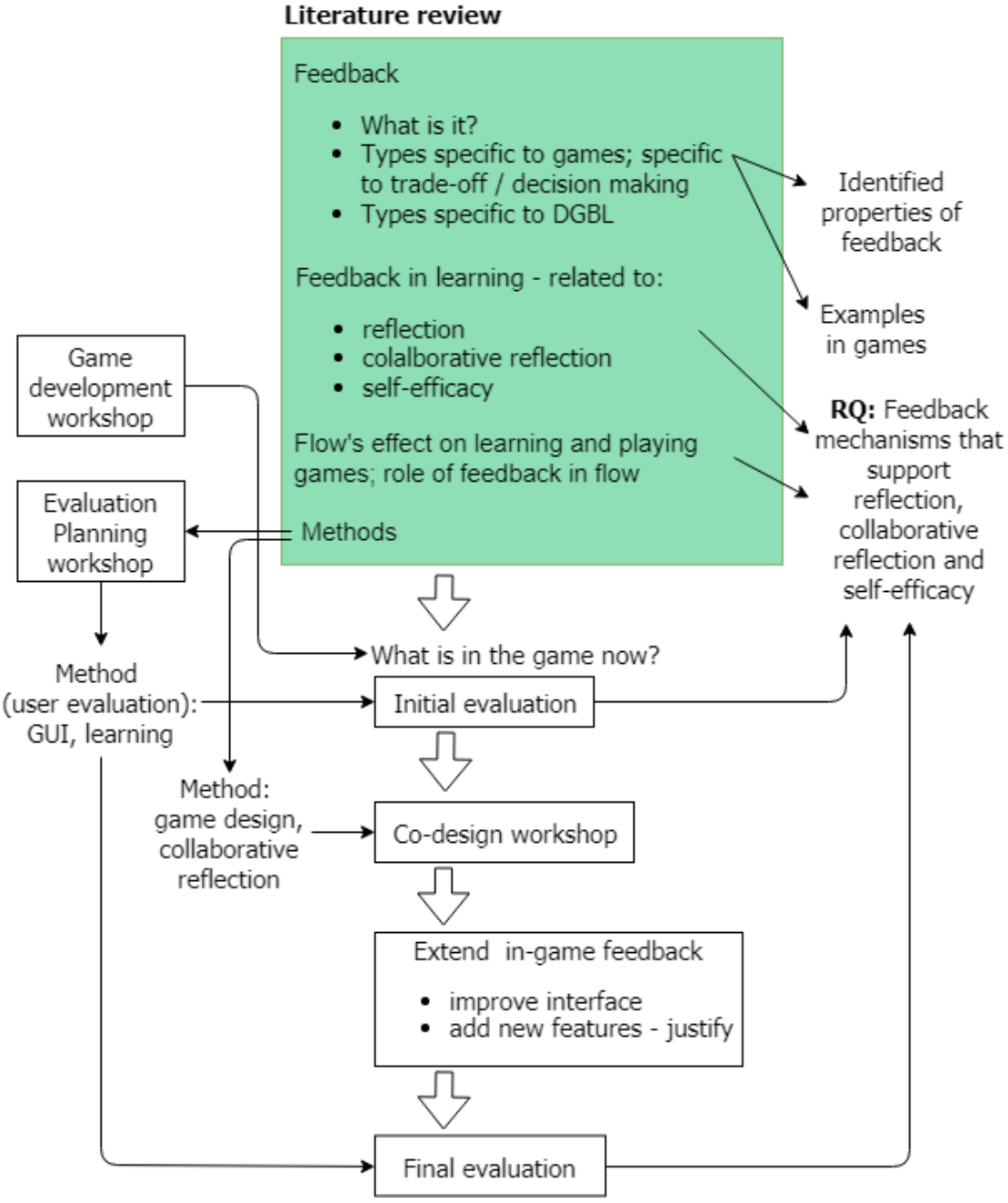


Figure 3.2.: Research process

3.2. Literature Review Method

Literature review has been conducted on following topics: heuristics related to usability, playability and educational games; feedback in design, instruction and games; technology acceptance; flow; reflection models; collaborative reflection; effect of serious games and feedback on self-efficacy; self-efficacy and reflection in a workplace; co-design and evaluation methods. Selected literature consisted of supervisor's recommendations, results from online keyword search through research catalogues such as Google Scholar and work by key researchers such as Bandura. The keywords consisted of "feedback in games", "flow", "self-efficacy in learning", "self-efficacy in a workplace", "reflection in a workplace", "feedback in instruction", among others.

3.3. Design and Creation Process

The project involved design and creation in order to propose game feedback mechanisms and UI design that would improve the existing game prototype with regard to reflection, self-efficacy and collaborative reflection. The process consisted of following steps:

- evaluation of the existing prototype
- requirements elicitation based on results
- co-design workshop for design ideas generation
- requirements expansion based on results
- design of UI improvements and feedback mechanisms based on the requirements
- creation of prototypes of UI and feedback mechanisms
- evaluation involving potential users

3.3.1. Tools

Proto.io is a prototyping tool that has been used to create prototypes based on designed UI and feedback mechanisms. Details regarding limitations are described in section 8.1.1.

3.4. Game Development Workshop

I participated in a game development workshop lead by Fredrik in order to determine what feedback support exists in the game and how it can be expanded. Objective and results of the game development workshop are included in section 2.2.

3.5. Evaluation Planning Workshop

The evaluation planning workshop was conducted in order to collaboratively decide the objective of the evaluation of the existing prototype. This was done to satisfy the needs of this thesis and Læringsliv AS. The main process consisted of three steps: heuristics elicitation, conduction of the evaluation planning workshop and heuristics refinement. Description of the process and results are included in section 6.1.

3.6. Co-design Workshop

The co-design workshop was conducted based on MyG methodology [80] described in section 4.7.3 in order to generate design ideas to aid the process of design and creation. The adapted method, including process and materials, is described in section 7.4.

3.7. Evaluations

The process included two evaluations involving potential users:

- **initial evaluation:** evaluation of the existing prototype
- **final evaluation:** evaluation of the proposed feedback mechanisms

The evaluations were composed of pre-interaction questionnaires, post-interaction questionnaires, observed interaction with prototypes and focus group. Methodology practiced in the initial evaluation is presented in section 6.3. Methodology practiced in the final evaluation is described in section 9.3.

3.8. Data Analysis

Primarily qualitative methods were used to analyse results from both evaluations. They included analysis of content and narrative in order to determine the game's effectiveness with regard to increasing self-efficacy or supporting reflection, as well as categorizing participants' tendencies linked to learning and playing styles. Questionnaire contents attempted data quantification, but due to small sample size this was a secondary purpose.

4. Literature Review

This chapter presents literature review conducted for the thesis.

4.1. Feedback

The concept of "feed back" was introduced during the industrial revolution. It consisted of information that is sent back to a system to trigger a change or a correction [22]. The idea was that the system can be controlled and adapted by feeding it the right input. The concept has spread as a correctional practice for engines. Since then, the notion of feedback has been adapted in several fields, bearing contextual differences in its definition:

- In system theory, feedback is a phenomenon where output in a system consisting of parts that affect each other is fed back into it as input, creating a loop. This input is used as a corrective element that alters the system's behavior.
- In user interface design, feedback is a mechanism that informs the user of the state or status of the system. This includes situations where immediate feedback is given as a response to user's input, resulting in a opportunity to manipulate the state of the system and discover errors. The design principle "feedback" was defined by Don Norman, stating that any user action should result in a visible reaction from the system [82]. Feedback is also a central component of "Visibility of the system status" heuristic defined by Nielsen as a part of 10 Usability Heuristics for User Interface Design [77]. its function is to keep the user informed of what is going on, as to create an environment where the user can use the provided information to achieve their goals within system's boundaries.
- In instruction, feedback is the post-response information given to a learner to communicate the quality and state of their performance and learning [76]. It has been shown to positively affect the learning process and learning outcomes.

4.1.1. Feedback in learning

In order to learn effectively one needs motivation, which is achieved with support of feedback, reflection and active engagement [34]. The role of feedback is to inform the learner of the quality of their performance and understanding and provide guidance for further work [44]. Boud, et.al. [21] argue that in order to have an effect on learning, feedback needs to completed as a cycle. When a learner is provided with information on their performance, there should be a way of assessing if the information pushed the

learner in the right direction. Without this effect, there is no feedback. Depending on the desired outcomes and the learner, there might be a need for several cycles. This process needs to be adjusted: the learning goals and number of feedback cycles have to fit in the time available before the final assessment. Feedback is usually provided in one of two forms: assessment of learning, consisting of summative feedback, and assessment for learning - formative feedback. These two types have different purpose and effect on learning. Summative feedback is given after the task is completed in its entirety, and the learner receives information on how well they performed. Such feedback does not give the learner a chance to improve, and assessment in form of a single mark or grade can negatively affect self-efficacy [46]. Formative feedback consists of information given to the learner on current state of their task, so that they can compare their progress to the desired outcome and adjust their performance accordingly [14]. Extensive reviews have shown that feedback has the most powerful effect on learning, and that giving feedback is the most powerful thing a teacher can do to affect learning. The issue lies in the quality of feedback, its structure, tone, timing, quantity and specificity. Additionally, there might be differences between teachers' and students' perception on what consists of feedback, [47] potentially resulting in misunderstandings regarding effectiveness of the feedback.

Shute has proposed a list of guidelines for providing effective formative feedback based on extensive literature review [92]. The guidelines are divided into recommendations on how to construct useful feedback, what to avoid, how to effectively use proper timing when giving feedback and what types of feedback are appropriate to distinct types of learners. Feedback should:

- focus on the task and not the learner and provide suggestions on how to improve
- be elaborated including what, how and why of the problem, with focus on facilitating learning
- be presented in an amount and structure not causing a cognitive overload. It should be divided in smaller, easy to process parts.
- be specific and create concrete connections between the goals and learner's performance
- be simple and provide just enough information to help the learner to improve
- keep both the goals and quality of the performance regarding the goal clear. It should specify what the learner needs to do to reach the goal.
- be objective and preferably computer-delivered as it is often seen as unbiased
- promote putting effort into the task to improve both learning and performance, while assuring that mistakes are a part of the process
- be provided after the learner tries to complete the task

Feedback should avoid:

- comparison between other learners
- providing an overall score if possible, as feedback consisting of only score as well as score combined with comments may reduce learning gains due to learner's focus on the score alone
- comments that focus on the learner themselves and discourage or have potential to hurt learner's self-esteem
- praise connected to the learner themselves
- being delivered orally to reduce risk of being interpreted as biased
- interruption if the learner is actively working on the task and immersed in it
- providing hints that reveal too much information and could be abused, effectively reducing learning
- being actively limited to text only
- comprehensive analysis and assumptions as they might not be accurate

Regarding timing, Shute divided feedback into two categories: immediate and delayed. Their effectiveness depends on the learning goals. According to Shute, immediate feedback should be used for difficult tasks to provide an assurance of teacher's support, and for constructing knowledge of conceptual or procedural nature. Delayed feedback is appropriate for simple tasks as to not cause irritation. It might also be more appropriate than immediate feedback for transferring of learning. Shute made also a distinction between high-achieving learners and low-achieving learners, arguing that the two types might benefit from disparate types of feedback. The recommendations are presented in table 4.1.

Table 4.1.: Recommended feedback types based on learner's characteristics

Type of learner	**Recommended feedback**
high-achieving learner	delayed feedback as they can perceive difficult task as easy ones; facilitative feedback to provide a challenge; verification feedback might be enough;
low-achieving learner	immediate feedback to provide sufficient support in the learning process; directive or corrective feedback to ease the struggle and provide explicit guidance; scaffolding; concrete, elaboration feedback to guide the learner in the right direction

Additionally, if the learner is focused on the performance itself and not the learning goal, feedback that is specific and goal-oriented is recommended. The teacher should in

this case motivate the learner to keep the learning goal in mind. Shute points also out that feedback should be reviewed from a multidimensional view, taking the situational context, learner's individual traits and instructional context into account.

In order to help with identifying issues with provided feedback, Hounsell [54] created a guidance and feedback loop presented in figure 4.1. It focuses on student's perspective, addressing issues where the feed-forward is halted and the students do not benefit from the feedback. At each step in the loop there are several elements of the process that might be lacking. For instance, the feed-forward effect might be weakened due to learner misunderstanding the guidance and focusing on less relevant aspects of the task. The model emphasizes on the connection between the assessment the learner receives after the task is completed and guidance provided at the earlier steps, clarifying expectations. A typical pitfall might be the assumption that a student that did outstanding work does not need feedback specifying what they did well. The point of the feed-forward is to assist the learner with growing and improving, meaning the feedback needs to keep the learner well informed at all steps. Hounsell also points out importance of differences in students' backgrounds and aspirations when constructing feedback.

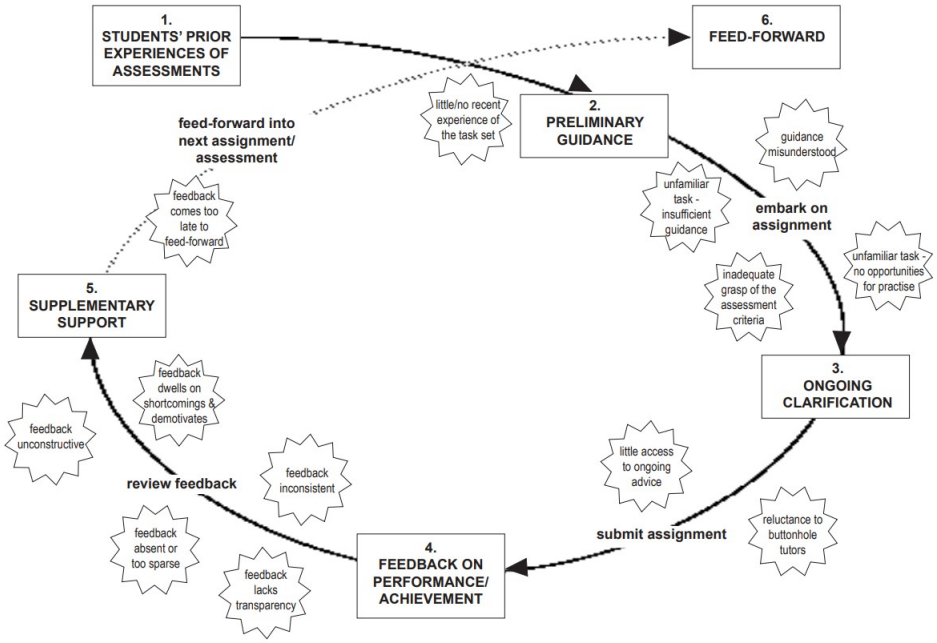


Figure 4.1.: Guidance and feedback loop by Hounsell [54]

Gibbs in his guide to assessment to support student learning [46] argues that the form of the assessment has a tremendous impact on feedback effectiveness, meaning it has to fit the learning goal. For instance, if the learner is to improve their writing, the assessment should not be in form of a design project. Additionally, quiz should be used

with caution, as there is a chance the students will resort to memorization, resulting in superficial understanding of the material. As Gibbs states, "Probably the only way to learn how to solve problems is to solve lots of problems".

4.1.2. Collaborative feedback

Collaborative feedback is an activity where feedback is provided and received in a group setting in order to improve each other's performance. In a study among first-year pre-service teachers effectiveness and perceived usefulness of collaborative feedback sessions was evaluated [31]. The feedback was linked to several skills teachers should have. It took oral and written form, and was provided by both peers and experts. 65% of participants felt the program was somewhat or very beneficial. There were mixed opinions on giving peer feedback, ranging from lacking expertise to give proper feedback to being afraid of offending or embarrassing others. Receiving feedback was described as challenging. The participants agreed they might have felt intimidated, but recognize the importance of critique in improving their skills.

4.2. Digital Game Based Learning

Digital Game Based Learning (DGBL) has been researched in several studies and games comprise several mechanisms and components that have potential to enhance learning. It has been shown that challenge in a game is a factor that has high impact on learning [13]. There is a question of how feedback can be implemented in a game to help with learning. Timely and informative feedback is beneficial both in the context of learning and engagement in a game [25]. A study has shown that implementing feedback in DGBL together with entertainment instruction might support deep learning and comprehension [90]. Mason et.al. [72] argue that there is no universal feedback type that fits all learners and learning goal in computer-based instruction. The selection should consider learner's characteristics, such as prior knowledge and achievement levels, as well as the nature of the task. These conditions can be used to determine timing and elaboration level of the most effective feedback in a specified context. These studies show that feedback in DGBL should first follow general guidelines for providing feedback, such as the list constructed by Shute, [92] and take into account individual characteristics. Games in general have the possibility to enhance feedback by utilizing the enjoyment aspect, and digital games can additionally make use of different forms of conveying the feedback, such as colors, images, animations and sound effects. Study condicted by Shih et.al. have shown that active interaction between participants, such as discussions and working towards common goal improved the learning outcomes [91]. Collaboration's effectiveness is however determined by the context and collaborative model utilized by the group. Meluso et.al. conducted a study to determine differences between collaborative and single player DGBL with regard to self-efficacy levels [74]. Results showed no significant differences between the modes, but both groups experienced an increase in self-efficacy. It is however argued that the collaborative mode could be more effective if a different collaborative model was used.

4.3. Self-efficacy

Self-efficacy is defined by Bandura [15] as one's confidence in their capacity to accomplish a goal or successfully carry out a task. It can be affected by four factors: mastery of the skill, modelling based on seeing if others are able to tackle the task, social persuasion and physiological states, such as symptoms of distress when facing a demanding situation. Mastery of the skill is perceived as having the most crucial role in this process [15]. Individuals with high self-efficacy are more likely to apply sufficient effort and accomplishing a goal given proper execution, while there is high probability that low self-efficacy individuals will terminate their efforts prematurely [96]. However, high self-efficacy can have both positive and negative effect on motivation, raging from persistence in active efforts to underestimating the task and not preparing sufficiently. Self-efficacy has nonetheless been shown to have strong positive effect on educational outcomes and performing work-related tasks, [96] as well as job satisfaction [60]. DGBL was shown to have positive effect on self-efficacy among elementary school students in mathematics course [55], and feedback on goal progress increases self-efficacy as well [17]. It is important to point out that positive feedback increases self-efficacy, while negative feedback has a decreasing effect, due to the learner not being as confident in their abilities [81]. Additionally, individuals with low self-esteem and low self-efficacy might have a skewed view on feedback, interpreting positive feedback as negative [86, 93].

4.4. Factors affecting learning in the workplace

Eraut's model of factors affecting learning in the workplace [41] presented in figure 4.2 consists of two sets of triangular dependencies: learning factors and context factors. In both, factor to the left is related to the work itself, right - to relations with others, and bottom - the employee. Learning factors comprise three elements: challenge and value of the work, feedback and support, confidence and commitment. The definition of confidence might vary depending on the perspective of an individual, but it proved to be similar to self-efficacy as proposed by Bandura [15] in most cases. Confidence benefits from tackling challenges at work, while the confidence to try and take on these challenges is build up by support. Lack of challenge and support results in reduced confidence and motivation to learn. Commitment to learning acts as complimentary factor to confidence, Feedback and value of the work is a motivational factor alongside challenge. Inadequate normative feedback might result in uncertainty revolving around career progression, which can further reduce motivation. The context factors consist of allocation and structuring of work, encounters and relationships with people at work and expectations of each person's role, performance and progress. These factors need to be considered in specific circumstances.

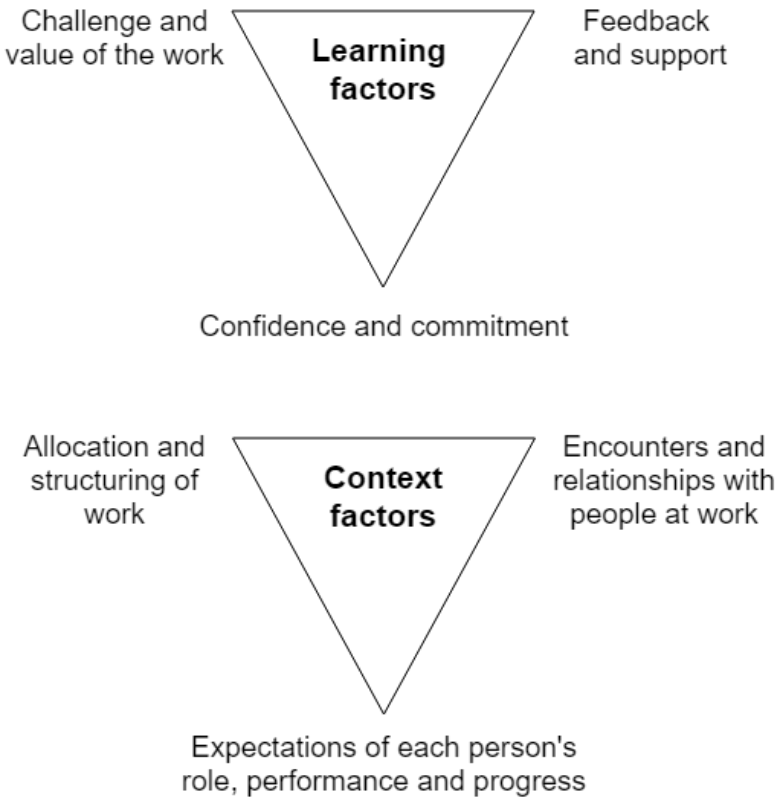


Figure 4.2.: Factors affecting learning in the workplace, adapted from [41]

4.5. Flow

Flow theory has been developed by Mihály Csíkszentmihályi [30] as one of the mental states the mind can be in, characterized by being immersed in a activity without being aware of the time passing. It is described by Csíkszentmihályi as "the holistic experience that people feel when they act with total involvement", and a vital component of enjoyment. Following list summarizes the six factors for experiencing flow:

- Concentration on the task in the present moment
- Merging of action and awareness
- A loss of reflective self-consciousness
- A sense of personal control or agency over the situation or activity
- A distortion of temporal experience, one's subjective experience of time is altered
- Experience of the activity as intrinsically rewarding, also referred to as autotelic experience

A combination of these factors constitutes of the flow experience. Flow theory and its effect on learning has been studied in several contexts, such as collaborative game-based learning [12] and live music performance [103]. In these studies there has not been found a direct positive effect of flow on learning outcomes. It has been shown that there is a link between flow and learning foreign language studies [38]. It has also been shown that flow and students' learning performance are related, [104] and that students with higher flow levels had more in-depth reflective process [53].

4.5.1. Experience Fluctuation Model

Additionally, Csíkszentmihályi defined as a linear function of skills and challenge resulting in experience of flow [30]. As the player acquires necessary skills, they need gradually more difficult challenges. Too little skill or too demanding challenge might result in anxiety. Without enough challenge an activity will be boring. This model proved however to be too simplistic. For instance, initial low challenge and low skill balance and task repetition resulted in apathy. A more detailed model, named Experience Fluctuation Model, has been since proposed [73] and its accuracy confirmed [24]. This model is presented in figure 4.3, showing various emotions that can be experienced at varying levels of challenge and skill. High challenge and high skill have the tendency to provide flow experience to the individual.

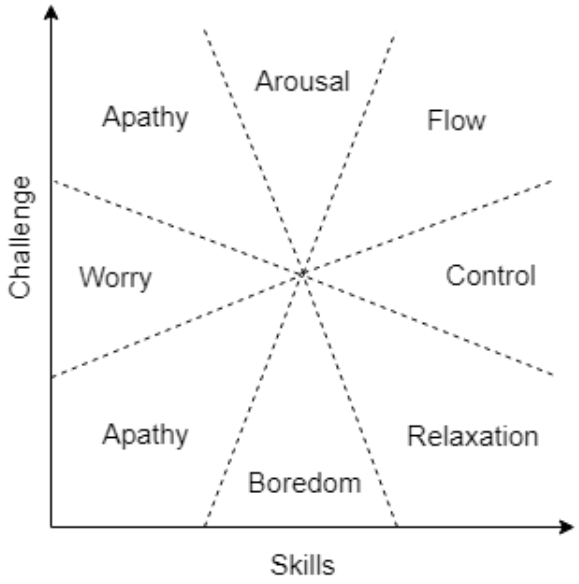


Figure 4.3.: experience fluctuation model

4.6. Reflection

Reflection is defined as ”the process of stepping back from an experience to ponder, carefully and persistently, its meaning to the self through the development of inferences" [32].

4.6.1. Kolb's cycle of experiential Learning

Experiential learning is a process where a person learns through experience. Kolb's experiential learning model (ELM) [65] outlines the process progression, where reflection is the vital component that triggers learning. Figure 4.4 summarizes its stages. First, the learner has a concrete experience with the task or activity. Then, they have a opportunity to contemplate the experience and recognize what worked and what did not work in their attempt to tackle the challenge. Further, the learner can consider how to improve and draw conclusions on what they should do to differently in their next attempt. Finally, they put their experience to practice and try to improve the results by using what they learned so far. Each attempt starts a new iteration of the learning process.

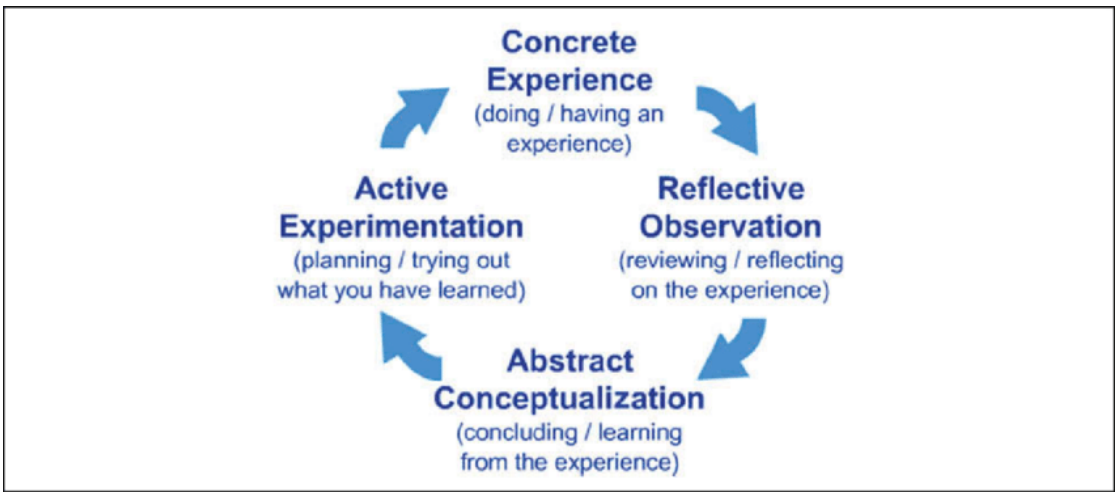


Figure 4.4.: Kolb's cycle of experiential learning

4.6.2. Rolfe's model of reflection

Rolfe's et. al. model of reflection [87] consists of three main categories of questions based on the aspect to reflect on:

- **What?**: returning to the situation and describing what happened. Questions might include: What happened? What did I do? What did I try to achieve?
- **So what?**: effort to understand the context and motivations behind the experience. Questions might include: So what did I base my actions on? So what could I have done better? So what is my view on the situation now? So what have I learned?

- **Now what?**: one considers how to improve their actions in future situations and what should be done next. Questions might include: Now what can I do? Now what do I need to do to make things better? Now what issues should I consider in order to succeed?

4.6.3. Critical Reflection

Critical reflection is a process of interpreting meaning of an experience, which serves as a base for understanding it and taking appropriate actions [75]. It requires that one challenges their presuppositions from prior experiences and established definitions and become aware of their own expectations, as opposed to reflection in general which focuses more on problem solving and lacks the aspect of questioning the settled behavioral and cognitive patterns [85]. Critical reflection is perceived as the most meaningful learning process in the adult age, as adults have already well established patterns of behavior and reasoning. Therefore critical reflection focuses on reasons behind actions and understanding them to make the perspective on the specific situations more objective despite strongly settled mindset. In this process, one systematically analyzes their actions from a critical point of view and examines what went wrong and how it could be improved.

4.6.4. Collaborative Reflection

While reflection is usually been described as an individual process, but it can act as a communication mechanism in a collaborative activity. As such, collaborative reflection is a process where a group of learners reflect together on one or more of their experiences, making experience sharing a starting point and a foundation. Collaborative reflection might be practiced in a formal or informal manner. The formal type is often practiced in the medical field in job training or at daily meetings. Examples of such activities are Exchange of Experience, where the participants in training share one experience which is discussed by the group, [101] and official meetings where physicians share their experiences in an organized manner. Reflection during meetings have been described as more structured, but lacking shared context, weakening the collaborative aspect [83]. Informal collaborative reflection has been observed to frequently occur in the medical field as well, while passing by colleagues or during lunches, breaks or any informal conversational setting where work is mentioned. Additionally, two main ways to conduct reflection were recognized: participants connect their knowledge to others' experiences, or the group gathers experiences of the participants to reflect in a collaborative manner [57]. Feedback is an important component of the reflective process, and studies have been conducted on how to implement programs stimulating and cultivating collaborative feedback and collaborative reflection [31, 71]. In Martin and Double's study the teacher participants performed peer-observations which was followed by a feedback meeting, where feedback based on observations were shared. This process was meant to result in collaborative reflection. While some participants were inspired to improve their teaching technique and pondered their habits in teaching, there are several factors that affect the process of collaborative reflection. Several participants did not feel comfortable, affecting their

ability to contribute. The staff were not used to such sessions where quality and effectiveness of their own and others' teaching practices were discussed. These results show that collaborative reflection is an activity which might require several accommodations, such as a clear process plan and opportunity to get accustomed with the process. For a joint reflection session to succeed the participants need to be comfortable and confident in their ability to contribute.

4.7. Methods

4.7.1. Heuristic Evaluation

Heuristic evaluation is one of usability inspection methods. It is conducted by an evaluator in order to discover issues with system's user interface. It is usually conducted by several evaluators, where each of them inspects the system alone and compares its elements to a list of heuristics - pre-defined design guidelines. The evaluators then aggregate the results together.

Nielsen's 10 usability heuristics [77] have been proved to serve as a solid foundation for developing an interactive interface. The heuristics are however general and need to be enhanced and possibly expanded to address challenges and differences posed by different types of interfaces, such as mobile devices, especially touch phones.
Desurvire [35] has proposed an list of heuristics for evaluation of playability of tabletop games. The list showed promise in helping with identifying issues with design, and more issues were identified through heuristics evaluation than through usability testing. The list provides a reliable basis for playability evaluation for various types of games. Notable aspects include outcome variation, presenting an interesting story to the player and importance of player's agency.

Koeffel et.al. has proposed The new list of heuristics for mobile devices has been developed based on several existing heuristics lists [48]. The study focuses on the touch phone interface and the challenges it poses. The list is extensive and takes into account different types of application. Depending on the application, many of the heuristics might not be applicable.
There has been developed a heuristics list for playability in mobile applications by Korhonen, et.al. [67] The list proved useful in identifying issues, but it has been found that playability is a difficult aspect to evaluate, and usability should be evaluated beforehand. A more focused and specific heuristics are needed to properly evaluate the learning aspect.
Ssemugabi et. al. [95] has assembled a detailed list of heuristics for a web-based learning application based on findings from several experts, and compared its effectiveness in finding issues to results from surveys with learners. The study has shown that the heuristics evaluation was a very effective and inexpensive method, given competence of the evaluators. Additionally, The study provided a solid heuristics list rooted in learning theory.

The study conducted by Herrington [52] identified design principles of incorporating mobile learning. These principles give an overview of contribution a mobile device can have in student's learning. The principles were however developed with focus on pedagogy and classroom learning. Zaibon, et. al. [105] and have created a list of guidelines for mobile game-based learning, taking into account different theories, such as behaviourism, constructivism and cognitivism. They have been implemented in a mobile learning game, and were deemed useful for future game developers for supporting learning in an application, but the usability would have to be evaluated for more accurate results. In another study [106] Zaibon et.al. created a heuristics list covering usability, mobility, playability and learning, which were tested in the same game. The results showed that creating a heursitics list for a mobile learning game is promising, but the list was vague in certain areas. For instance, the learning aspect was addressed through four simple heuristics: the content can be learned easily, the game provides learning content, the learning objective from the game is achieved and the content is understandable. Therefore the evaluation might show superficial results and provide limited insight in the quality of the learning content of a game. A more specific and comprehensive list should be created to indicate the effectiveness of the design with regard to learning.

4.7.2. Technology Acceptance Model (TAM)

According to Davis' TAM, [33] the most widely used technology acceptance model, user's acceptance - and as a result intention of use - is based on two aspects: perceived usefulness and perceived ease of use. However, this model does not take into consideration hedonic information systems, that is systems where enjoyment and leisure play a major role. These systems include games and game-based versions of more serious systems. Heijden [99] argues that this model should be enhanced by taking into account the fun aspect when determining intention to use for hedonic systems. This additional aspect, called perceived enjoyment, is affected by perceived ease of use and affects intention to use, as presented in figure 4.5). Heijden's study shows that perceived enjoyment and ease of use are stronger indicators of intention of use than perceived usefulness in hedonic systems. This enhanced model might be useful for evaluating systems following current trends of combining leisure activities with learning.

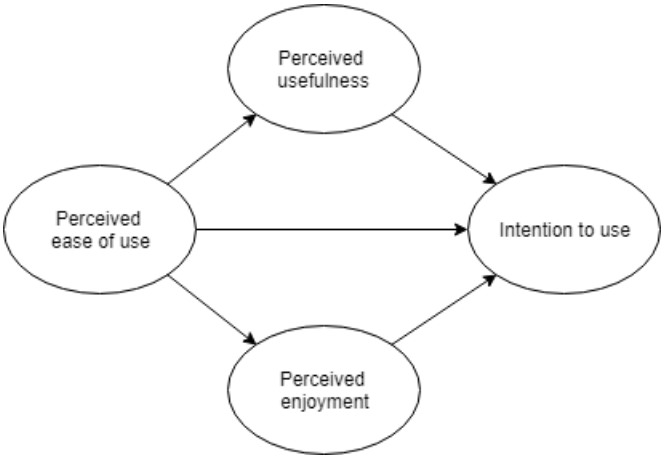


Figure 4.5.: Technology Acceptance Model including perceived enjoyment, adapted from Heijden [99]

4.7.3. MyG Methodology

MyG methodology is a co-design workshop method for enhancing an application with gamification [80]. The method involves potential users that have little to no experience with gamification, and relies on the participants to brainstorm on game ideas. The process is supported by 52 cards providing identifiers for several aspects of the final gamified solution proposal. The cards consist of the following types:

- **User Archetype:** yellow cards; recognize user type based on user's personality and its effect on behavior and decision making.
- **User Experience:** black cards; identify how much experience the user has, such as "novice" and "expert".
- **Goal:** green cards; define the goal set to achieve by the user.
- **Motivation:** red cards; identify the underlying motivation affecting their decision making.
- **Social Mechanic:** orange cards; represent the social
- **Game Mechanic:** dark blue cards; consist of elements that would gamify an application.
- **Game Pattern:** blue cards; represent more complex game mechanics that might be composed of two or more regular game mechanics.

The method consists of three steps:

- **Setting the context.** The method is meant to gather ideas from non-experts. As a result it is required that the context is explained to the participants and that examples of gamified solutions are provided.

- **MyG process.** The main process consists of gamestorming - brainstorming ideas for gamification.
- **Crowning of best gamified solution.** The workshop is organized as a competition between several groups that design the gamification proposals. The proposals are ranked based on participants' voting results.

Each participating group has a size of 4-6 and is assisted by a facilitator making sure they are focus on the task and understand it.

5. Feedback in Games Review

There exist several established mechanisms and theoretical approaches to feedback in games. This chapter presents an overview of how feedback is used in games, including games for increasing soft skills, and demonstrates relevant examples.

5.1. Positive and Negative Feedback

In game design theory, a vital dynamic is a feedback loop. It is based on the same concept as feedback in general, consisting three main components: one that oversees the state of the game, one that determines if changes to the state should be made, and one that carries out the changes [94]. A game can have multiple loops that control game's actions based on player's input. Feedback loops are designed based on two main types of feedback: positive and negative. Positive feedback consists of a situation when the output is fed back to the system and then magnified in some manner [11]. In games, a typical use is to create a progression where achieving one goal makes the next one easier. Positive feedback needs to be balanced, as to provide sufficient challenge, but not make the game too hard. A usual issue when designing positive feedback in multiplayer games is to strike a balance between game's fairness, length and possibility to win. If the game rewards too much, the first player to gain any advantage is guaranteed to win. If too little, nobody can win. The positive feedback should also not be invoked too early to prevent the game from being won too fast.

A typical example of a game relying on positive feedback is a single-player RPG, such as Diablo III: Reaper of Souls. The player starts off with no valuable items or skills. As they kill more monsters and gain experience (marked (1) in figure 5.1) they are able to use better skills (2) and find and equip better items (3), which makes it easier to kill monsters. Thus a loop is created, so that the game scales potentially indefinitely, and the player never actually finishes the game. Positive feedback can also be used to amplify negative effects. An example of such a game is Dark Souls series. In the game, the player combats several bosses that are difficult to defeat and require advanced skills. The combat mechanics are designed in such a way that the player is often immediately punished for their mistakes. E.g., if the player does not dodge boss' attack effectively, not only do they receive damage from the enemy, which might be substantial, but they also cannot land an attack themselves before the boss attacks for the second time. Due to the game relying on unforgivingness to create challenge, positive feedback amplifying negative effects plays a major role in its combat mechanics.

Figure 5.1.: Diablo III: Reaper of Souls interface [1]

An example of genre that might incorporate no positive feedback is race games. If one leads significantly it does not become easier to beat rivals, as the player has to maintain their lead all the same.

The second type of a feedback loop, negative feedback, occurs when the game adjusts its state in order to balance the challenge, depending on circumstances. A typical scenario is used in multiplayer games, such as race games - when one player is leading, they are provided with additional challenges, or the game can change the dynamic so that other players might have an easier time trying to catch up. For example, in Mario Cart series (figure 5.2) players receive items throughout the race to make it more interesting, by helping themselves or creating obstacles for others. Figure 5.2 shows an example of using an item in Mario Kart Double Dash!!: one of the players is throwing an item called Green Shell that makes another player crash. During the race, the losing player will receive better items to give them a chance for better performance. One of the losing players will also receive a Spiny Shell item. When activated, it searches for the leading player and makes them crash with little chance to avoid it, making it the most powerful item in the game [10]. This is a typical use of negative feedback as an effort to balance the chances of winning among players with varying skill levels.

Figure 5.2.: Mario Kart Double Dash!! [5]

5.2. Juicy Feedback

Hunicke [56] suggests that game designers should strive for implementing feedback that is "juicy". In game design jargon it means feedback that is engaging, exciting and effective, as opposite to being uninspired and predictable. Hunicke argues that even if the game has no clear goal or has simple mechanics, the feedback can be elaborated, creative and a part of the environment, making the game fun. She identifies following properties of juicy feedback:

- Tactile: feedback is a natural part of the game that feels organic.
- Inviting: feedback should make the player eager to accomplish more in the game
- Repeatable: feedback can be provided each time the player interacts with the game.
- Coherent: feedback should be contained within the game, in harmony with the story and environment.
- Emergent: feedback should be revealed in a timely and organic manner, without creating a distraction.

- Balanced: the player cannot be overwhelmed be the feedback, it should come in right amount and when the player expects it, so that they can act based on it.
- Fresh: feedback should include an element of surprise, as to prevent the game from seeming dull and keep it interesting. It should fit in the context and environment of the game.

Hunicke presented a prototype of a game that incorporates juicy feedback, called Wildflowers. The player holds one button and tilts the game controller in order to move through the environment. The movement invokes feedback from the environment, such as waving grass, mountains moving from player's path and intense variation in the music. The purpose of the game is to provide a profound experience created through the feedback mechanisms.

5.3. Score

Score is one of the fundamental game attributes serving as measurement of player's progression. It is usually presented as a number of obtained points. The scoring system can be visible or not. A visible scoring system acts as a goal for the player, a graphical effect and representation of status. This combination, especially the goal aspect, support enjoyable user experience [70]. Highly perceivable scoring systems, where the player is well aware that the system exists, are usually used in games requiring decision making strategy. In this context, the score is usually highly visible and consists of measurable values. If the scoring system is designed in a way that allows personal achievement, it increases the challenge, resulting in higher level of engagement [27].

In-game score is a feedback mechanism that has a potential to support learning. With regard to serious games, a study has found that the score a learner achieves correlates with results from a traditional test, meaning in-game scores can be used to assess learning [51]. In a game where the player evaluates resumes it has been shown that reward-only scoring was more effective than reward/punishment scoring with regard to skill improvement among entry level HR employees [49]. However, in a similar study where participants were offered monetary compensation per reviewed resume instead of in-game points, both positive and mixed incentives yielded improving results in comparison with no incentive, while negative incentive introduced merely a small improvement [50]. This shows that there might be significant differences in user's perception of an in-game feedback compared to real life consequences. Closing this gap by connecting game outcomes to real world might yield interesting results.

Score might also be used in multiplayer context as grounds for competition. In a study conducted by Charles et. al. [26] several higher education students played a game where the points were issued in multiple categories, such as attendance and using discussion boards. Points in certain categories were hidden, and a total sum was calculated for each week. The students had mixed reactions to the competitive aspect of the feedback.

Some felt that they were motivated by comparing their score to other students', while others felt discouraged. The aspect of transitioning from high school to university among 1. year students was perceived as a fitting context for game-based feedback, as it has potential to help with forming new positive habits and build foundation for the learning process in a new environment.

5.4. Multiparameter

Multiparameter is a game feedback mechanism where the status is divided into multiple parameters, often represented in form of multiple categories. The objective may vary, but usually the player needs to keep the various categories at balance, e.g. have at least a certain amount of points in each category or maintain scores in each category in a certain range. The multiparameter may represent multiple score counters keeping track of the performance in separated aspects, as opposed to having a single score counter summarizing the performance. The scores may however count toward a final total score.

An example of a game utilizing a multiparameter score is Reigns. The player acts as a monarch and their objective is to reign for as long as possible. The player is presented with a series of choices that affect the further gameplay. Figure 5.4 presents the choice alternatives. The score consists of four categories: church, people, army and treasury. They represent factions that might have an impact on game outcomes. The player needs to keep the scores in the categories in balance in order to survive. Each choice might be considered greatly unbeneficial by one of the factions, resulting in low score in a category, leading to a sudden death of the player. This approach forces the player to consider possible side effects and try to foresee the unforeseen. As seen in figure 5.3, the user might preview each choice alternative. Each fraction affected by the choice will have a dot over it. Size of the dot indicates how serious the consequences will be. However, the indicator does not disclose if the consequences will be positive or negative.

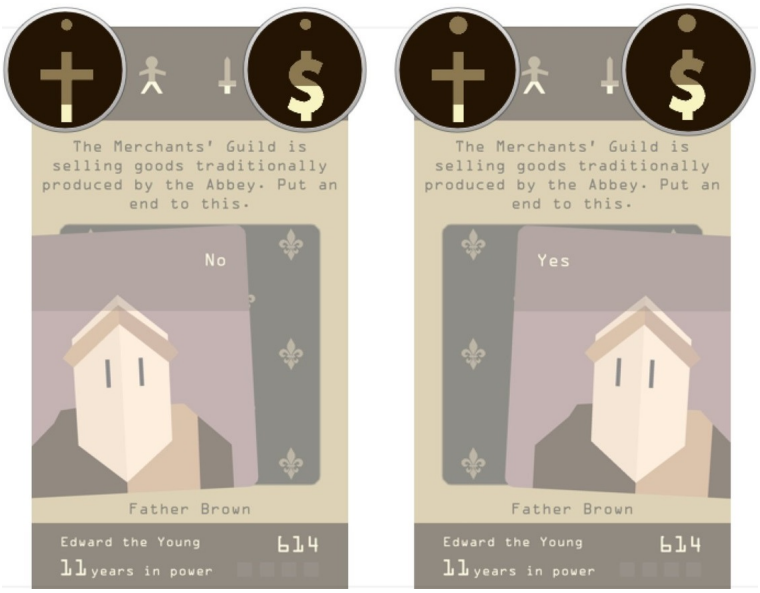


Figure 5.3.: Reigns: indicator of impact on categories [69]

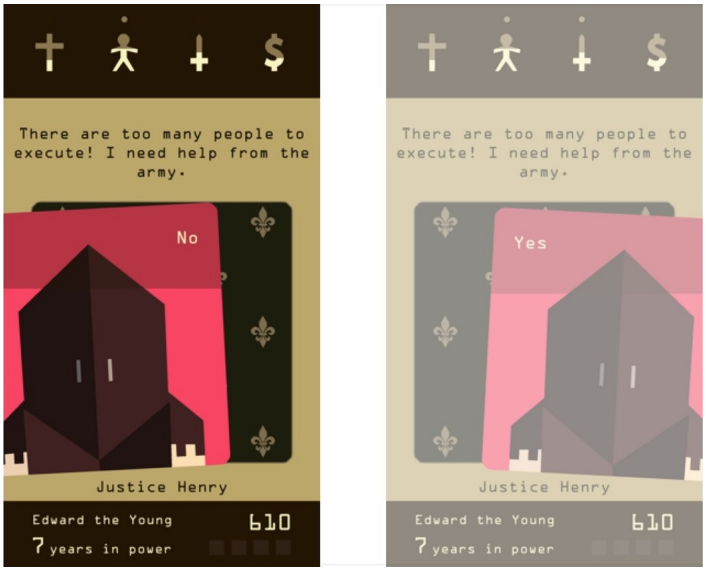


Figure 5.4.: Reigns: Choice alternatives [69]

Another feedback mechanism in the game is the last situation presented to the player before their death. An example is presented in figure 5.5. A general informs the player that he kingdom is ruined, and other fractions own it. It is up to the player to connect this state to the score, in this case the treasury being empty. The reason for loosing the game is presented in this last dialogue, where both choice alternatives are the same, effectively concluding the game session. This information is meant to be used by the

player to make sure they do not make the same mistake the next time they play the game.

Figure 5.5.: Reigns: last choice [69]

Multiple parameters can also be used to represent needs that have to be satisfied in the game, rather than acting as a score that measures player's performance. Such a game is Don't Starve, a survival game where the player has to gather food, build structures and fight off monsters in order to stay alive. The parameters in the game consist of health, sanity and hunger, as presented in figure 5.6. Health is the only parameter that makes the player die and loose the game when it goes down to zero points. Decreasing sanity makes the game harder - the player begins to hear eerie sounds and has to fight off creatures that gradually start to appear. The creatures can however drop valuable items, making the low-sanity state potentially beneficial. When hunger reaches zero points, the player starts to slowly loose health. The player might take different actions to improve the state of each parameter: eat something to improve hunger, use a healing salve to improve health and interact with friendly creatures to improve sanity. The player is informed of changes in these parameters through sound cues, temporal color cue of the icon and filling level of the icon. If the effect is applied over time instead of instantly, such as standing close to the source, an arrow will appear to indicate the effect. This approach presents the status of the game to the player based on their actions and game's responses, while not assessing their performance. The game recognizes that the main goal is to survive as long as possible, and makes it clear that it is not wrong or right to have low levels of different parameters. Sometimes the player has to commit immediate sacrifices in order to benefit in the long run.

Figure 5.6.: Don't starve: status [40]

Multiple scoring categories are typically used in fantasy sports such as fantasy basketball. In fantasy sports, the players build their virtual teams consisting of digitized real-life players and their real life performances. Together the players decide in which categories the results will be assessed in the league, such as number of assists or blocks [29]. There are several scoring formats, and one of them is point based. In this format each statistic is awarded points in the respective category, e.g. an assist would reward the team with 3 points in assists category. At the end of the season the team ranking can be sorted based on each category, while the individual scores count towards the total score which determines the winner. Figure 5.7 shows an example of a score table.

POINTS STANDINGS										
		SEASON STATS					FANTASY PTS			
RNK	TEAM	CPTS	WIN	POLE	TOP5	TOP10	WIN	LEDMOST	TOTAL PTS	POINTS CHG
1	Go Speed Racers	16745	12	12	33	52	60	80	16689	+427
2	Chicago Burn	16121	8	11	27	49	40	75	16236	+410
3	Bellevue Speed	15744	6	5	34	40	35	70	15849	+447
4	Mercer Island GO!	15315	5	4	30	41	25	35	15390	+381
5	Faster! Faster!	13645	3	3	27	40	15	55	13685	+400
6	MSFT to 40!	11054	2	1	27	39	15	40	12685	+294

Figure 5.7.: Fantasy basketball - score table example [9]

5.5. Game for Training Soft Skills

Enact Game is a serious game for training and assessment of negotiation skills [3]. In the game, the player interacts with a AI-controlled agent in several short scenarios, invoking

their negotiation skills. Figure 5.8 shows a screenshot from the game. The game differentiates between an assessment session, where the player is presented with a summary of their performance when the scenario ends, and a training session, where scenarios are acted out in different contexts. Both verbal and nonverbal cues are tracked in the game [4]. It has been used in a course at the University of Naples Federico II teaching effective negotiation and communication [37].

The game provides summative feedback at the end of an assessment session. The assessment consists of an overview of player's negotiation skills that are calculated by AI based on Rahim Organizational Conflict Inventory-II test. Specifically, the player is informed which negotiation style they practiced at each step in the session, which can be one of the following: integrating, obliging, avoiding, compromising or dominating. An example is presented in figure 5.9a. The player also receives feedback on their final decision in the negotiation, see figure 5.9b, including which style was used, what the consequences were and if it was fitting in the given scenario. The player can also read a bit more about each style, as presented in figure 5.10, to better understand what their choices tell about their style and values.

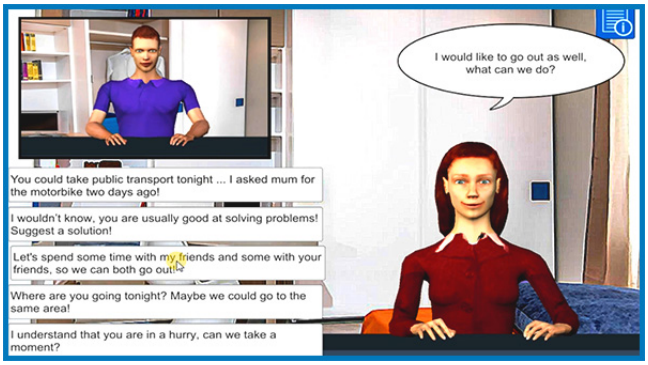


Figure 5.8.: Enact Game: screenshot [3]

(a) Assessment: step by step (b) Assessment: feedback on final decision

Figure 5.9.: Enact Game - feedback

Figure 5.10.: Additional info

5.6. Trade-off

Trade-off mechanic occurs when player's choices result in a trade-off: there is a certain gain and a certain loss involved within game's boundaries. It provokes the player to make conscious decisions and develop strategies in order to achieve their goals. Trade-offs can be presented to the player in various ways, such as points being both docked and received

or varying changes in relationships with in-game characters.

The simulation board game "Tradeoff!" was designed to teach about ecosystem services and consequences of our choices on the environment, especially when compromising between generating revenue and preserving nature, through ecosystem management [102]. Main feedback mechanism in the game is a score based on choices made in the game. The player can loose or gain points, depending on several aspects of their decision. The goal of this mechanism is to present consequences to the player, so that they can analyze them and learn to reasonably utilize ecosystem services. An automated downloadable calculator [84] presented in figure 5.11 is also provided, so that the player can get an instant overview of the results. The player can enter data from their gameplay, such as placement of hotels and protected areas, in order to compute their score. The paper suggests that the calculator provides more rapid feedback to players that are interested in seeing immediate results from their strategies.

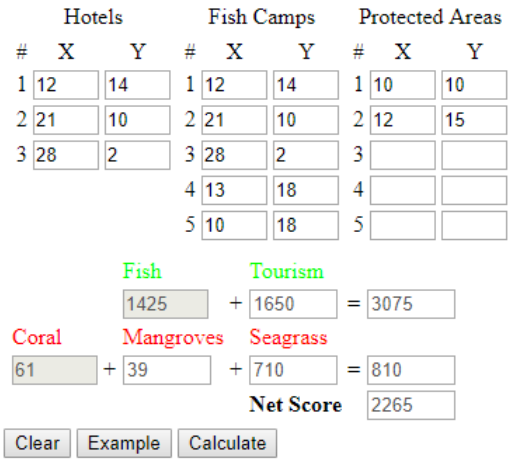


Figure 5.11.: Tradeoff! Online Calculator. Retrieved from Natural Capital Project's sites [84]

Testing revealed that complex rules might seem intimidating to the players. It was concluded that the game needs to be simple and not seem to require prior advanced knowledge or skills. The learning goals were limited to a few main points, making the game more focused. It was also found that setting the game in a real place that at the same time resembles a paradise was engaging to the players, while helping them with contextualizing their activities. This was however not true for scientists with vast knowledge on the topic. It seems the audience for the game should be defined more precisely to address more specific needs and traits of the users. The study also concluded that the game should be designed to deliver an optimized game flow. Dividing up the gameplay and providing a concise set of rules for each stage helped the players with easily picking

up the game. The players were presented with varying activities and the information was revealed gradually based on what is needed at the time, which gave an opportunity with experimenting with different strategies and kept the outcomes uncertain. As stated in the paper, this change appeared to enhance learning of basic concepts, but this has not been confirmed. Feedback from participants suggests that clear and well defined rules, improved layout and an online calculator automatically computing the score improved the enjoyment and made the game more fitting with regard to learning goals.

It was also showed that players were building on their prior knowledge and experience, and utilizing the same setting was not beneficial to all players equally. E.g., players from land-locked countries had trouble with relating to marine-ecosystem management, and it was not of use to researcher players who focused their studies on other types of ecosystems. It was therefore concluded that the game should take into account differences in implicit knowledge and incorporate it in the learning process.

6. Initial Evaluation

This chapter details the planning process preceding the initial evaluation, which was conducted in order to determine the state of the existing prototype, as well as results and elicited requirements.

6.1. Evaluation Planning Process

After discussions with the supervisor, it was decided that a heuristics list would be a tool that would guide both planning of the evaluation and game design process later on. This list should be further refined through a discussion with other actors. This process consisted of the following steps:

- Initial heuristics elicitation - basis for the evaluation
- Evaluation planning workshop - discussion on what aspects of the game should be evaluated
- Heuristics refinement - creation of an updated heuristics list

6.1.1. Initial Heuristics Elicitation

It was concluded in collaboration with the supervisor that a heuristics list would be a useful tool guiding several aspects of the game design, such as player engagement and learning, and serve as a basis for a potential evaluation questionnaire. The initial heuristics elicitation followed steps presented in *Heuristic Evaluation on Mobile Interfaces: A New Checklist* [48]. To cover different usability aspects and take into account a touch mobile interface, the list was assembled based on the relevant literature, such as Nielsen [77], Desurvire [35] and Zaibon, et .al. [105]. The heuristics were divided into three categories: usability, playability and learning. The list is rather generic so that it takes into account multiple aspects and types of learning, namely behavioral, constructive and instructional, and interaction with a mobile learning game. It was done to capture the big picture of what aspects of the system can be evaluated in this project. The list was later narrowed down to the aspect or aspects the customer deems as most relevant based on the project's scope. The initial heuristics list is available in appendix A.1.

6.1.2. Evaluation Planning Workshop

In this step the initial heuristics discussed in section 6.1.1 were revisited. The goal was to collaborate with actors from Læringsliv AS in order to select heuristics that would

be relevant to the first iteration of the evaluation of the game, refine the selection and eventually discard heuristics that are out of scope. The workshop was conducted in two sessions due to time constraints. The first session took place on 12.09.18, where Sobah, Andreas and Sverre Kondrad were present. As we did not manage to finish the workshop in time, the second session was conducted on 19.09.18 with Andreas.

During the workshop we reviewed the initial heuristics list and discussed which categories and specific heuristics would be of interest in the first evaluation, which ones would be relevant later in the process and which ones should be excluded. Company representatives' input was the primary basis for the decisions to satisfy their needs in the context of product's success. Section B.1 documents the results from the workshop, including reasoning behind the selection and other details. The heuristics that were deemed relevant to the first evaluation are: visibility of system status, connection to the real world, (re)creating an experience, character development, feedback, context, objective. Heuristics relevant to subsequent evaluation include: cognitive load, error prevention, winnability, winning strategy, outcome variation, learning curve, mistakes, failure points, control, practice, motivation and creativity. This list acts as a basis for the refined version of heuristics relevant specifically to the game.

6.1.3. Heuristics Refinement

Based on results from 6.1, a new heuristics list was created comprising of aspects deemed most relevant. The refined heuristics are more specific to the game that would be evaluated. The list has been used to plan the evaluation involving potential users. The list can be seen in 6.1.

Table 6.1.: Refined heuristics list

Category	**Heuristics**	**References**

Status and feedback	• The player should be aware of received and docked points in each category. • The player should always be aware of their current score. • The player should be aware of the available choices. • The player should receive meaningful feedback on each of their choices. • The player should be aware of and understand the trade-offs of their choices. • The player should be informed of the in-game consequences of their choices. • The player should be informed which categories they should work more on, why and how. • The player should receive qualitative feedback on their progress in the game. • Feedback should be provided when it is apparent the player does not consider all the options.	Nielsen, 1994 [77]; Desurvire, 2004 [35]; Zaibon & Shiratuddin 2010 [106]; Sssemugabi, 2007 [95]

Connection to the real world and context	• Language should be recognizable to the user and should match language used in the real world situations. • Icons should be connected to real world conventions and it should be clear what they symbolize. • Situations should be realistic and provide a contextualized challenge. • Situations should be interesting and captivating. • Situations' content and order should create a continuity mimicking the real world. • Skills, experience and knowledge gained in the game should be transferable to the real world context. • Characters introduced in the game should be realistic, distinguishable and relatable. • The characters should develop throughout the game based on player's decisions. • The in-game consequences should mimic the real world consequences to immerse the player in the game.	Nielsen, 1994; Desurvire, 2004; Ssemugabi, 2007

Outcomes	• The player should be able to review their past decisions and motivations. • The player should be able to analyze the in-game situation while it is happening. • The player should be able to connect their in-game choices to score changes. • The player should be able to identify positive and negative results of in-game choices. • The player should be able to define outcomes they are trying to achieve for each in-game situation. • The player should be able to draw conclusions from the score changes. • The player should be able to try to improve their score based on previous score changes. • The player should have a possibility to take alternative courses of action and test different strategies based on previous score changes. • The player should be able to see results of different strategies. • The choice consequences should be fair, meaningful and motivate to improving the score.	Kolb, 1984 [65]; Gibbs, 1988 [45]; Rolfe, 2001 [87]; Desurvire, 2004 [35]
Practice	• The player should come across similar situations more than once. • The difficulty of the situations should increase as the player progresses through the game. • The player should get a chance to interact more often with the types of situations where they can practice skill they need to improve.	Zaibon & Shiratuddin, 2010

6.1.4. Other Aspects

Usability Testing

Usability testing is a usability evaluation method that involves real users, where they interact with the UI to complete tasks during a testing session. As it was vital to determine if the participants were affected by the UI or other aspects of the game, usability was included as a part of the evaluation. Guidelines were constructed for participants' interaction with the game and the simultaneous observation. They were based on usability testing guidelines established by Nielsen Norman Group [42]. The final guidelines are available in appendix B.6.

Technology Acceptance Model

In addition to aspects presented in table 6.1 the supervisor recommended evaluation of intention to use based on TAM described in section 4.7.2.

Diversity Icebreaker Theory

Based on recommendation from the co-supervisor, Diversity Icebreaker (DI) theory was used to determine participants' preferences for interaction, communication and problem-solving [2]. DI is a psychological questionnaire, where results place the participant in one of three groups: blue (focus on task through logical perspective), green (focus on ideas, vision and changes) and red (focus on relations and social perspective). [39] The results are used for different purposes, such as improvement of collaboration at work [23] or awareness of group dynamics [88].

6.2. Prototype

The prototype used in this evaluation was presented in chapter 2.

6.3. Evaluation Design

The evaluation consisted of four elements: pre-interaction questionnaire, interaction, post-interaction questionnaire and a focus group. It was structured as presented in figure 6.1. At the beginning of the evaluation the participants would fill out a pre-evaluation questionnaire. Then they would interact with the game, where the interaction would be observed. The post evaluation consisted of a questionnaire and a focus group.

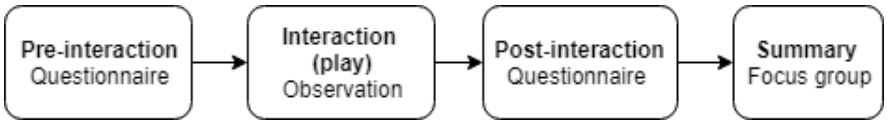


Figure 6.1.: Evaluation Structure

6.3.1. Questionnaire

The questionnaire used Likert scale for the most part, where the steps were translated to following values: 1 - strongly disagree, 5 - strongly agree. Statements and questions referred to in this section are available in appendix B.2 and B.4. Overview of the questionnaires contents is presented in figure 6.2. Data collected through the pre-questionnaire include demographic information, work experience, usage of mobile games and learning applications and their preferences based on DI theory. For the purpose of this study the participants were asked directly about their focus to understand how they self-identify and observe correlations connected to playing styles. In the post-questionnaire the users were asked questions about their general impression of the game, usability, intention to use, realism and game's influence on their reflection. The overlapping questions of the questionnaires will collect answers both before and after the interaction, This was done to establish changes in participant's general soft skills and self-efficacy of soft skills in a work environment based on the interaction with the game.

Figure 6.2.: Contents of the questionnaires

Self-efficacy scale [89] has been developed and used in various research as means of measuring one's self-efficacy. Bandura points out however that general self-efficacy cannot be measured, as each individual has different perceptions of their abilities in different contexts [16]. Questions should be therefore tailored to the specific context as to determine one's self-efficacy with regard to a task, goal or situation for accurate measurement. karierreStart.no lists following examples of soft skills as important for a potential employer: [61] collaboration skills, self-motivation, integrity, honesty, positive attitude, emotional intelligence and work ethic. Self-efficacy regarding these qualities based on self-efficacy scale was measured in the pre-questionnaire (Q16-Q17, Q19-Q22, Q24-Q26)

and the post-questionnaire (Q60-Q61, Q63-Q66, Q68-Q70). Statements regarding self-efficacy alternated with statements related to general aspects of soft skills.

Technology Acceptance Model was used to determine intention to use the game by the participants. Figure 6.3 presents the TAM model and how the following questions and statements were used:

- **Q1:** The game was easy to use.
- **Q2:** The game was not mentally demanding.
- **Q3:** By playing the game I improved my soft skills.
- **Q4:** I intend to play the game it it is ever published.
- **Q5:** How fun was the game? (1 - boring, 10 - fun)
- **Q7:** How exciting was the game? (1 - uninteresting, 10 - exciting)
- **Q6:** Was the game uncomfortable? (1 - uncomfortable, 10 - comfortable)

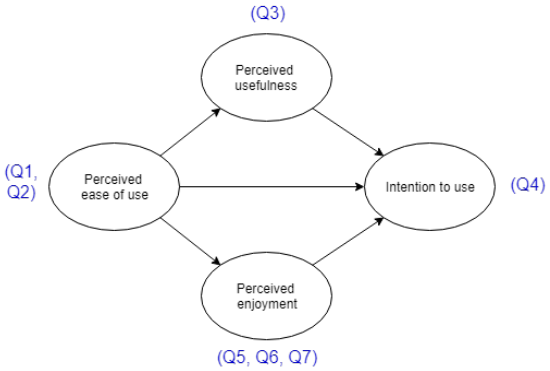


Figure 6.3.: TAM template

Based on table 6.1, following aspects were evaluated: usability in general and related to categories (Q8-Q19, Q32-Q39) and realism (Q47-Q58). Statements related to reflection, Q20-Q25 and Q27-Q28 were based on reflection models described in sections 4.6.1 and 4.6.2. Q26 is related to critical reflection as described in section 4.6.3. Additionally, the participants were asked about what part of the game was determining for their gain from the game (Q30-Q31), categories as a feedback mechanism related to soft skills (Q40-Q46) and their opinions on multiparameter category system compared to a single counter (Q71-Q74).

6.3.2. Interaction with the Game

The interaction with the game and observation were based on guidelines for usability testing. The used guidelines are summarized in appendix B.6. The participants were playing the game freely as they would if they picked it up by themselves, without being provided with a task list.

6.3.3. Focus Group Interview

The focus group interview has been conducted at the end of the session in order to extract attitudes, ideas and perceptions about the game, with focus on the categories, feedback and realism. This method served as means to further clarify and understand findings from the questionnaires and observations [100]. I acted as both moderator and secretary for the interview. The developed interview guide is available in appendix B.7.

6.4. Evaluation Plan

The plan for the evaluation is presented in table 6.2.

Table 6.2.: Evaluation plan

Activity	**Duration**
Introduction	5min
Pre-questionnaire	$\sim$ 10min
Interaction with the game	20min
Post-questionnaire	$\sim$ 15min
Focus group	30min

6.5. Participants

There were seven participants in the study, two female and five male. Six participants were fifth year students (corresponding to second year of a master's degree) and one was in their fourth year (first year of a master's degree). Due to limited amount of mobile devices available for the evaluation, the evaluation was conducted in two separated sessions. There were three participants present at the first session and four at the second.

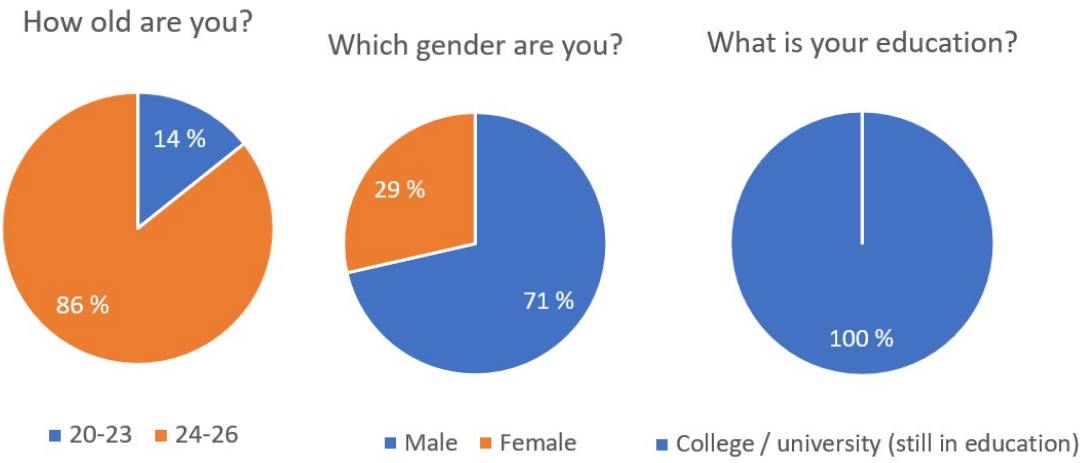
6.6. Findings

This section details result from the conducted evaluation sessions.

6.6.1. Pre-questionnaire

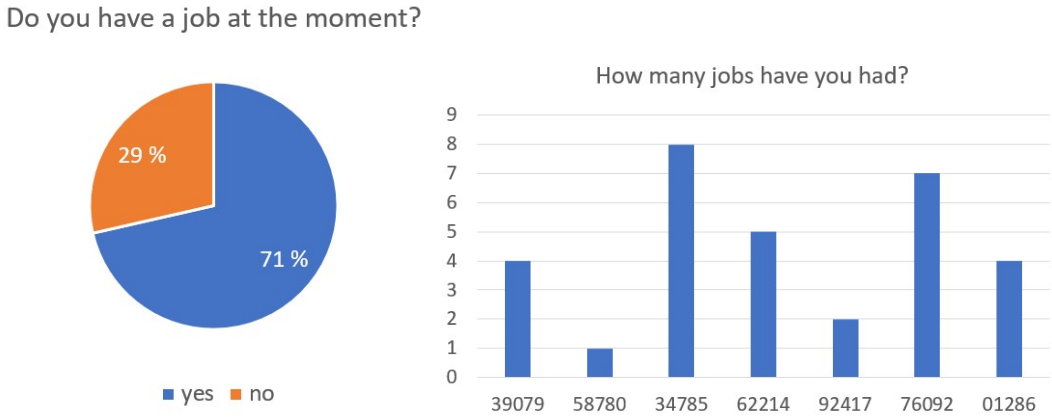
Figure 6.4 shows demographic information on the participants. 6/7 were 24-26 years old, and 1/7 was 20-23. There were 5/7 males and 2/7 females, all college students still

in education. Figure 6.5a shows if the participants had the job at the time, where 5/7 did and 2/7 did not, and how many jobs each participants has had, raging from one to eight. Appendix B.3.1 shows a more detailed overview of the work experience of each participant.



(a) Age (b) Gender (c) Education

Figure 6.4.: Demographic information

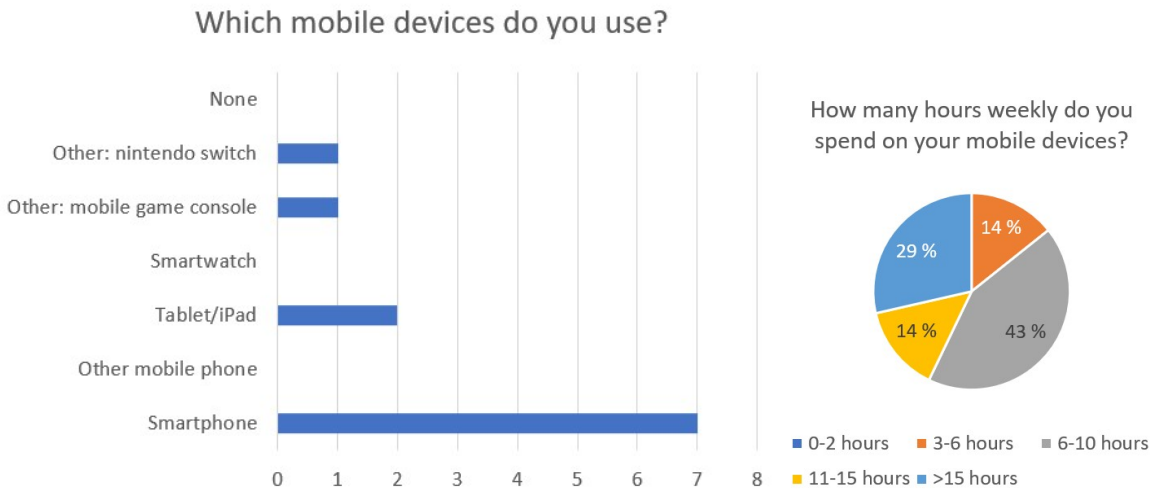


(a) Job at the time (b) Number of jobs

Figure 6.5.: Work experience

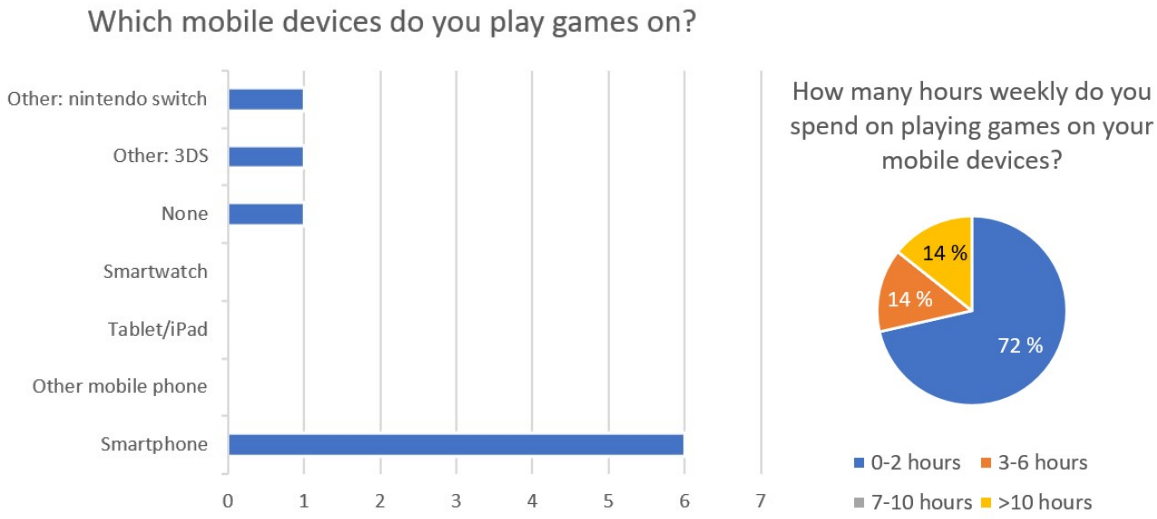
Figures 6.6a, 6.8a and 6.8 shows how the participants use their mobile devices. 7/7 use a smartphone, while a few use a tablet/iPad and a mobile game console. Number of hours spend on the devices varies from 3-6 hours to >15 hours. The participants play mobile

games on smartphones (6/7), Nintendo Switch console (1/7), 3DS console (1/7) or none (1/7). Time spent varies from 0-2 hours a week (5/7) to >10 hours. 6/7 participants claimed to use learning applications on their smart phones, 0-2 hours a week, while 1 participant did not use learning applications. Figure 6.9 shows what learning applications are used. Most use quiz (5/7), educational games (2/7) and glossary test (2/7). Other kinds include interactive encyclopedia and interactive library. One participant does not use any learning applications.



(a) Mobile devices used (b) Number of hours spent

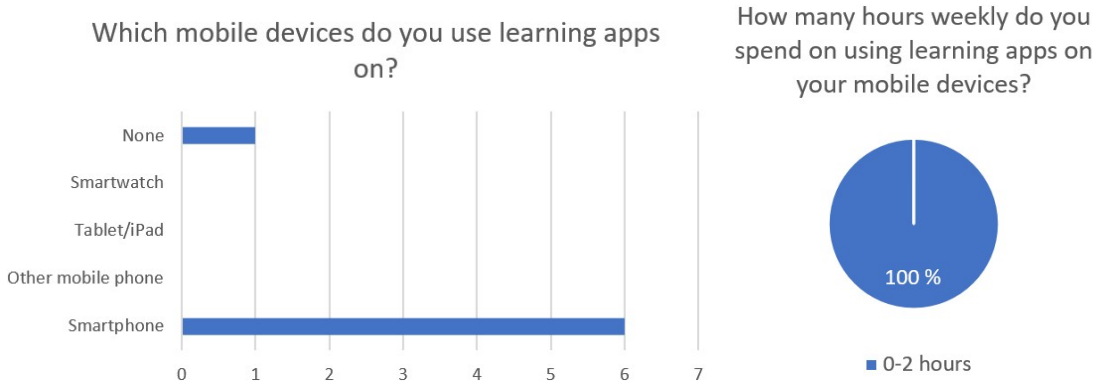
Figure 6.6.: Mobile devices - general usage



(a) Games - mobile devices used

(b) Number of hours spent

Figure 6.7.: Mobile devices - playing games



(a) Learning apps - mobile devices used

(b) Number of hours spent

Figure 6.8.: Mobile devices - learning apps usage

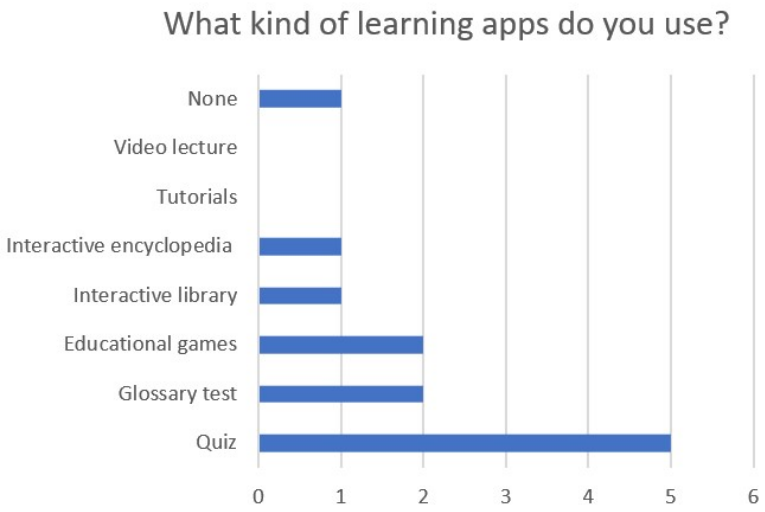


Figure 6.9.: Learning apps used

Focus

Results related to focus are presented in figure 6.10. Some participants' behavior was consistent with DI theory. Those feeling they have a strong focus on structure and task through logical perspective tended to interact with the game on a more technical level, testing its boundaries and inspect its components. However, several neither agreed or disagreed if they are focused on relations or change, vision and ideas. Therefore their behavior and opinions could not be connected to a focus area.

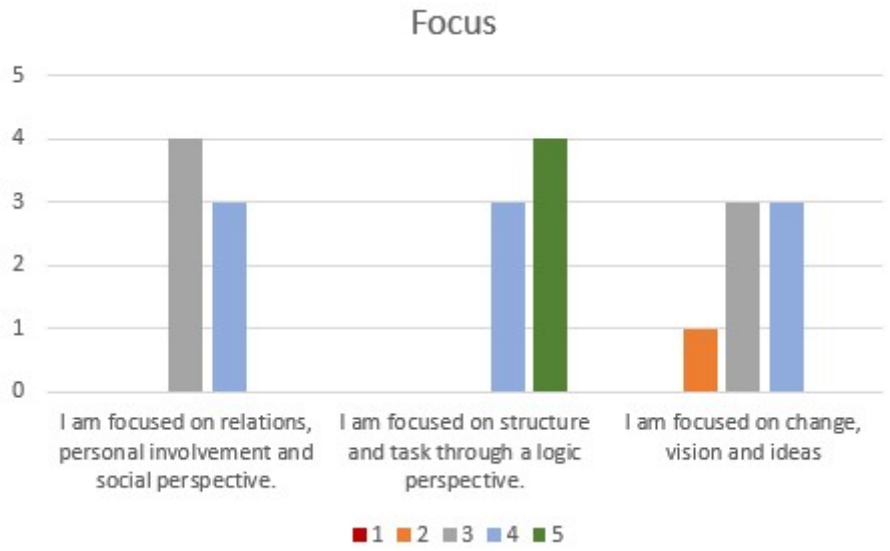
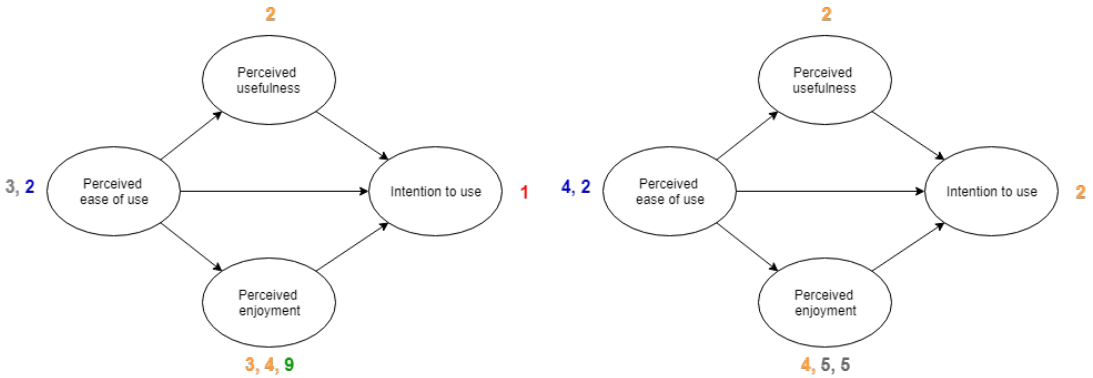


Figure 6.10.: Focus

6.6.2. Intention to Use

For each participant there was created a TAM based on their responses. Colors are used to indicate how positive the response was, with following mapping: Green - very positive, blue - positive, gray - neutral, orange - negative, red - very negative. Figures 6.11 and 6.12 present the models. 4/7 participants declared low intention to use, 2/7 were neutral and one was positive. It seems the perceived usefulness has strong relationship with intention of use for 34785, 39079, 62214 and 92417. A general tendency can be observed that low perceived enjoyment results in low intention of use, but high perceived enjoyment does not equal high intention to use. Perceived ease of use did not have strong effect on intention to use aside from for 62214.



(a) 76092 (b) 34785

Figure 6.11.: TAM for each participant 1/2

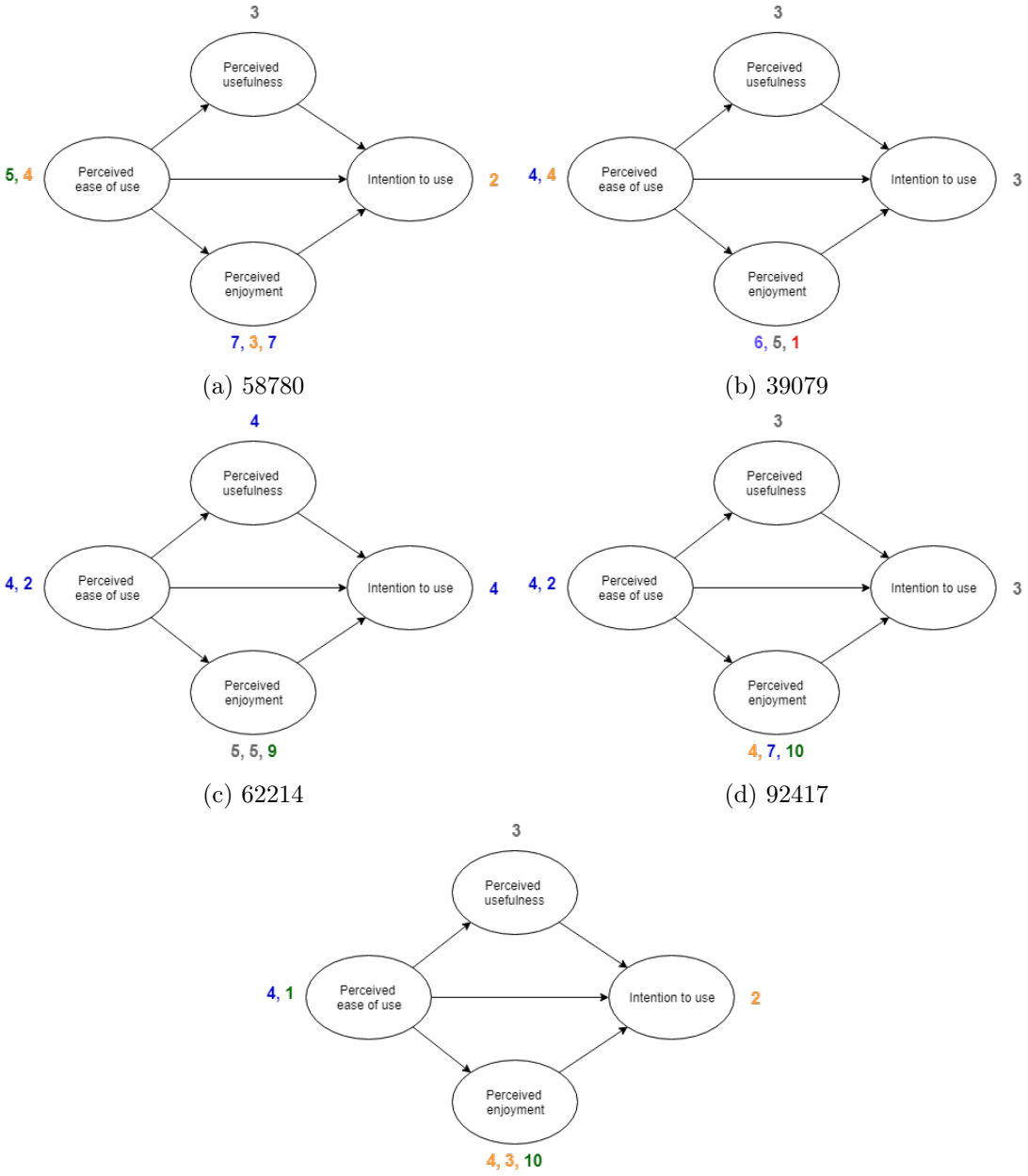


Figure 6.12.: TAM for each participant 2/2

6.6.3. Usability

Results for Q8 *It was easy to understand that there were three choice alternatives* in figure 6.13, observations and focus groups have shown disagreement with this statement. Participants said there needs to be an indication that there is a possibility to swipe

up, as it is not usual to have swiping in three directions in an application. Results for Q9 *It was easy to understand how one chooses an alternative* and Q10 *It was easy to choose an alternative* show mixed responses. Focus groups showed the issue might be with the devices being old. Several participants have asked during interaction if there was a correct answer for each question, which shows the game did not convey its logic and purpose. However, Q19 *It was easy to understand the objective in the game* shows agreement. Results for Q15 *it was easy to find out how well I was doing in the game* and Q17 *It was easy to understand what function the icons at the top of the screen had* show that the categories communicated their purpose well. However, most players did not notice that categories at the top of the screen can be clicked on to reveal more details. It seems the icons did not look like buttons and were considered only a visual cue for when points were received or docked. Time measure presented in the bottom right corner was also unclear - participants were not sure if it represented in-game time or play time. This element had no function in the game, which might contribute to the confusion.

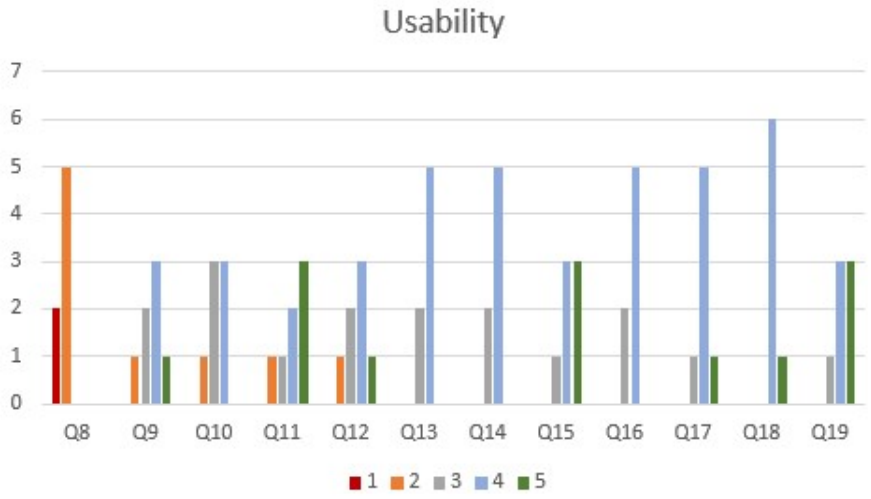


Figure 6.13.: Usability

6.6.4. Feedback

Both focus group and questionnaire results showed the participants understood that categories at the top of the screen act as a feedback mechanism - when a category is affected negatively, it turns red for a moment, if positively - green. The general consensus was that this feedback shows consequences of the choices, but the game does not provide sufficient feedback in general with agreement mean of 2.28 (see results in figure 6.15), or with regard to understanding the consequences or improving game outcomes. The participants claimed that better visibility of status in categories would better communicate the consequences. Suggestions included showing amount of points being added or docked and showing the score at all times. One comment said that colorblind people would have

issues with distinguishing red and green, suggesting that arrows would be more helpful. Most of the participants did not realize the categories could be clicked on, revealing the name and score in each category, with 2/7 ever clicking on them.

Participants were asked if the game made them aware of their relation to colleagues, work environment, customer and economy. The results in figure 6.14 show mostly positive results with regard to colleagues, work environment and customer, while awareness of economy was significantly lower. The focus group showed that the categories were unclear to some in general. It was not clear what Economy category represents - player's economy or company's. Categories People and Work Environment overlapped according to most, and the difference between them was unclear. The participants were also asked if it were the situations, choice alternatives or the categories that made them aware of these aspects. Figure 6.15 shows mostly positive results for all of them, with categories showing that most participants were in agreement. Result from the questionnaire show that the number of categories, four, was neither a sufficient nor insufficient. During the focus group the number was in general described as good enough. One participant commented that the number works in a game context, but is not necessarily enough to represent what one should take into account as an employee in the real world.

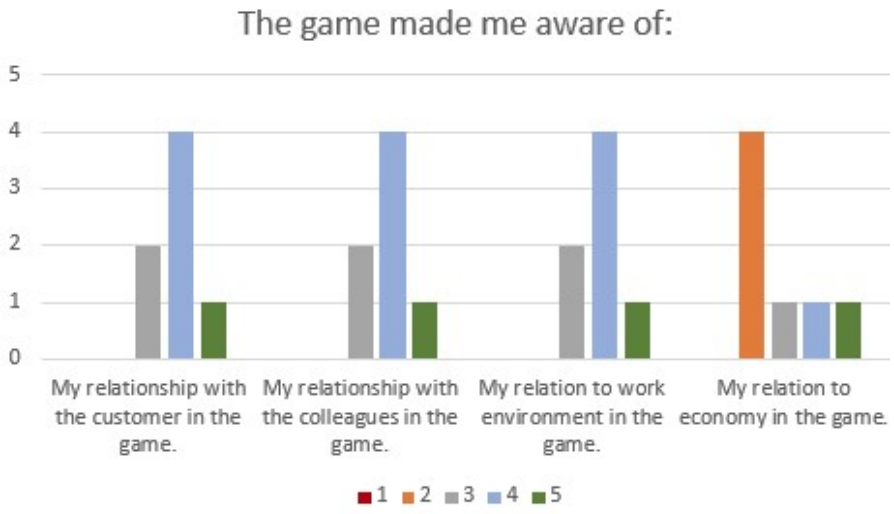


Figure 6.14.: Awareness of specific aspects of a workplace

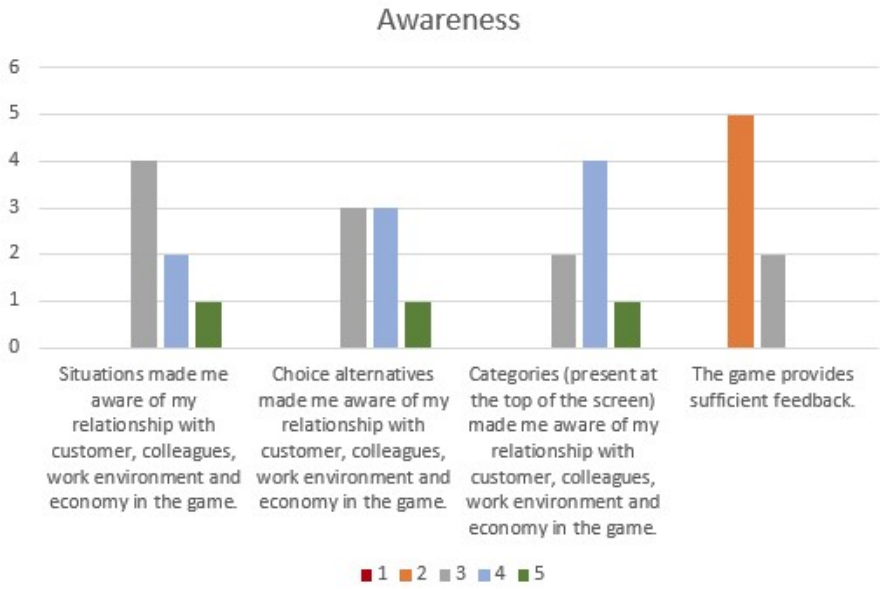


Figure 6.15.: Which component raised awareness of the workplace aspects

Figure 6.16 presents questionnaire results regarding categories. 6/7 participants agreed or strongly agreed that categories are a good way to represent aspects one needs to take into account in a work environment. 5/7 agreed that the categories gave them a good overview of what they are good at as potential employees, but the agreement was lower for overview of what they could work on - 4/7 participants neither agreed nor disagreed. There were various levels of agreement regarding categories' helpfulness with reflection with 4/7 agreeing, as well as if the categories gave them an overview of their soft skills, with 3/7 agreeing. There were also various levels of curiosity surrounding one's score, but 4/7 were positive.

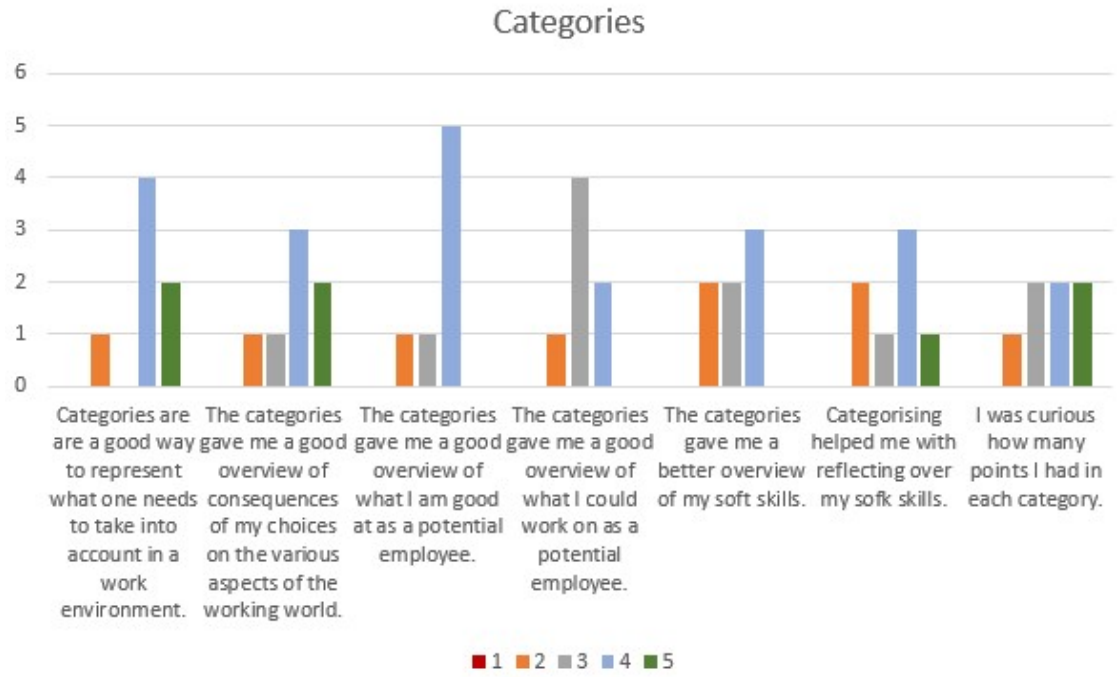


Figure 6.16.: Categories

A few participants received textual feedback based on sub-optimal score in any subcategory, informing them that they should work on the subcategory. This component was in development at the time and was not supposed to be a part of the evaluation. This feedback was perceived as unclear and vague - the participants did not know how to work on the specified aspect or why. If the low score prevailed, the feedback was shown after every situation in the game. This was perceived as annoying and unhelpful, obstructing the player from playing the game.

A few participants claimed that they would like to receive feedback that summarizes their performance, once in a while, e.g. each in-game week or month.

6.6.5. Realism

Based on the questionnaire result in figure 6.17 and focus group results, the general opinion was that the game is realistic. The participants felt that the situations could have happened in the real world, and most felt they could have been encountered in a real workplace. However, the observations showed that there were at least a few situations that were not, such as friends inviting to the beach the day before the player is supposed to go to work, and a few not serious enough alternatives. Figure 6.17 shows that 4/7 felt the consequences were meaningful, but only two felt they were realistic or fair. This might be connected to comments made during the interaction that some of the available choices had informal wording, which resulted in these choices being considered

obviously wrong. Multiple participants felt they were taken out from the experience and did not take these alternatives seriously. Furthermore, several participants perceived score changes as insignificant. For instance, loosing ten points in one category and receiving five in another were not serious consequences in the scheme of things, resulting in a boring gameplay. Multiple participants effortlessly accumulated over 100 points in a few categories, even though the maximum amount was 100. This might explain why only 2/7 felt the situations were challenging as seen in figure 6.17. Observations and focus groups revealed there were also situations where participants felt the consequences did not make sense to them. E.g., there was a situation where the main character gets sick and choosing the option of staying home reduced Economy score. One participant argued that this is not realistic, as sick days are usually paid, and that the game should reward this choice in some way, as staying home means not infecting others at work.

A few participants described several situations as vague, lacking context that would be crucial for making the choice. For instance, when the situation was that the main character is in the middle of a task while a customer asks for help, multiple participants felt that they should be informed of what kind of task the main character is working on, and what the customer needs. Without this information they had trouble with analyzing the situation and considering the choices. Several participants also wished the game clarified the industry and occupation of the player, as it would make it easier to immerse themselves in the presented world and understand main character's role and responsibilities. It was however easy to immerse themselves for 4/7. Additionally, all participants were curious about consequences of their choices.

Figure 6.17.: Realism

As presented in figure 6.18, 3/7 strongly agreed with caring about the fate of the main

character, which is the character they played as in the game, but 3/7 disagreed. 4/7 felt the main character could have been themselves, and 6/7 played the game as if they were. Three participants stated that the main character need to have more personality or details revealed about them, and their position at work should be specified. Thus they would be able to identify themselves with the main character and take personal interest in their fate.

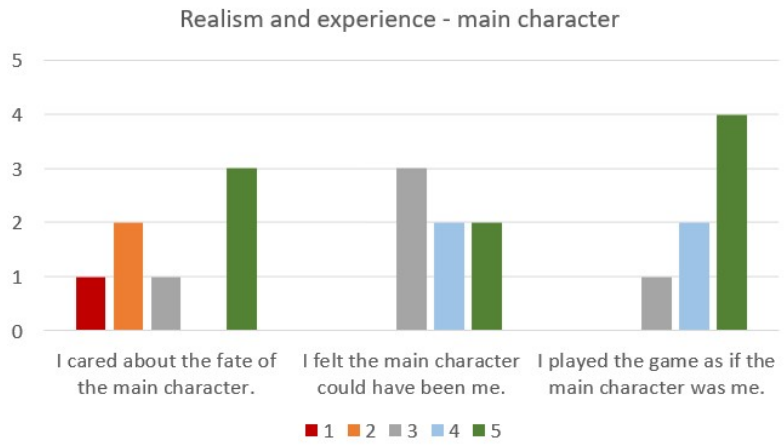


Figure 6.18.: Realism - character

One of the participants suggested that realism and playability would be enhanced if the game included a mechanic that would take into account player's sanity or exhaustion. They claimed that one does not need to think about the mental state of the main character, which makes it very easy to make a "right" choice that makes a customer or boss happy. In reality one has to take into account their own values that might not align with choices that might be best for others.

6.6.6. General Learning

Responses to questionnaire in figure 6.19 show that only 3/7 were motivated by the game to improve their soft skills. 4/7 neither agreed or disagreed that they can transfer their in-game experiences to the real world, but 3/7 agreed. 5/7 agreed that situations and choice alternatives determined their gain from the game, consequences showing the same number of agreeing participants, however while however 2/7 disagreed. This shows that situations and choice alternatives were regarded as more determinig factor than the consequence.

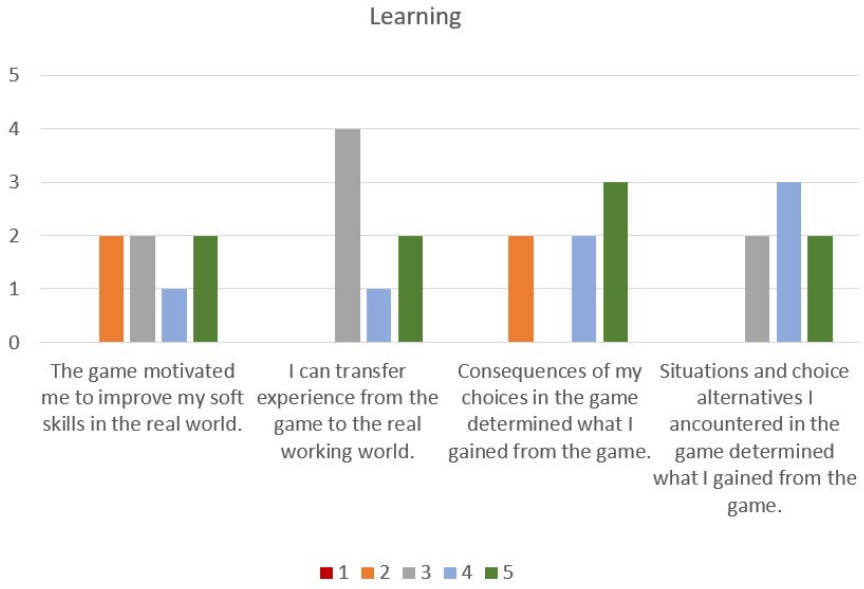


Figure 6.19.: Learning

6.6.7. Reflection

Answers to questions concerning various aspects of reflection are presented in figure 6.20. In most cases the responses were positive: at least 5/7 felt the game made them think of why they made the specific choices, if the could make better choices, what they would do in similar situation in the game and in the real working world and what soft skills are needed at work. Highest levels of agreement can be seen regarding decision making in the real working world and in similar situations in the game, as swell as what soft skills are needed at work. 4/7 neither agreed or disagreed that the game made them challenge their view of what soft skills are needed at work. This shows that the participants probably did not experience critical reflection while playing the game. This might be due to situations being vague, resulting in not enough foundation for challenging one's views.

Results from the questionnaire show that participants who had less previous work experience related to customer service or similar jobs involving daily interactions tended to be more in agreement with statements connected to reflective behavior. This was however not correct for all participants, but given a small sample size these results might not be representative. It seems nevertheless likely that experienced individuals encountered situations in the game that were nothing new to them, resulting in being more certain about what choice to make. The only two participants that have clicked on the categories were mostly in agreement with reflection related statements. This might indicate that the score overview has potential to invoke more reflection than just the category icons. Nonetheless, the sample is too small to determine a correlation.

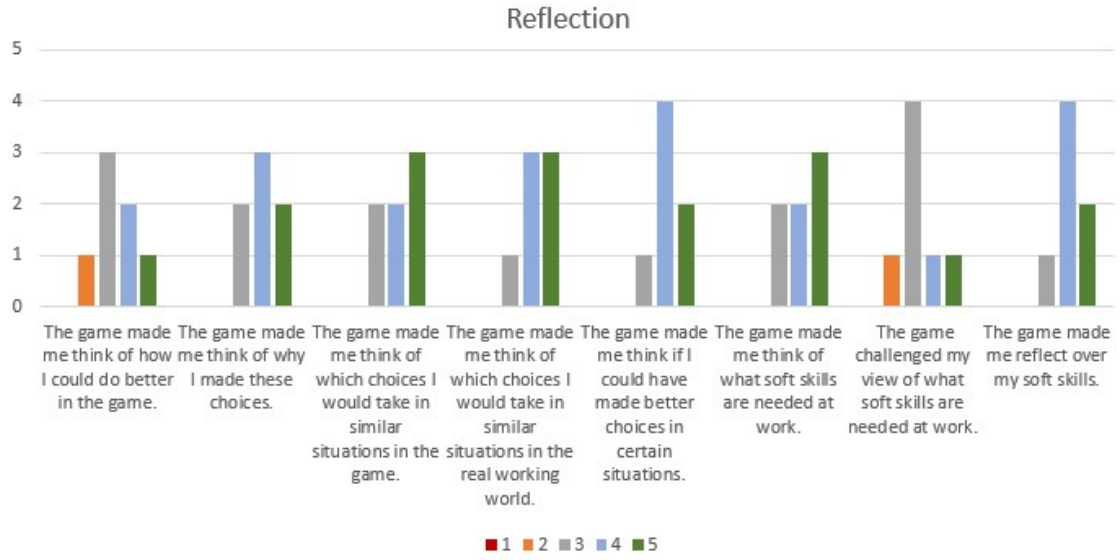


Figure 6.20.: Reflection

Observations showed that multiple participants were unsure if getting the same situation again was a bug or desired functionality. As a result, a few wondered if their initial choice was correct or not, and what they should do to stop the situation from reappearing. Learning theory indicates that repetition increases the likelihood of retention [106], but it seems the situations and reappearing frequency must be fine-tuned to achieve this. It was unclear to the players why the situation reappear, confusing them and taking them out of the experience instead of giving an opportunity for practice. The participants suggested that sameness of the situations can result in a boring gameplay, where the player memorizes the outcomes. A solution might be providing similar situations instead of exactly the same. Multiple participants claimed that sometimes the available alternatives are not sufficient and they wished there was a fourth alternative. Sometimes they did not agree with the available alternatives, and wondered what they should do when that happens. There was an opinion that in certain situations in the game it should be possible to do nothing, as sometimes it might be the right choice in the real world. This shows that the participants actively contemplated the situations and possibilities. In a number of situations the game did not provide choice alternatives perceived as applicable, and as a result there might be fewer opportunities for reflection.

During the interaction with the game, the participants were wondering if there is any connection between the situations they encounter. Particularly, they expected that their choices would affect subsequent situations, and that the situations themselves would present them with consequences of the choices. This was not implemented in the game. The desire of this functionality shows that the participants were highly interested in detailed, contextualized consequences, which shows they made an effort to reflect on their choices, but they felt the opportunities were limited.

Multiple participants enthusiastically shared their work experience and connected it to the game content, discussing what situations and choice alternatives could be included to make the game challenging and interesting. They felt that the content was often too easy, but they also discussed specific questions and what the different choices could result in or mean in various contexts. It became apparent that participants with previous working experience would need to encounter more extraordinary situations in the game, as everyday situations might not be enough to challenge their established views and habits. It seems however that the game still made these participants reflect on their choices in general based on the questionnaire results and discussions. The discussion that emerged during the focus group shows the game has a potential to prompt a group reflection. Even though it seems the game itself does not challenge player's views, the discussion that followed most certainly revealed various perspectives and opinions on work related issues and dilemmas. The participants said themselves they imagine that if the game was played by employees in a real workplace, they might talk about the game and its content during a lunch break, for instance.

6.6.8. Self-Efficacy

Figure 6.21 shows results from pre- and post-response questions related to self-efficacy of work-related skills. Six out of nine statements asking about self-efficacy showed minor increases in mean agreement after interaction with the game and two statements had a decrease. Statement *I would stay calm if I encountered misconceptions and disagreements at work because I trust my abilities* showed that the one disagreement disappeared in post-response, there was one more neutral response and one less agreement.

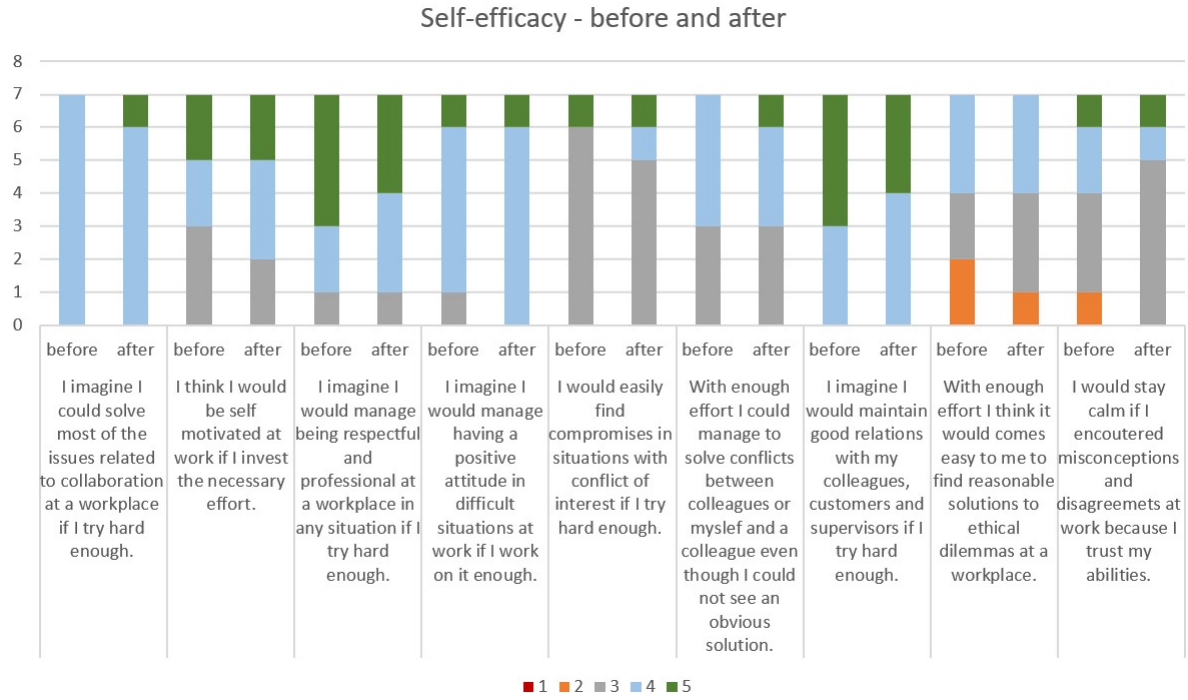


Figure 6.21.: Self-efficacy - before and after

Mean values per participant in table 6.3 have shown that four participants had minor increases after interaction with the game, two had no change and two had a decrease. Participants with most mean increase had little work experience involving interactions with customers. This shows possible potential for the game to increase self-efficacy for the inexperienced. One of the participants experiencing a decrease, 58780, had some working experience. Additionally, this participant felt it was hard to understand that the choices result in consequences, and that categories are not a good way to represent aspects that should be taken into account in the working life. The categories did not give them an overview of the consequences of the choices. This might mean the categories did not provide a useful stimuli to this participant and did not have positive effect on self-efficacy. Additionally, 58780 declared spending more than 10 hours on playing games on their mobile devices. This might suggest that experience in playing games might have a negative effect on self-efficacy. The other participant experiencing a decrease responded mostly positive to the questionnaire, especially with regard to reflection. They were however neutral with respect to amount of feedback, situations' realism and consequences' fairness. This might have affected their ability to increase self-efficacy based on the interaction.

Differences between pre- and post-interaction were minor, meaning the game did not have a significant effect. A reason for this might be lack of challenge and support due to low quality content and not visible enough feedback. The feedback was perceived

as sparse, not provide sufficient support in decision making. Several consequences were deemed unfair, which results in not wanting to try to tackle the next situation. This seems to conform with Eraut's factors affecting learning in the workplace [41].

Table 6.3.: Self-efficacy results - mean changes for each participant

Participant	**Mean before**	**Mean after**	**Diff**
39079	3,89	4,22	0,33
58780	3,67	3,44	-0,23
34785	3,67	3,67	0
62214	4,11	3,78	-0,33
92417	3,33	3,56	0,23
76092	4,56	4,78	0,22
01286	3,44	3,67	0,23

One of the participants had previous experience in several work environments, and they felt that the game did not provide many challenging situations to interact with. They felt that it would be more useful if the situations could present edge cases, meaning unique situations posing tough dilemmas one would not encounter every day. This way the situations would give an opportunity to consider difficult choices, and experiencing the consequences would equip them with a broader perspective, challenging their established views. They felt that this effect would make them more confident in knowing what they are doing and what outcomes they might expect in real life encounters. This suggestion shows that there is possible potential with enhancing self-efficacy by connecting choices and subsequent situations.

6.7. Discussion

Figure 6.22 summarizes results from the evaluation. The findings include expected ones, connected to feedback, realism and enjoyment, as well as unexpected, connected to content in the game. Based on these findings, the subsequent steps include discussion connecting both types of findings, discussion of variations in responses and preparation of a co-design workshop.

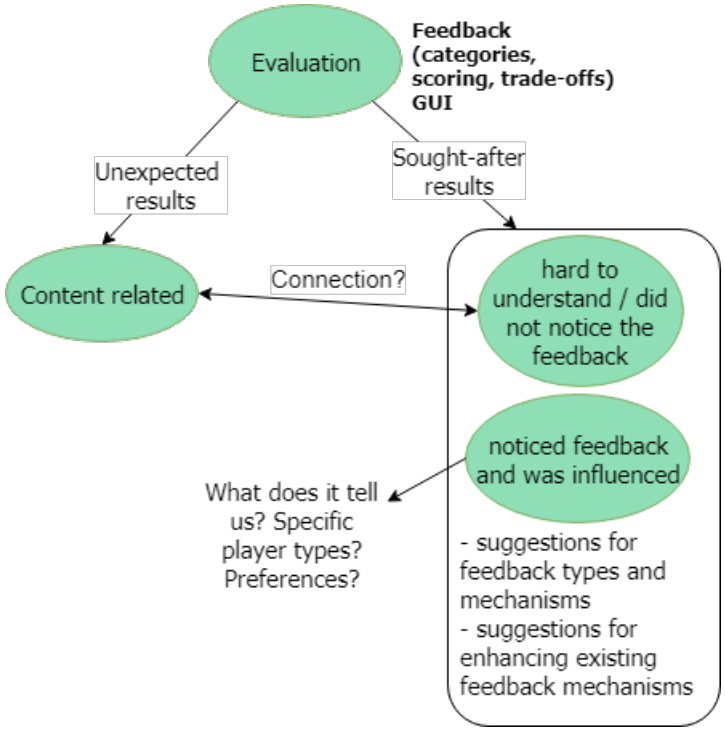


Figure 6.22.: Evaluation results: overview

During the evaluation, different participants focused on varying aspects and qualities of the game, both during the interaction and focus group. For instance, some players read thoroughly the situations and alternative choices thoroughly each time, immersing themselves in the world created by the game. Others tested game mechanics, trying to swipe in any possible direction and for example choose choice alternatives to the left many times in a row to see what would happen. There emerged a tendency where the immersed participants did not try to click on the categories revealing the score, while ones checking how the game works did. The immersed players had more suggestions connected to the content of the game. Additionally, participants playing games in their free time seemed to suggest more in-game mechanics to make the game more fun or interesting. These observations suggest that interaction with and comprehension of the game depends on how one wants to play the game, what their goal is and what aspects they are interested in. It is consistent with Bertle's taxonomy of player types, [18] presented in figure 6.23. Some players are interested in the world presented to them, its story and details. Others focus on achieving in-game goals. Some want to socialize within the game context, some would rather inflict themselves on others, often showing their skills and power.

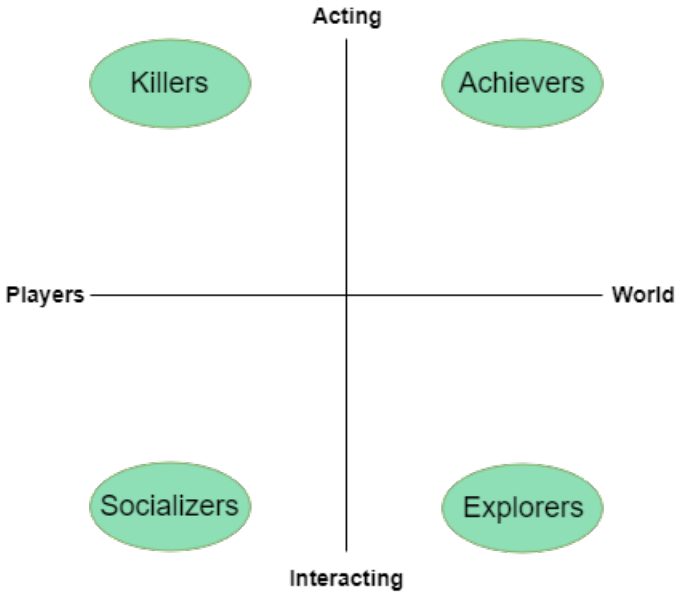


Figure 6.23.: Taxonomy of player types, adapted from Bartle [18]

It became clear during the session that many participants expected a form of connection between the situations in the game. While content was not the main focus of the evaluation, some of the participants shared comments related mostly to this aspect. While building content for the game is its own process, connections between content and feedback can be made, where the one supports the other. The participants interested in situations that represent consequences of previous choices seem to be interested in exploring details in the game, focusing on the context and game's lore. This attitude would place them on the explorer area of the Bertle's character theory chart. Based on these findings, merging feedback and content might be a useful feedback mechanism for explorers, where their interaction with the world affects it. As the participants suggested themselves, it could be interesting for some players to see consequences of their choices presented in a subsequent situation. This kind of functionality would provide concrete, meaningful feedback that does not interfere with the gameplay and sustains the flow. It could enhance playability, while providing a solid basis for reflection. The player could be presented with consequences taking form of a new situation, which would be more nuanced and easier to transfer to the real world than direct assessment if their choices were right or wrong. This format could provoking them to think back on their choices - were the choices right, what could they do differently and determine their course of action. Additionally, the consequential situations could be unique, unforeseen and challenging, while still being realistic, laying a foundation for critical reflection.

Several participants stated that their goal while playing the game was to accumulate as many points as possible. While the game was not winnable in this iteration, and the objective was not specified and situations were designed to result in trade-offs, a few par-

ticipants were wondering out-loud what the right choice alternatives were. Additionally, several players were checking their score quite often, verifying how many points they received. This kind of focus is typical for another of Bartle's player types: achiever. They were missing a clear overview of the score, and felt it was too easy to accumulate an amount of points that exceeds the upper boundary. To satisfy this type of player, feedback based on scoring and connected to achievements should be supported. There needs to be one or more clear goals to work towards. Additionally, increases and decreases in score based on each choice alternative need to be balanced. Achievers need a challenge, meaning the game cannot reward the player too easily, and it should not be predictable. At the same time the score should provide feedback that can be transferred to the real world, therefore it should be understandable to the player what the increases and decreases mean, in addition to being perceived as fair. Inclusion of a feedback mechanism taking player's mental state could provide an additional challenge, where the player does not make the "correct" choice accumulating points, but has to focus on balancing the consequences of their choices.

While the third player type, socializers, thrives most in multiplayer games, their focus on relations might be catered to through characters they meet in the game. Some participants felt they need to know more about the customers, supervisors and colleagues they are presented with in order to make informed choices. Additionally, they thought giving characters identifying features, names and personalities would give the game more depth, enhancing the experience. Players that care about relations should be provided with feedback connected to relationships with others. They might be interested in knowing how their choices affect the characters and maintaining positive relationships. Another possibility is taking advantage of the context the game would be played in, embracing the social aspect outside of the game. As mentioned in section 6.6.7, some participants felt the game could be discussed during breaks by employees, providing a conversation topic through its content. As it became apparent during the focus group, players could discuss situations among themselves, and sharing experiences and thoughts provide a starting point for reflection [34].

The last player type, killer, did not seem to emerge during the testing session. It might however be useful to take this perspective into account, as to make the gameplay inclusive for all kinds of players. Killers in single-player games might be interested in destruction and being the "bad guy" [18]. In the context of this game it would mean making choices resulting in feedback based on negative consequences. This version of the prototype could provide low score. Suggestions for future prototype that might satisfy other player types could be adjusted for killers as well. For instance, consequences contained in a subsequent situation might be severe. Feedback in form of relationship statuses could include a possibility of ruining the relationships.

During the evaluation it became apparent that the participants had varying previous experience with the working world, games and mobile devices, resulting in differing

needs, expectations and interpretations regarding the feedback. This observation conforms with findings from Shute [92] and Hounsell [54], showing that differences between students should be taken into account when creating feedback. This issue might be addressed by implementing a mechanic in the game that maps certain aspects of the way the player interacts with the game. The mapping might help with adjusting the feedback so it fits the player in various ways. It might be based on their player type, learning style or preferences for interaction and communication. Suggestions to take into account player's mental state and to make the situations more unique and challenging conform with Eraut's factors in learning in a workplace [41]. Both suggestions increase the challenge provided by the game. However, the issue lies in an implementation that provides support to the player.

6.8. Conclusion

Analysis of the results provided a foundation for defining requirements for the game. This foundation was enhanced with feedback related recommendations from literature [92, 77, 30, 56]. The elicited requirements are presented in table 6.4.

Table 6.4.: Functional requirements based on evaluation

ID	**Requirement**
FR1	The game should provide visible continuous status for each category.
FR2	The game should provide immediate feedback on player's choices.
FR3	The feedback provided should not distract from the gameplay.
FR4	The game should provide enough context for the player to make informed choices.
FR5	The game should provide visible, realistic and informative feedback on consequences of the choices.
FR6	Choices made in the game should affect which situation(s) will be encountered in the future.
FR7	Situations should provide a challenge to the player.
FR8	Consequences should provide a challenge to the player.
FR9	The game should provide status on relations with characters encountered in the game.
FR10	Relation status should determine character's attitude towards the player in situations.
FR11	The game should provide status on player's mental state.
FR12	The game should require the player to balance between their own in-game needs and the work environment's.
FR13	The game should take into account player's characteristics (preferences for communication, interaction and problem-solving, player type, work experience, achievement levels).

7. Co-design Workshop

A co-design workshop involving students have been conducted on March 14th, 2018. The workshop was planned in collaboration with course professor Monica Divitini of TDT4245 Cooperation Technology and Social Media course at NTNU. This chapter presents the game prototype played by the participants, utilized methodology and results. Pictures taken of the resulting design proposals are available in appendix C.2.

7.1. Objective

The objective of the co-design workshop was to gather game design ideas related to collaborative reflection generated by participants. These ideas would be used to further expand requirements specification and aid subsequent design of feedback mechanisms for the game. Focus in the co-design workshop was expanding the existing game with game mechanics that would help with provoking collaborative or social reflection among players.

7.2. Differences From Initial Prototype

The prototype presented in chapter 2 has been further developed by Pineleaf AS before the co-design workshop. This version of the prototype had updated design that can be seen in figures 7.1, 7.2 and 7.3. Visuals such as colors and fonts have been modernized. The category visuals were enhanced by adding score counters under the icons, which are updated each time the player looses or gains points (see figure 7.3b). Color indicators, where red meant score decrease and green score increase, have been removed. Time measure was removed as well.

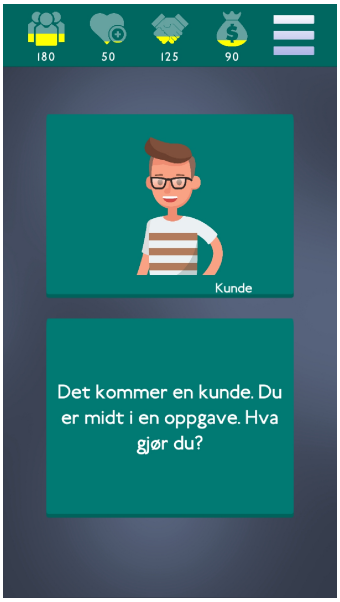
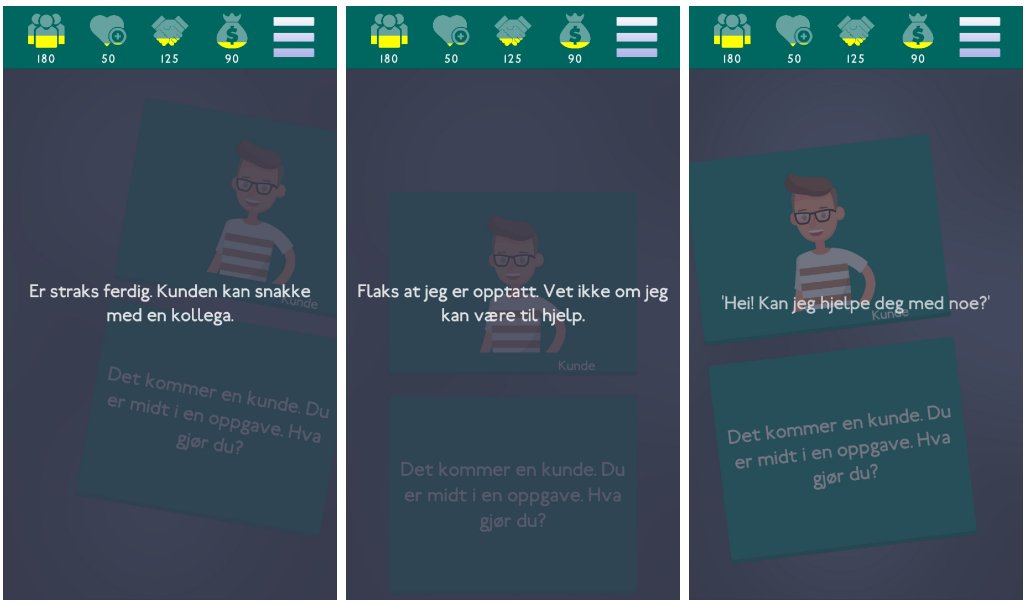


Figure 7.1.: The player is presented with a situation in a game



(a) Choice 1 (b) Choice 2 (c) Choice 3

Figure 7.2.: Choices in a situation

(a) Economy category after it as been clicked

(b) Categories with score counters

Figure 7.3.: Multiparameter - categories

7.3. Planning

A meeting with the supervisors and TDT4245 course professor was held in order to ensure the workshop's relevance to the thesis, course and company's needs. It was emphasised that by participating in the workshop the students should receive inspiration for the projects they would deliver in the TDT4245 course. Sobah suggested using MyG methodology in order to provide ideas and examples for what mechanics and patterns could be used in the game. Two hours were available for conducting the workshop.

7.4. Methodology

Method used in the co-design part of the workshop was MyG methodology presented in section 4.7.3, customized for the purpose of enhancing an existing game instead of gamifying an application. From the original deck, categories Social Mechanic, Game Mechanic and Game Pattern were used, in order to help with brainstorming the ideas for mechanics and social drivers. User Archetype, User Experience and Motivation cards were excluded due to level of complexity that would not fit into time constraints. Goal cards were excluded as the goal has been provided in the workshop. Additionally, after a discussion with supervisors it was concluded that social mechanics do not cover all the dimensions of social interactions in a game, as they serve as a way of implementing gamification only. It was therefore decided that the deck could be expanded with a

few extra cards that focus on extending the social aspect of a solution that is already a game. Based on Koster's list of social game mechanics, [68] following Social Mechanics cards were added to the deck in order to emphasize the social and collaborative aspect: Teamwork, Race, Instant Messaging and Forum. Finally, all mechanic and pattern cards had their edge color changed to orange as to not confuse the participants with varying colors. They are further called Mechanic cards.

Additionally, five Reflection Scenario cards were created, having a green edge to distinguish them from other cards. This was done to bring participants' attention to social contexts the game addresses as aspects of the real working life the player should reflect on. These contexts consist of: *interaction with one's peers*, *interaction with one's superiors*, *real life experiences of similar situations*, *how one's choices affect others and how one takes care of their own needs and values against others.* Reflection Scenario cards served as a starting point or inspiration for a more specific scenario the participants would create. The later generated design ideas would address issues posed in the scenario. The deck is presented in appendix C.1.

After the deck has been formed, a co-design template was conceived following the logic behind the connection between the cards, presented in figure 7.4. The template consists of three sections:

- **Scenario**. In this section there is a space provided for placing a Reflection Scenario card and a more detailed textual description outlaying the issue the design would address.
- **Mechanics/concepts**. Here the space is to be populated with one or more Mechanic cards and a textual description of how the mechanics work in relation to the scenario.
- **Categories**. In this section there is room for specifying which in-game categories would be affected by the proposed solution, with a possibility of suggesting a new one if the existing ones weren't sufficient.

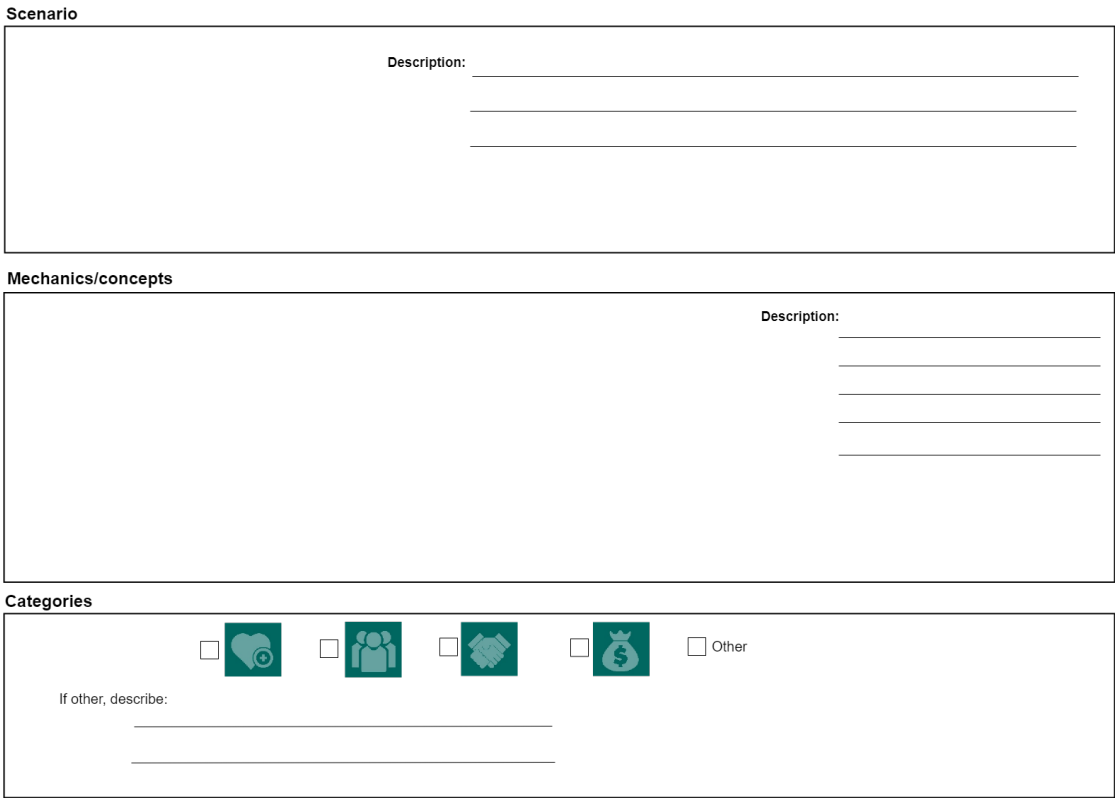


Figure 7.4.: Co-design template

7.4.1. Process

The goal of the planned process is to provide the context for the workshop and inspiration for the subsequent design proposals, as well as grounds for linking the proposal to the personal experiences. The competitive aspect from the MyG methodology was excluded due to anticipated time constraints. As it was unknown how many participants would attend, the group sizes could be as small as two. I was the only facilitator available to the participants. The process consist of four parts:

- **Setting the context.** In the first part the participants are presented with the game they would try to expand, and the goal of the workshop is explained.
- **Play and reflection.** In this part the participants play the game in groups or pairs. This setup creates an environment where they organically consider choices they make in the game together before selecting one. After playing the game they reflect together on their experience of the game and connect it to their real life. The groups are encouraged to focus on a specific aspect of the experience, such as how they interact with others or how their choices affect others. This two-fold process gives an opportunity to get familiar with the game, while stimulating collaborative reflection, which prompting is the main goal of the workshop.

- **Co-design.** The participants are asked to think how the activity they just completed can be replaced by the game. They are presented with the workshop goal: generating design ideas to extend the game so it triggers social or collaborative reflection. The participants populate the co-design template to represent their ideas. The process starts with picking a Reflection Scenario card from the deck. The next step is to establish a more specific issue or dilemma to address. Then the participants would pick Mechanism cards addressing the scenario. Further they would decide on how the mechanics work. Finally, the group would decide which categories in the game are affected by the new design. This process might be incremental or sequential, depending on the time available and the brainstorming process of the group.
- **Pitches.** After the co-design session is over, each team presents their proposal(s) in a one minute pitch.

7.5. Participants

The participants were students taking the TDT4245 course, which were Informatics and Computer Science students in their 1st year of master's degree. Seven participants attended, where one left early and one arrived late. The participants collaborated in pairs.

7.6. Workshop Plan

The Workshop started with an introduction presenting the game, explaining the purpose of the workshop and outlying activities involved. The participants were then divided into pairs. They received mobile phones with the game installed and played it for about 10min. In the next step the participants reflected on their experience with the game and its connection o their lives for 15min. Next the materials consisting of the co-design template and MyG cards were presented and explained. In the co-design session the participants' goal was to create a design proposal for extending the game with triggering collaborative or social reflection. The participants spend about 45min on creating their designs. Then the proposals were presented in form of 1 minute pitches. The workshop was concluded with a short group reflection based on the impression of the game and the workshop itself.

7.7. Results

The co-design workshop results consisted of feedback on the process and the game and three design proposals, one for each pair of participants.

7.7.1. Play and Reflection

Throughout play and reflection part the participants discussed consequences of similar choices in a real work environment. Both during and after this step several comments were voiced. One participant mentioned that there were choice alternatives in certain situations they did not even consider before revealing all three alternatives. When presented with one specific in-game situation they subconsciously decided what they would do, but there was a choice alternative they did not think of themselves, and they regarded this alternative as the most fitting and even inspiring one. Another participant said it is good to reflect on the situations before unveiling the choice alternatives.

7.7.2. Design Proposal 1

The first design proposal (see figure 7.5) revolved around the card *reflect on how you take care of your own values and needs against others*. The specific scenario was a situation where one experiences a hectic day at work and being swamped with difficult tasks. The dilemma was how to compromise between getting the work done, taking care of oneself and involving others in task completion in a reasonable way.

The proposal was to create a shared quest system, where the players would work together on completing the quests, resulting in a multiplayer game. The game would provide feedback on the progression towards completion of the task, as well as actions' influence on both the whole quest and the team. Due to creation of a new game mode, all score categories would be affected. The score categories personal development and people would not be shared, as they reflect individual qualities, while economy and task would be shared showing progress and resources spent towards completing the quest.

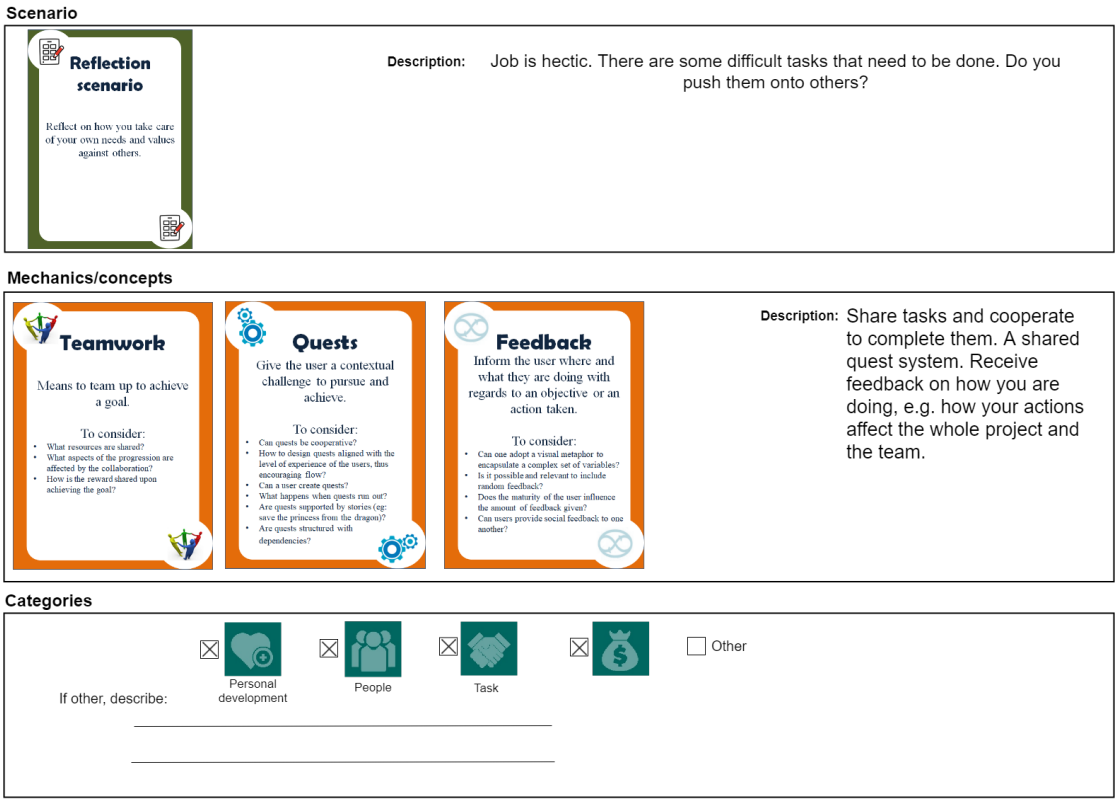


Figure 7.5.: Design proposal 1 reconstructed

7.7.3. Design Proposal 2

In this design, *reflect on how your choices affect others* was the starting point for the context. In the scenario the player is presented with a following dilemma: they are sick, and have to decide if they should go to work and risk infecting others or stay home, reducing the workforce for the day.

The proposal (see figure 7.6) was to create more advanced progression where consequences of the choices affect situations encountered later in the game, both short-term and long-term. This would be aided by quests with more specific goals, as the current progression indicators are seen as vague by this pair. Several variants of this solution were presented orally. The players could play a multiplayer version with different roles in the game, such as a boss or a colleague, possibly temporarily, effectively making the game feeling more real and forcing the players to considering others' perspectives. They could be presented with statistics showing which choice other players in different roles would prefer. The player could also be asked what they would do in real life and be presented with statistics on this aspect as well. In a single player mode the players could communicate through a forum to exchange experiences and opinions.

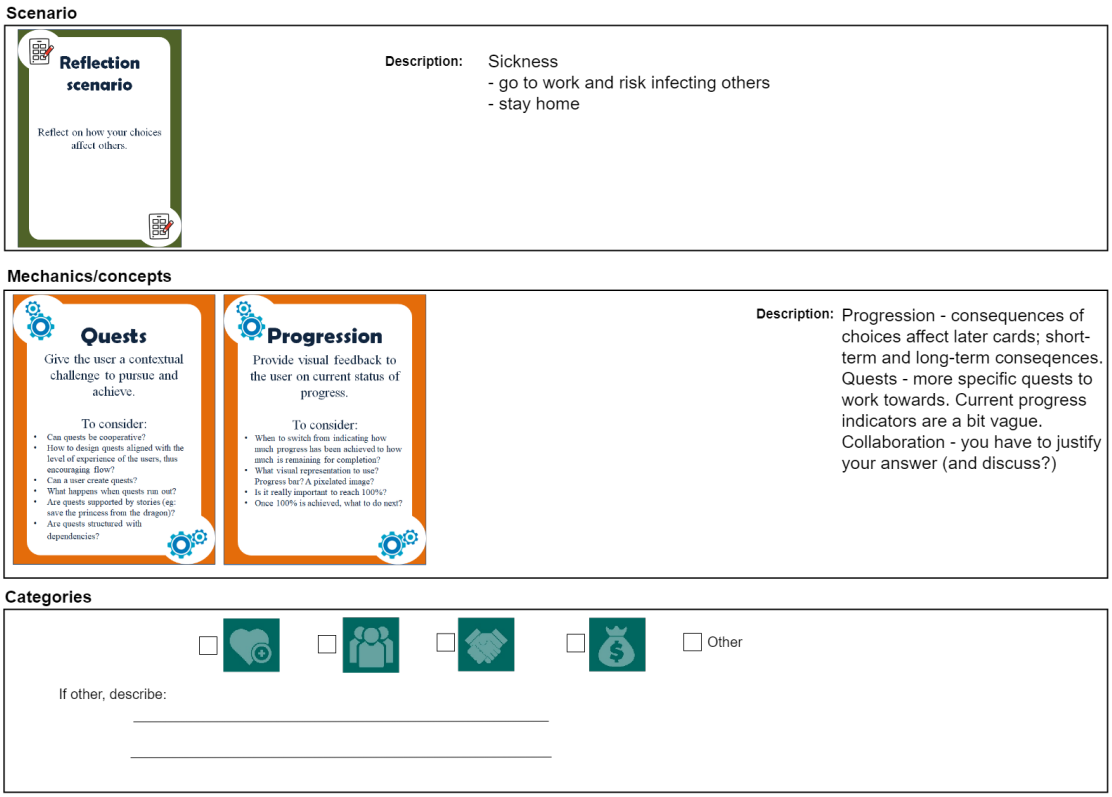


Figure 7.6.: Design proposal 2 reconstructed

7.7.4. Design Proposal 3

The third design started with the card *reflect on how your choices affect others*. In this scenario there is a software development company, and the workers cooperate to exchange practices, technologies and coding styles. The goal is to teach how one's approach when programming affects others.

In this proposal the players would team up and barter with other teams to exchange the practices and technologies linked to coding. While considering the offers, the teams would reflect on how different practices affect their teamwork, aiding the process of choosing relevant ones. The practises and technologies to offer might preexist in the game.

This approach would affect both personal development due to reflecting on how others are affected, as well as task and economy since the employees would utilize more fitting practices.

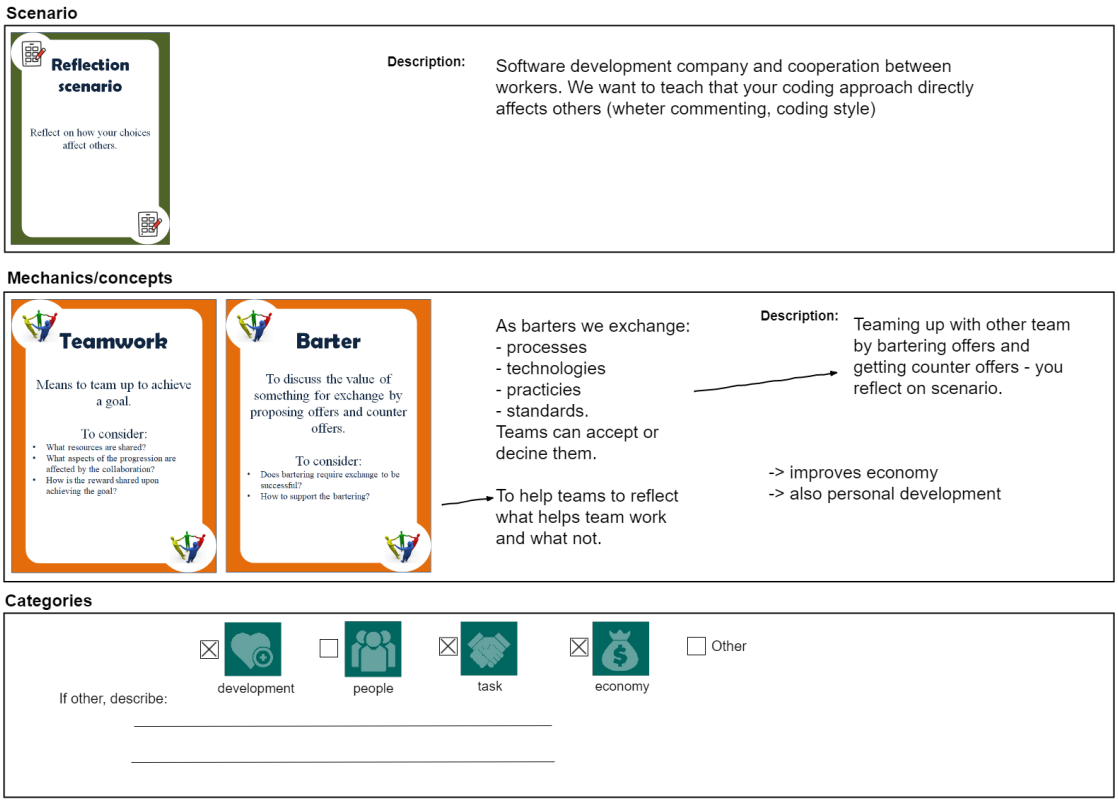


Figure 7.7.: Design proposal 3 reconstructed

7.7.5. Closing Reflection

Most of the participants felt the process was useful for generating game design ideas. The cards were deemed by most as helpful in the process due to including lists of aspects to consider when creating a design. A few participants asked if they could keep the cards to aid the design process in their course work. However, one participant was wondering what the purpose of the cards was, and seemed confused by them.

Multiple participants mentioned that it was fun to play the game the workshop revolves around as opposed to receiving only a description of it, as one has a real experience to connect their reflection and design to. They also felt that the co-design process gave them ideas they could utilize in their course work.

Focus on feedback in this thesis was mentioned in this phase, and some participants discussed the possibilities of enhancing the design proposals with feedback related to collaborative reflection. Design proposal 2 involved a suggestion to present the players with statistics on what choices players in different roles prefer to be taken by others, as well as statistics on what the players would do in real life. A few participants proposed a modification of this mechanic where the player is presented what choices others made

in general, not necessarily in different roles.

The participants said they liked the template, but the space was too small to contain the cards and to write on. It was also said that "description" is a vague term, and the template could guide the designer with making their proposal more specific by including hints such as "What is the context?" or "Why did you choose this card?". One participant felt the hardest part of the workshop was to ensure the proposal supports triggering reflection, and that the materials did not aid that directly. They said however that they understand that this was the main task, and that is it not easy to create materials that guide this aspect without providing essentially ready-made solutions.

The participants shared their opinions on the game as well. It was not clear in which category the score changes. The reason for that is that the fill of the icon changes color instead of the whole icon, and the icons are not filled in the beginning as there is zero points in each category. It was not clear the icons can be clicked on, or how to leave the icon information screen after clicking. The categories themselves were not explained well enough. The participants were also missing an indication in which directions one can swipe to choose an option. They felt also it would be a good idea to add relation indicators in the game, as well as a way to track time so to not get "first day at work" situations later on and some form of stamina indicator as a way to represent player's personal state. It was mentioned that the game should include situations that are personal problems that "just happen", such as a death of a colleague's family member, to maintain life's unpredictability and show ways to handle such circumstances. With regard to reflection, one participant suggested to have indicators showing which choice alternative other players selected, to make the player analyze their thinking process.

7.8. Discussion

During the play and reflection part of the workshop, the participants seemed to create a link between the game and real life. They sincerely immersed themselves in the reflection activity and regarded this part of the workshop as enjoyable, as well as inspiring for the subsequent steps. This shows that the method was engaging, acting as a valid foundation for the co-design process.

The materials consisting of cards and templates proved useful. Cards' purpose and usage has to be conveyed more clearly while presenting the process, but their contents seemed straightforward. The general consensus was that the template was lacking in a few areas: it could be more spacious and include clues on what to consider while writing the descriptions of scenarios and mechanics. It did nonetheless structure the ideas in a clear manner and provided a framework for the co-design. The process consisted of two parts, where both revolved around a hands-on experience. This practice was met with general enthusiasm. It was however apparent that two groups had trouble starting the co-design process. This might be due to uncertainty of how to start or what to do in general. As

mentioned in 7.7.5, one participant missed scaffolding related to supporting collaboration in the process, which might be the bottleneck of the process. The method appears to require refining with regard to transparency and guidance linked to collaboration support.

The workshop resulted in three design proposals, whereas two groups used *Teamwork* mechanic, converting the game into a multiplayer version, and one included both multiplayer and single-player variants. These results might indicate that the goal of the workshop was not entirely clear to all the participants, as the game was to be merely enhanced, without changing the main concept. It might however mean that the goal was deliberately taken one step further to aid the process of designing a collaborative game for the course, or simply because of a desire to brainstorm more advanced ideas.

Two out of three groups used Mechanic card *Quest*. The pitches explained that large part of the reasoning was the goal of the game being unclear. Both solutions involved quests with specific goals to work towards, making the objective more transparent. Additionally, two groups selected *reflect on how your choices affect others* scenario. This tendency might be due to being easier to design game mechanics for than other alternatives, which focus solely on interactions with others. It might also be that interaction based scenario does not seem as exciting as a game idea. Another explanation might be that content or intended usage of reflection scenario cards was ambiguous, and this specific scenario seemed most approachable.

Multiple comments related to the game itself were consistent with results from the initial evaluation, despite the update of the design. Visibility of the feedback mechanisms, progression indicators and the learning goal seem not sufficient.

Mechanics that would be relevant in the single player mode included a forum. This mechanic provides means of communication outside the game, without modifying the core concept. This solution serves as a stand-alone component. It could be entirely separated from the game, or be integrated into it. A forum requires that the players make conscious effort to participate in its discussions.

The second mechanic related to single player was asking the player what they would do in reality, and subsequently showing statistics on what choice others made, as well as if they would do it in the real world. This mechanic does not allow communication between players, but the results of others' way of thinking is visible to the player. This solution is integrated into the game and not constructing the gameplay. Asking the player what they would do in the real world might provoke reflection. Seeing what others answered might additionally make the player compare their view to others'. It supports sharing of thoughts and ideas without requiring players to communicate directly. It does however not allow for distribution of more advanced ideas or perspectives, or a further discussion. This solution might act as a starting point for a collaborative reflection in a single player game. It is nonetheless superficial, not supporting the practice of collaborative reflection.

7.9. Conclusion

Generated design proposals mostly focused on converting the game into a multiplayer version. As the existing game is single player only at this point, this aspect of the proposals cannot be used directly in the improvement of requirement specification or foundation for the design of feedback mechanisms. A mechanic that proved relevant in both multi- and single player modes was Quest. This mechanic addresses two important issues: keeping track of progress in the game in both modes and a starting point for a discussion or planning activity in a multiplayer mode. It does however not relate to collaborative reflection.

Forum and indicators of what others would do in the real world are mechanics that could provoke collaborative reflection. Table 7.1 presents requirements elicited from the co-design workshop results.

Table 7.1.: Functional requirements base on co-design workshop

ID	**Requirement**
FR14	The game should provide a status of player's progression in the game.
FR15	The game should provide clear objectives to achieve.
FR16	The game should provide means to discuss the game with other players.
FR17	The game should inform the player what choices others made in the same situations.
FR18	The game should inform the player what choices other players would make in the real world.

8. Design

This chapter presents proposed design and explains process and reasoning behind it. The design was based on results from the evaluation of the existing prototype and co-design workshop, exhibited in sections 6.6 and 7.7 respectively.

8.1. Prototyping Tool

Proto.io [6] is a web-based prototyping software, which allows for creating interactive application prototypes for any device with a screen. The tool has been used to develop prototypes of designed UI and feedback mechanisms.

8.1.1. Limitations

The prototyping tool used posed limitations affecting core functionality of the game. Swiping and holding to preview a choice alternative was not possible to implement. Swiping was therefore changed to clicking on one of three arrows on the sides of the situation description.

I have found that the prototyping tool did not allow for development including programming concepts such as conditional statements or loops. This resulted in inability to address a number of requirements and develop full prototypes of the feedback mechanisms. Additionally, the prototyping tool did not allow for communication between devices. Requirements related directly to collaborative reflection were therefore not taken into account in the prototyping process. Section 8.2 provides an overview of the requirements and their status.

8.2. Scope

Scope of the proposed design includes improving usability of the UI connected to feedback and prototypes of proposed additional feedback mechanisms. These proposals are based on requirements elicited from the evaluation and co-design workshop. The design was developed as a composition of interactive prototypes that would enhance the existing game without changing its core functionality. Each prototype corresponds to a designed feedback mechanism or UI improvement.

8.2.1. Requirements

The complete requirements specification is available in table 8.1. Individual requirements were not taken into account in the design process due to being outside of the scope of the thesis or lack of support in the prototyping tool specified in section 8.1.1. A number of requirements were addressed with paper prototypes. Details can be found in table 8.1. Designed fulfillment of FR10 and FR14 is discussed in sections 8.4.1 and 8.4.5 respectively.

Table 8.1.: Complete requirements specification

ID	Requirement	Prototype	Comment
FR1	The game should provide visible continuous status for each category.	yes	
FR2	The game should provide immediate feedback on player's choices.	yes	
FR3	The feedback provided should not distract from the gameplay.	yes	
FR4	The game should provide enough context for the player to make informed choices.	no	beyond the scope
FR5	The game should provide visible, realistic and informative feedback on consequences of the choices.	yes	
FR6	Choices made in the game should affect which situation(s) will be encountered in the future.	no	too complex; lack of support
FR7	Situations should provide a challenge to the player.	no	beyond the scope
FR8	Consequences should provide a challenge to the player.	yes	
FR9	The game should provide status on relations with characters encountered in the game.	yes	
FR10	Relation status should determine character's attitude towards the player in situations.	no	lack of support
FR11	The game should provide status on player's mental state.	yes	
FR12	The game should require the player to balance between their own in-game needs and the work environment's.	yes	
FR13	The game should take into account player's characteristics (preferences for communication, interaction and problem-solving, player type, work experience, achievement levels).	no	beyond the scope
FR14	The game should provide a status of player's progression in the game.	no	lack of support
FR15	The game should provide clear objectives to achieve.	yes	
FR16	The game should provide means to discuss the game with other players.	yes	paper prototype only
FR17	The game should inform the player what choices others made in the same situations.	yes	paper prototype only
FR18	The game should inform the player what choices other players would make in the real world.	yes	paper prototype only

8.3. User Interface - Proposals

This section details proposed improvements to UI.

8.3.1. Categories

To aid affordance, [78] the categories have darker background to indicate they are clickable. The scores are visible at all times. Score increases and decreases are represented with numbers in real time for a few seconds, so that the user can study and contemplate results from their choice, as seen in figure 8.1. The score changes are color coded, where red means a negative change to the score, while green - positive. This is done to follow visibility of the system status guidelines by Nielsen [77]. The icons were redesigned to be more consistent with what they represent.

Requirements: FR1, FR2, FR3

Figure 8.1.: Score increase and decrease at the top of the screen

8.3.2. Category Screen

Clicking on a category screen results in a category screen pop-over. This screen shows a category name, icon and score, including a progression bar. This was done to provide a

more visible overview of the status. Styling, such as fonts, was made consistent with the rest of the game. An example can be seen in figure 8.2.

Requirements: FR1

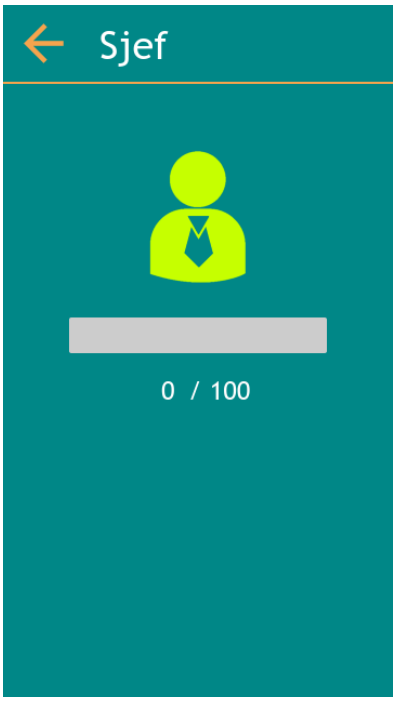


Figure 8.2.: Category screen: example

8.4. Feedback Mechanisms - Proposals

This section presents proposed feedback mechanisms.

Feedback Cards

A proposed mechanic to address issues with lack of context and specific feedback is Feedback Cards. After the player selects a choice alternative, they are presented with a new screen, where they are informed of consequences of their choice through a short textual description. An example is shown in figure 8.3. This is done in addition to usual score increases and decreases. Feedback Cards capture an effort to mimic Eraut's learning factors affecting learning in the workplace [41] by providing challenge and feedback, as well as more context to the game. The textual feedback is designed to provide specific information in form of small, digestible pieces of text, without interrupting the process of making a choice, while providing guidance for making choices in similar situations [92].

Requirements: FR2, FR3, FR5

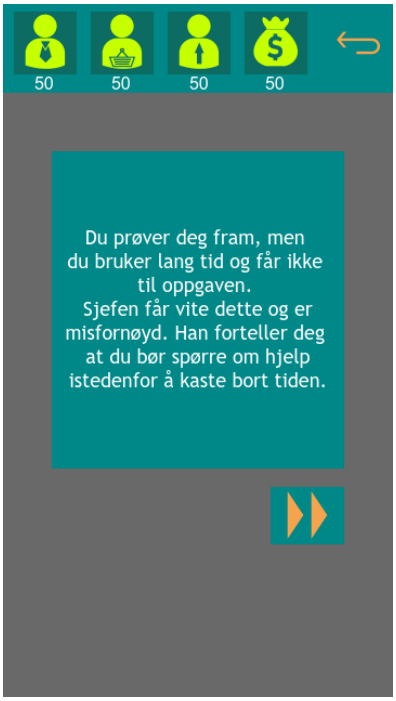


Figure 8.3.: Feedback Card: exmple

8.4.1. Relations

The existing game prototype has a category named "people" which was viewed as vague and overlapping with other categories. Encountering specific characters and tracking relationships with them might be a way to make it more specific.

A proposal for a feedback mechanism is to track relations between the player and several characters met in the game. Each relation would be represented as a progression bar and numerical value, where 100 points indicates a great relationship, and 0 points show a disastrous relationship. Additionally, each person is represented with a unique avatar and a name. This is illustrated in figure 8.4b. Relations would be accessible from the main screen (see figure 8.4a). This feedback mechanism was designed taking into accounts Hunicke's properties of juicy feedback [56] presented in section 5.2. This solution might be appealing to socializers as described by Bartle [18] and increase challenge by having to balance several relationships [70]. This in turn might have an effect on self-efficacy given appropriate challenge level. Additionally, the necessity of balancing between several relations and other aspects of the working life might result in trade-offs.

Requirements: FR2, FR5, FR9

Not Implemented

Full score in a relation will result in positive encounters with the person, while zero points - in a negative one, directly affecting the gameplay and creating an incentive to maintain adequate relationships.

Requirements: FR4, FR5, FR10

(a) Access to Relations (b) Relations screen

Figure 8.4.: Relations

8.4.2. Relations Category

Another proposal addressing the need for status on relations is to have Relations category, as shown to the top right in figure 8.5a. It would be similar to the category called "people". However, remaining categories would represent different actors met in a work environment, such as a boss or a customer, who have unique stakes, letting the Relations category keep track of relations with the colleagues. It would act the same as other categories, without considerably increasing the cognitive load [64] and keeping the design minimalistic, [77] while informing the player on their status on general relations with their colleagues. It would also be interesting to compare Relations feedback mechanism

to Relations category with focus on reflection, self-efficacy and collaborative reflection potential.

Requirements: FR3, FR4, FR9

(a) Relations category at the top (b) Relations screen

Figure 8.5.: Relations category

8.4.3. Sanity Indicator

The game lacked a measure taking into account personal mental health and motivation. As a result there was no incentive for considering how the choice would affect the player themselves, making for a gameplay where the players considered what others would expect from them in such situations. Additionally, the game was regarded as too easy and not challenging. A game needs to provide a challenge to capture interest The game needs a way to force the player to make an effort to balance scores in different aspects of the game, instead of choosing the "correct" choice. Challenge combined with feedback might also support self-efficacy in a working life context [41].

A proposed feedback mechanism is a Sanity indicator. It represents the mental state of the player as a bar with a filling level. When player makes a choice that takes toll on

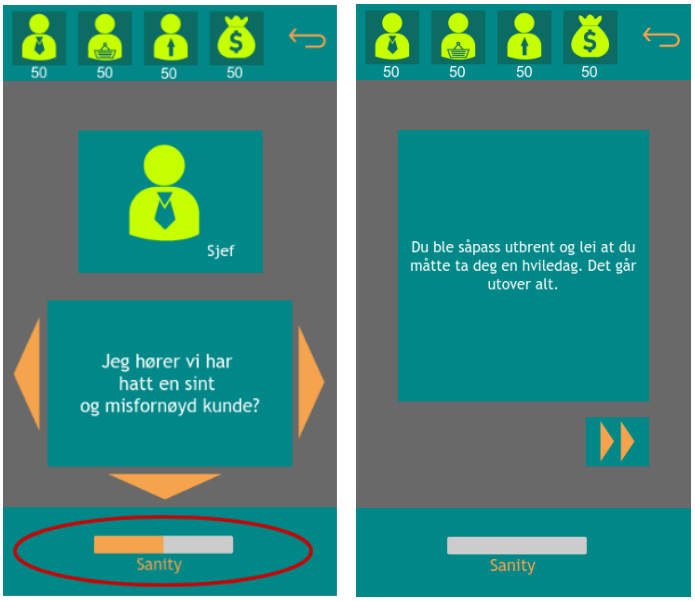
their mental health, the filling level is reduced. This mechanic results in trade-offs when choices are made, calling for necessity of balancing between personal needs and different aspects of the working life. It is designed to provide a challenge in the balancing process, as well as grounds for seeing their own needs in the process. The immediate yet separated visual effects give a possibility of reflecting on the situations. An example screen with a sanity indicator is presented in figure 8.6a.

Requirements: FR2, FR3, FR11

Not Implemented

When the bar is empty, the player is exhausted and the game presents them with a screen informing of the urgency of taking a mental day, as shown in figure 8.6b. This results in score reduction in all categories. This is done to present the player with consequences of not taking care of themselves.

Requirements: FR2, FR3, FR12



(a) Sanity indicator at the bottom

(b) Consequences of empty sanity

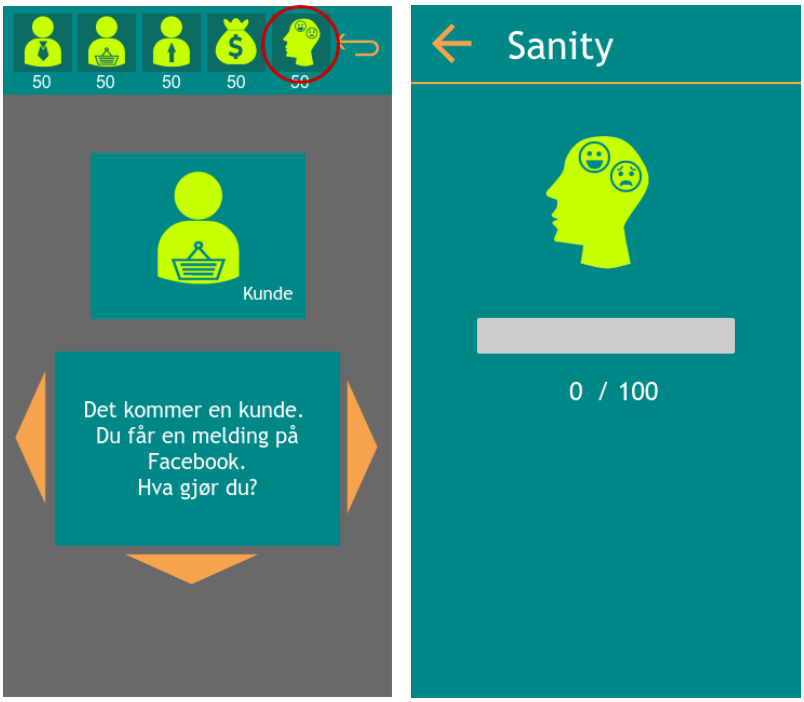
Figure 8.6.: Sanity indicator

8.4.4. Sanity Category

Another proposal taking into account player's mental state is to keep track of sanity through an additional category called Sanity, as shown in figure 8.7a. Similar to Relations category, there would be no difference between this and other categories. It is

however designed so that choices result in trade-offs. The category screen is shows in figure 8.7b. There would be no additional unique elements to follow for the player, possibly reducing the cognitive load [64] and providing minimalistic design, [77] while still providing understandable the feedback.

Requirements: FR1, FR2, FR11, FR12



(a) Sanity category at the top (b) Sanity screen

Figure 8.7.: Sanity category

8.4.5. Goals

Two out of three design proposals from the workshop included use of *Quest* game mechanic. The participants felt they needed a clear progression indication, where they know what they strive for and receive confirmation on goals achieved. This solution might provide a clear progression indicator and goals to work towards, possibly resulting in an experience of flow [30].

Quests are called Goals in this proposal to fit the context and are connected to the real world conventions, [77] and are presented as a list (see figure 8.8b). In this proposal the goals are available after clicking on the corresponding icon seen in figure 8.8a. The goals represent milestones in the working life of an employee. When a goal is achieved, the player sees an animation indicating a goal is achieved. This mechanic conforms with

Shute's [92] properties of good feedback: informing a student of the goals to achieve. The goals act as challenges the player might try to tackle, and with an appropriate difficulty level a success have a potential to increase self-efficacy [41]. Support in the mechanism is expressed by making the goals visible to the player, which acts as an encouragement. While this kind of support might be superficial, it is interesting to determine its effectiveness. With correct level of difficulty, it may make the game more enjoyable and increase flow of the experience [70].

Requirements: FR15

Not Implemented

Due to limitations of the prototyping tool, there is proposed functionality that was not developed in this prototype. Each goal achieved would result in adding situations and goals that are more challenging in the specific area. This would make the game continuously more challenging as skill level increases, providing a foundation for a flow experience based on the Experience Fluctuation Model [73] and self-efficacy improvement [41].

Requirements: FR14, FR15

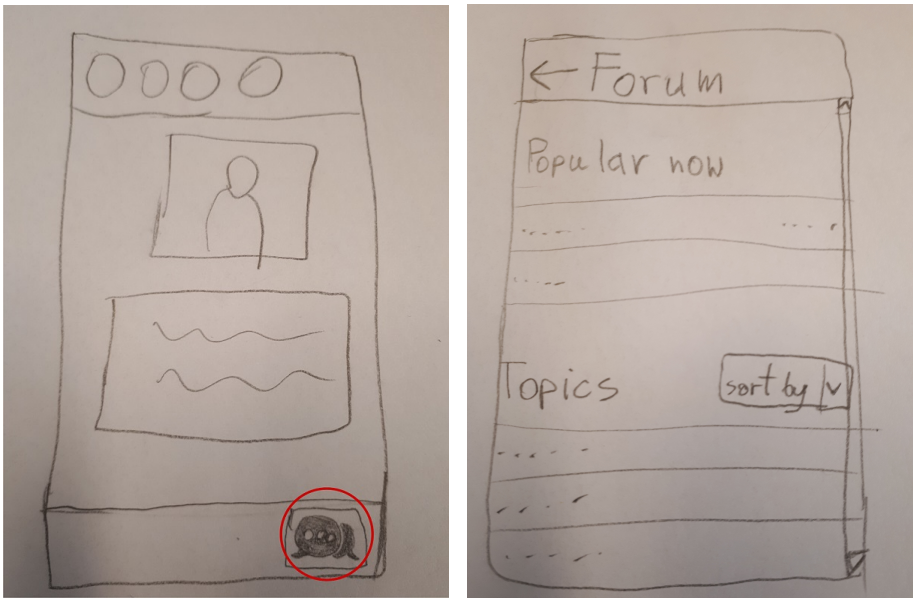
(a) Access to Goals (b) Goals screen

Figure 8.8.: Goals

8.4.6. Forum

The game might provide support for discussion, so that others' attitudes, knowledge and experiences can be shared, possibly imitating an organized collaborative reflection activity [101]. It could in addition document the experiences to provide context and basis for returning to them [83]. Such feedback mechanism might be a forum, where players informally talk about the game, including situations and consequences, and possibly provide feedback to each other. Figure 8.9a shows that one could access the forum with a button click. The forum itself might be organized in a number of ways, in a website outside the game or through functionality contained within the game. The latter proposal is presented in figure 8.9b. The topics popular right now are available at the top to motivate joining an ongoing discussion. Below rest of the topics is organized as a list that can be sorted based on several properties, such as number of responses or time posted.

Requirements: FR16



(a) Forum - button to access (b) Forum screen

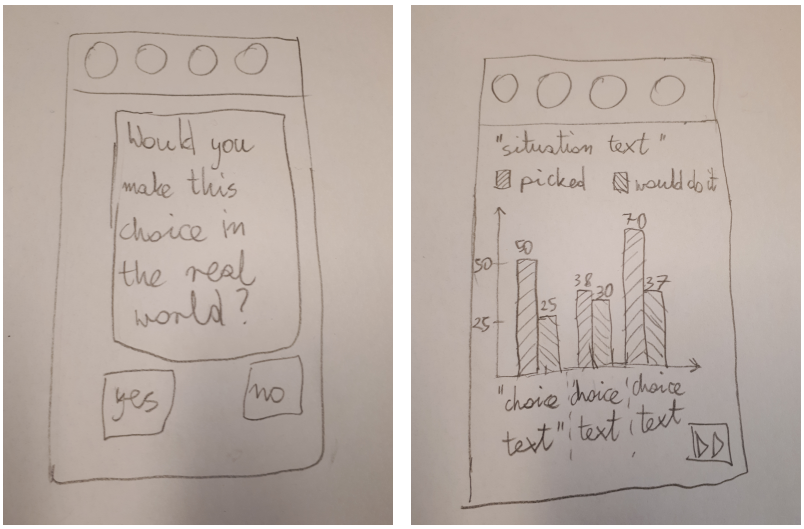
Figure 8.9.: Forum - proposal

8.4.7. Comparison between Choices

The game could spark collaborative reflection within itself if the player could be informed of others' choices, laying a foundation for pondering. A proposal is to ask the player if they would make the choice in the real world after they make one in the game. This is presented in figure 8.10a. Afterwards they would be presented with following statistics for each possible choice: how many players picked the specific choice alternative and how many would make this choice in the real world, as illustrated in figure 8.10b. This

presents the player with a possibility to consider why they made the specific choice, why or why not they would do it in reality and ask themselves the same questions regarding others' choices. While this solution supports a superficial form of collaborative reflection as no discussion can be started directly, it might be interesting to measure its effectiveness related to provoking reflection on others' attitudes and thought processes. Additionally, the statistics might be discussed with others outside the game.

Requirements: FR17, FR18



(a) Question to the player (b) Statistics on choices

Figure 8.10.: Comparison

8.5. Selection of Proposals

Proposals that were made into interactive prototypes are: UI, Feedback Cards, Relations, Relations category, Sanity indicator, Sanity category, Goals.

8.6. Differences from the Game Prototype

Certain changes in comparison to the existing full game prototype were made. They are not related to any particular prototype, and they affected all prototypes globally.

8.6.1. Scoring Changes

Results from the initial evaluation showed the game was perceived as too easy, as one could accumulate more than maximum amount of points in a category without difficulty. Additionally, the consequences in form of score changes were trivial, scarcely affecting

the overall scores. The score changes has been made more significant in order to observe changes in perceived challenge.

8.6.2. Categories

The categories represent different aspects of the working life: Boss, Customer, Personal Development and Wage. This changes were done to isolate relations-related feedback mechanisms and explore possibilities with the representation. Results from the initial evaluation demonstrated that the categories might be unclear and overlapping. It would be interesting to examine effectiveness of a different set of categories.

9. Final Evaluation

In the final evaluation participants interacted with proposed design. This chapter presents the planning of the evaluation, how it was carried out and results.

9.1. Prototypes

Participants evaluated the designed functionality that is described in detail in chapter 8. There were seven small prototypes in total, one for each designed function proposal. Figure 9.1 shows the menu from which each of the prototypes can be accessed, presenting an overview of the prototypes. The prototypes were: UI, Feedback Cards, Relations, Relations category, Sanity Indicator, Sanity category and Goals.

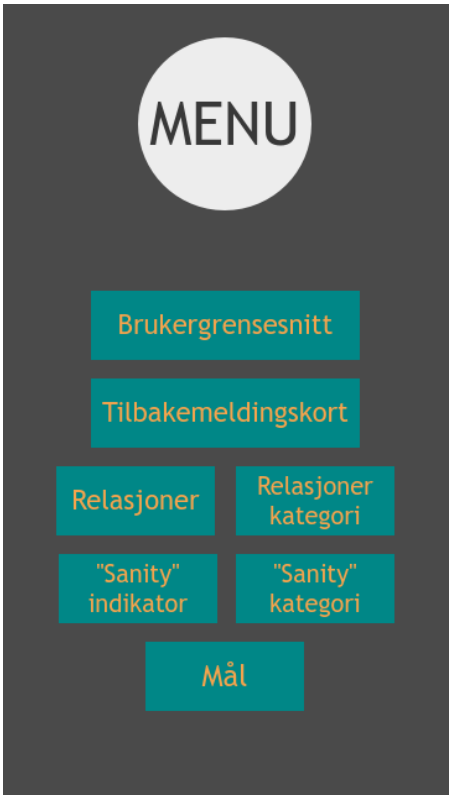


Figure 9.1.: Menu

9.2. Evaluation Objective

The main objective for the evaluation was to gather data on participants' experience of each designed prototype in order to compare the results with the initial evaluation. Aspects that would be compared were impressions related to usability of categories, reflection and self-efficacy. This comparison as well as general results would be used to determine which prototyped feedback mechanisms and UI elements were regarded as useful in supporting reflection and increasing self-efficacy. Additionally, this evaluation would gather data on prototypes' ability to spark collaborative reflection. Table 9.1 presents time allocation for each activity. Due to low room availability, only two hours were allocated.

Table 9.1.: Final evaluation: time allocation

Activity	**Duration**
Introduction	5min
Pre-questionnaire	$\sim$ 10min
Playing the game	10min
Interaction with prototypes	7 * 4min
Post-questionnaire	7 * $\sim$ 5min
Focus group	20min

9.3. Evaluation Design

The evaluation design from the initial evaluation as described in section 6.3 was largely repurposed in this evaluation. However, in order to satisfy requirements presented in section 9.2 evaluation consisted of five elements: filling out the pre-interaction questionnaire, short interaction with the existing full game prototype, interaction with prototypes of individual feedback mechanisms, filling out the post-questionnaire and focus group. Figure 9.2 after interaction with each prototype the participants would fill out the corresponding section of the post-questionnaire. The interaction and observation followed main points guidelines for usability testing as summarized in appendix B.6.

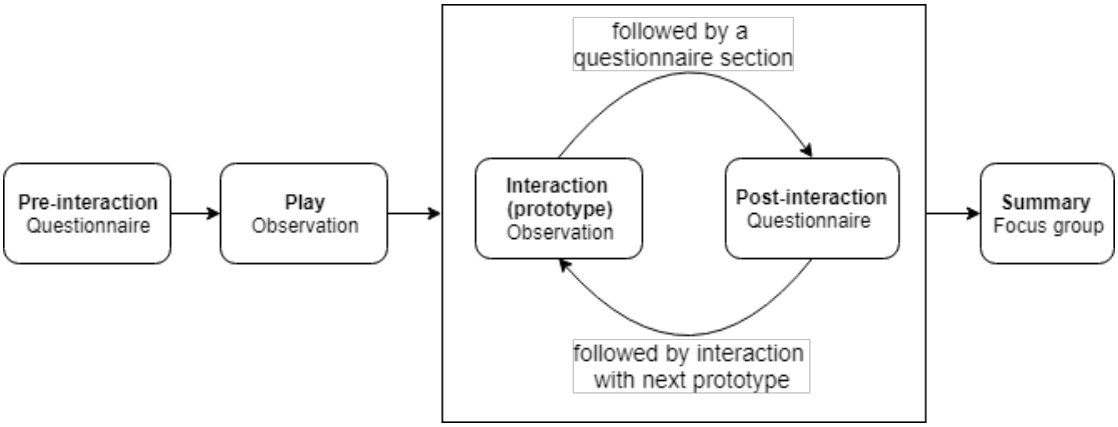


Figure 9.2.: Evaluation structure

9.3.1. Interaction with the Game

The participants were asked to interact with the current game prototype developed by Pineleaf, further called full game prototype in this chapter, in order to get familiar with the core concept: encountering situations, choosing from three alternatives and consequences being registered as score changes in four categories. The game version used was the same as in the co-design workshop, described in section 7.2.

9.3.2. Questionnaire

The pre-questionnaire included the same questions as the pre-questionnaire from the initial evaluation, available in appendix B.2, aside from questions regarding self-efficacy. This was done to measure self-efficacy only as a result of interaction with the prototypes and compare to results from post-questionnaire in the initial evaluation. Post-questionnaire was composed of seven parts, one for each prototype:

1. **User interface:** seven statements related to usability of proposed visual changes to the categories.
2. **Feedback cards:** how this feedback mechanism affected reflection, self-efficacy and desire to discuss the game with others
3. **Relations:** how this feedback mechanism affected reflection, self-efficacy and desire to discuss the game with others
4. **Relations category:** how this feedback mechanism affected reflection, self-efficacy and desire to discuss the game with others
5. **Sanity indicator:** how this feedback mechanism affected reflection, self-efficacy and desire to discuss the game with others

6. **Sanity category:** how this feedback mechanism affected reflection, self-efficacy and desire to discuss the game with others

7. **Goals:** how this feedback mechanism affected reflection, self-efficacy and desire to discuss the game with others

The participants were to interact with one prototype at the time, followed by answering a corresponding section of the questionnaire. Table 9.2 presents templates for statements that were repeated for each feedback mechanism. A five-point Likert scale was used to measure participants' agreement with a few statements in the pre-questionnaire and all statements in the post-questionnaire. The range of the scale was defined as following: 5 - strongly agree, 4 - agree, 3 - neither agree or disagree, 2 - disagree, 1- strongly disagree. Both questionnaires are available in appendix D.1 and D.3.

Table 9.2.: Statement templates

Aspect of learning	**Statement template**
Reflection	<Feedback mechanism> made me think of why I made these choices.
	<Feedback mechanism> made me think of which choices I would take in similar situations in the game.
	<Feedback mechanism> made me think of which choices I would take in similar situations in the real working world.
	<Feedback mechanism> made me think if I could have made better choices in certain situations.
	<Feedback mechanism> made me think of what soft skills are needed at work.
	<Feedback mechanism> challenged my view of what soft skills are needed at work.
Self-efficacy	<Feedback mechanism> made me think that I could solve most of the issues related to collaboration at a workplace if I try hard enough.
	<Feedback mechanism> made me believe that I would be self motivated at work if I invest the necessary effort.
	<Feedback mechanism> made me believe that I would manage being respectful and professional at a workplace in any situation if I try hard enough.
	<Feedback mechanism> made me believe I would manage having a positive attitude in difficult situations at work if I work on it enough.
	<Feedback mechanism> made me believe I would easily find compromises in situations with conflict of interest if I try hard enough.

	<Feedback mechanism> With enough effort I could manage to solve conflicts between colleagues or myself and a colleague even though I could not see an obvious solution.
	<Feedback mechanism> made me believe I would maintain good relations with my colleagues, customers and supervisors if I try hard enough.
	<Feedback mechanism> made me believe that With enough effort it would comes easy to me to find reasonable solutions to ethical dilemmas at a workplace.
	<Feedback mechanism> made me believe I would stay calm if I encountered misconceptions and disagreements at work because I trust my abilities.
Collaborative reflection	<Feedback mechanism> made me want to discuss the game with others.
	<Feedback mechanism> made me want to compare my choices with others'.
	<Feedback mechanism> made me want to discuss the situations from the game with others.
	<Feedback mechanism> made me want to discuss consequences of my choices with others.

9.3.3. Observation

Observations were conducted during interactions with the full game prototype developed by Pineleaf AS and prototypes of UI and feedback mechanisms that were designed.

9.3.4. Focus group Interview

The focus group interview was designed in the same fashion as the focus group from the initial evaluation described in section 6.3.3. It was conducted after all the participants have filled out the post-questionnaire to gather more details on their impressions. The interview guide is available in appendix D.5.

9.3.5. Results Comparison

Results from the post-questionnaire would be compared to the results from the initial evaluation in the manner presented in table 9.3. Aspects that will be compared are usability, reflection and self-efficacy. Statements from the initial evaluation were presented with regard to the entire game, see appendix B.4.

Table 9.3.: Overview of compared statements

Current evaluation	Initial evaluation
Q1-Q6	Q13, Q15, Q16, Q17, Q18, Q41
Q8-Q22	Q21-Q26, Q60, Q61, Q63-Q66, Q68-Q70
Q28-Q42	Q21-Q26, Q60, Q61, Q63-Q66, Q68-Q70
Q48-Q62	Q21-Q26, Q60, Q61, Q63-Q66, Q68-Q70
Q68-Q82	Q21-Q26, Q60, Q61, Q63-Q66, Q68-Q70
Q88-102	Q21-Q26, Q60, Q61, Q63-Q66, Q68-Q70
Q107-Q121	Q21-Q26, Q60, Q61, Q63-Q66, Q68-Q70

9.4. Participants

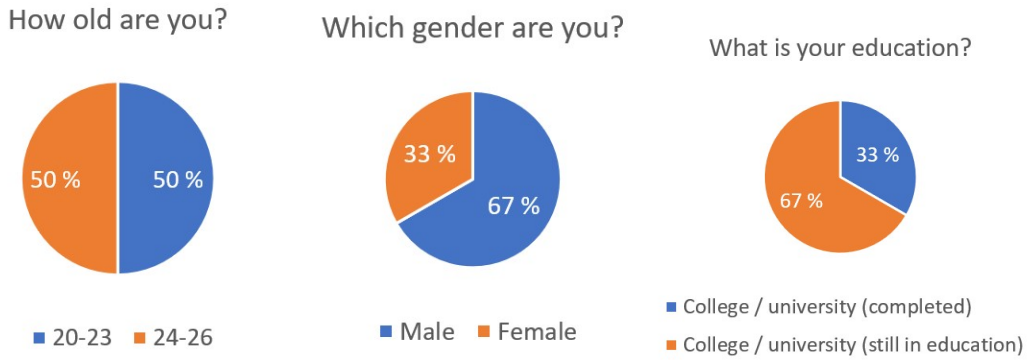
Participants were recruited from own network. There were six participants in total, all college students, two female and four male. Two of them have participated in the initial evaluation, while four were not familiar with the game. Three have a background in IT and three in natural and mathematical sciences. Due to limited amount of available mobile devices and time slots for the evaluation the participants interacted with the prototypes in two turns during the same evaluation session.

9.5. Findings

This section presents findings from the final evaluation. Questions and statements from the questionnaires that are referred to in this section are available in appendix section D.1 and D.3. Legends in figures 9.11, 9.10, 9.14, 9.12, 9.13, 9.15, 9.18, 9.16, 9.17, 9.19, 9.22, 9.20, 9.21, 9.23, 9.26, 9.24, 9.25, 9.27, 9.30, 9.28, 9.29, 9.31, 9.34, 9.32, 9.33 and 9.35 correspond to points on Likert scale: 5 - strongly agree, 4 - agree, 3 - neither agree or disagree, 2 - disagree, 1 - strongly disagree. Complete results from both questionnaires are available in appendix D.2 and D.4.

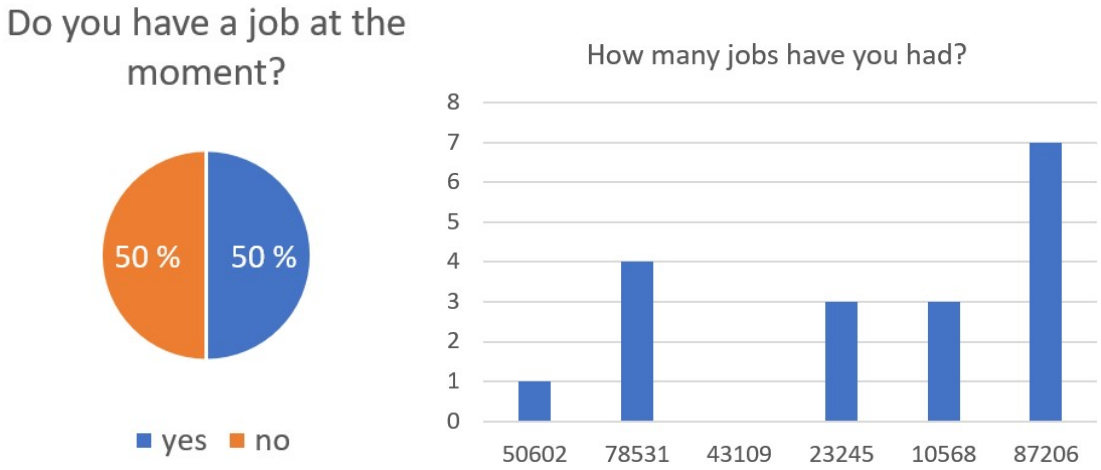
9.5.1. Pre-questionnaire

Figure 9.3 show demographic information gathered about the participants. 3/6 were aged 20-23 and 3/6 were aged 24-26. 3/6 had a job at the time of the evaluation, while 3/6 did not, and all of them were college students. Figure 9.4 show basic work experience information. They had varying working experience, with 1/6 never having a job, 1/6 having one job in the past and 4/6 having experience with 4 or more jobs in several branches. More details on work experience are available in appendix D.2.1.



(a) Age (b) Gender (c) Education

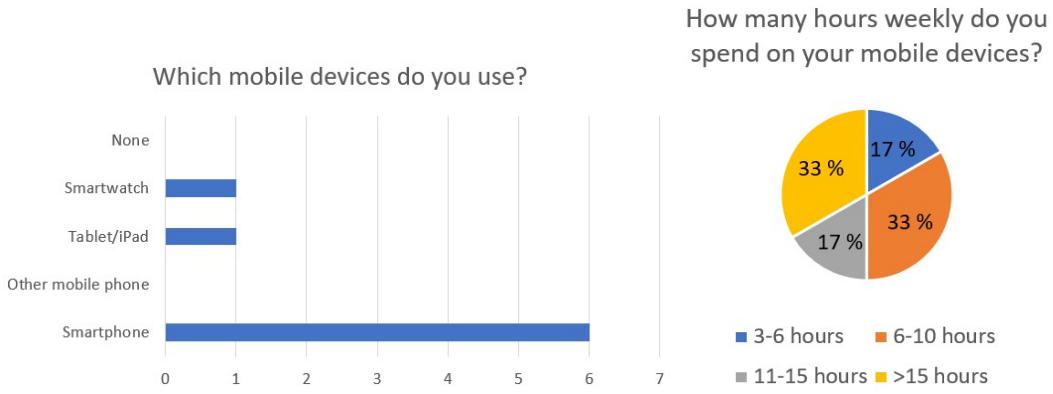
Figure 9.3.: Demographic information



(a) Job at the time (b) Number of jobs

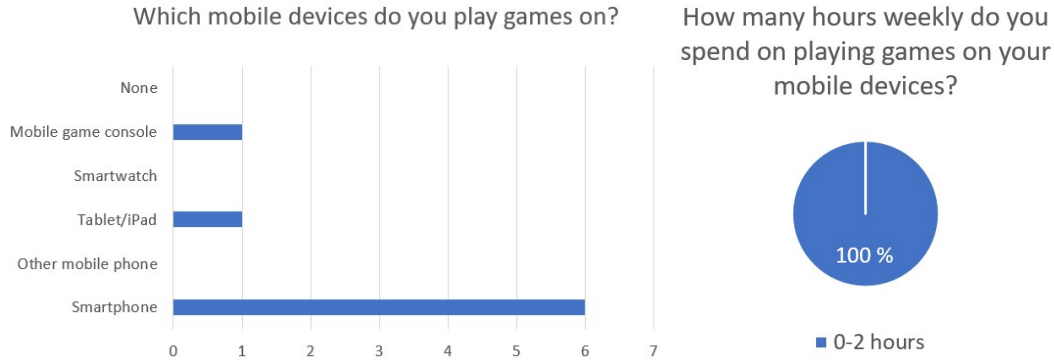
Figure 9.4.: Work experience

Figures 9.5, 9.6 and 9.8 show results on usage of mobile devices. Mobile devices used by the participants included smartphone (6/6), smartwatch (1/6), tablet / iPad (1/6) and mobile game console (1/6). The participants spend following amount of time on their mobile devices weekly: 3-6 hours (1/6), 6-10 hours (2/6), 11-15 hours (1/6) and >15 hours (2/6). All the participants spend 0-2 hours weekly on both playing games on their mobile devices and using learning applications. They play game on a smartphone (5/6), mobile game console (2/6) and tablet / iPad (1/6). All the participants use the learning applications on a smartphone. The learning applications used consisted of quiz (4/6), educational games (3/6), vocabulary test (2/6), video lectures (2/6) and tutorials (1/6).



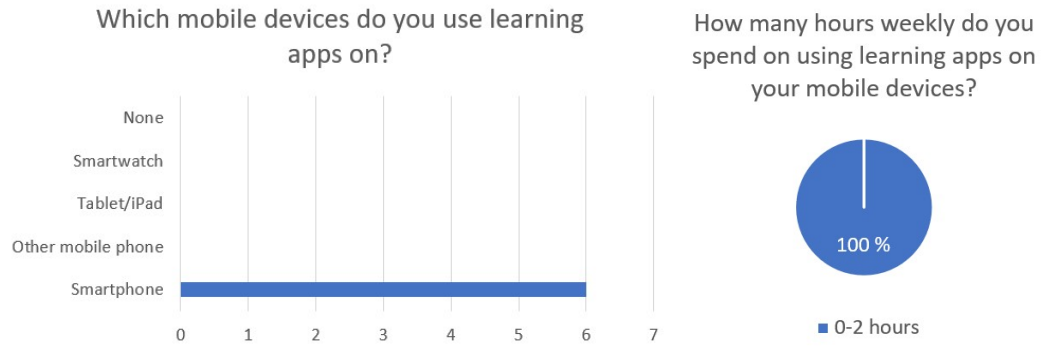
(a) Mobile devices used (b) Number of hours spent

Figure 9.5.: Mobile devices - general usage



(a) Games - mobile devices used (b) Number of hours spent

Figure 9.6.: Mobile devices - playing games



(a) Learning apps - mobile devices used (b) Number of hours spent

Figure 9.7.: Mobile devices - learning apps usage

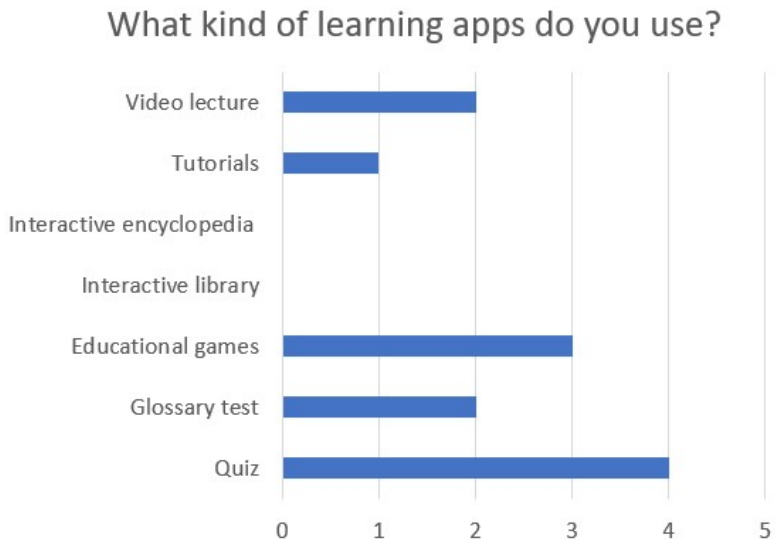


Figure 9.8.: Learning apps used

9.6. Focus

Figure 9.9 presents results related to focus as described in DI theory. 6/6 participants felt they are focused on structure and task through a logic perspective, 3/6 have a relational focus and 4/6 are focused on change, vision and ideas.

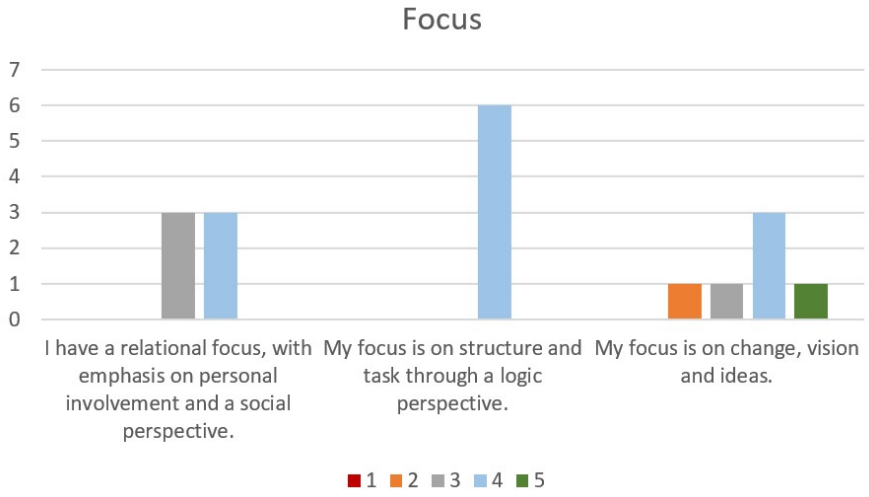


Figure 9.9.: Focus

9.6.1. User Interface

Questionnaire results were mixed, as presented in figure 9.10. It was not transparent to 4/6 that the choices resulted in compromises. The categories provided a clear overview of consequences of the choices on the working life for 4/6. It was clear what the categories represent for 3/6 and what their function is to 2/6. It was not clear they were clickable for 3/6. The categories were changed in the prototypes to isolate the proposed feedback mechanisms, which might be the reason for why they seem unclear. Mean for each statement from the initial evaluation results were higher as presented in figure 9.11. However, those who participated in both evaluations (2/6) stated the scoring was much more visible this time, and they felt the overview was much clearer. They also felt the UI elements present in the UI prototype only, such as amount of points added or deducted being shown immediately after the choice is made combined with a color-based indication was missing in other prototypes. 1/6 claimed they did not notice categories in the full game prototype, while the prototype of the UI gave them distinct feedback on what categories were affected and how. The focus group showed that category icons being briefly modified to show amount points being added or deducted were perceived as an improvement. This combined with red color signifying negative effect and green for positive was a clear, attention capturing indication of what the consequences were. It has also been said that this effect made the participants think more of the consequences. The general lower values might be due to very short interaction with the prototype due to time constraints, slow application response observed during the interaction and low resolution.

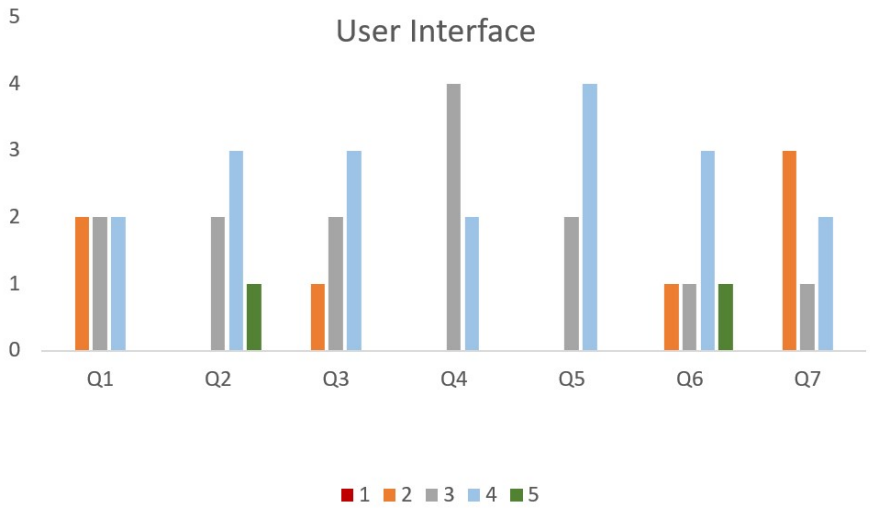


Figure 9.10.: User interface results

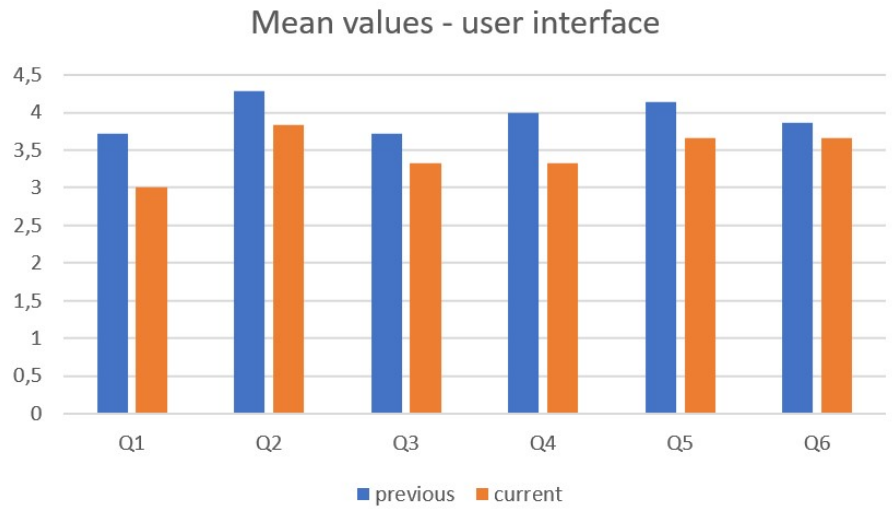


Figure 9.11.: User interface - comparison

9.6.2. Feedback Cards

The questionnaire results in figure 9.12 show that feedback cards did mostly make the participants reflect on their choices, but only to a certain extent. 5/6 neither agreed or disagreed if the feedback cards made them think of what is needed on soft skills at work, and the view on that topic was challenged only for 1/6. Result regarding self-efficacy were mixed, see figure 9.13. 4/6 felt that the mechanism made them believe they could solve ethical dilemmas at work with enough effort. As illustrated in figure 9.15 6/6 were in agreement that he feedback cards made them want to discuss the game, situations and consequences and compare choices with others. Comparison with the initial evaluation in figure 9.14 shows lower values for the feedback cards. The difference was most noticeable in questions regarding self-efficacy.

The observations showed the participants enthusiastically discussed the consequences with each other, commented on them and 1/6 claimed they made an effort to make the in-game boss angry. 6/6 stated that the presenting consequences of each choice is a good idea that gives the game depth by providing additional feedback. They imagine this mechanism has a lot of potential and they would like it to be included in the game. At the same time most felt the feedback cards did not affect them considerably due to their personal disagreement with the content, especially the specific consequences represented by the cards. 2/6 felt the presented consequences did not conform with their personal experiences in the branch they have worked in. However, 1/6 said that it is important to show that the same choices might have different results depending on the context, which they felt the prototype did. Most participants stated that current content did not challenged their views nor did it make them believe they could master soft skills, but they definitely see potential in the mechanism itself. Additionally, the prototype pro-

vided only three looped situations and the interaction was short, making it difficult to immerse themselves. The consensus was that with better content an multiple situations the results might have been more positive.

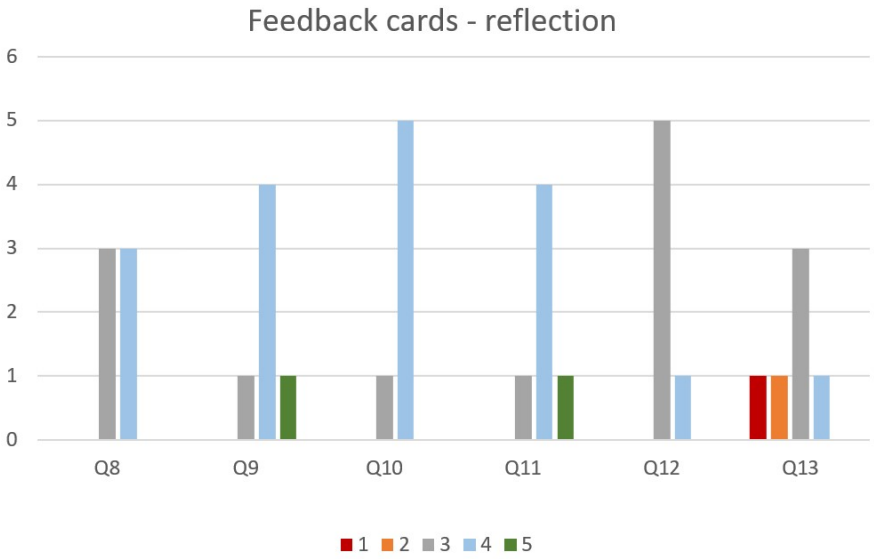


Figure 9.12.: Feedback cards - reflection

Figure 9.13.: Feedback cards - self-efficacy

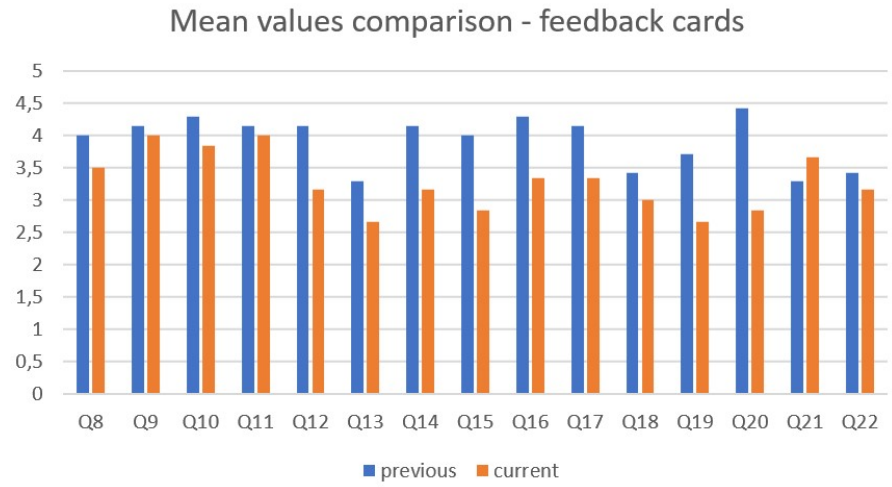


Figure 9.14.: Feedback cards - comparison

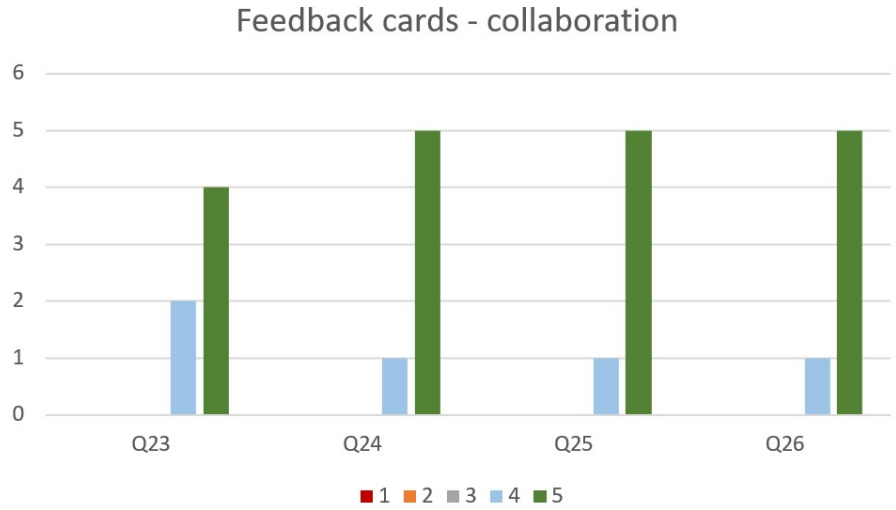


Figure 9.15.: Feedback cards - collaboration

9.6.3. Relations

Based on questionnaire results presented in figure 9.16, Relations seemed to make most of the participants reflect on their choices, especially with regard to considering if they could make a better choice (6/6). 1/6 felt Relations made them think of what is needed of soft skills and challenged their views on it, but results were mostly negative. 3/6 participants neither agreed or disagreed that Relations made them think why them made the specific choices, but the other half was in agreement. The participants were mostly indifferent of Relations' effect on the self-efficacy (see figure 9.17. 3/6 felt Relations made the believe

they would be respectful and professional at work with enough effort. Comparison to results from initial evaluation in figure 9.18 shows that opinions of Relations mechanism were similar with regard to reflection, and more positive for making the participants think if they could make a better choice. Results concerning self-efficacy showed however lower means, especially with respect to maintaining good Relations with both colleagues, customers and employer. As presented in figure 9.19, 6/6 were in strong agreement that he Relations made them want to discuss the game, situations and consequences and compare choices with others. The observation showed immersion in the game, enthusiastic discussions of individuals encountered in the prototype and how their choices affected the Relations. 2/6 mentioned the mechanism absorbed them so much they did not track their score in the categories. 3/6 discussed what character's personalities might be. 1/6 checked Relations menu at once, while 5/6 checked them after encountering the first character in the game. 6/6 checked status on the Relations regularly, after making choices. The focus group showed interest in this feedback mechanism. 4/6 felt the mechanism was useful to present different personalities one can meet at work. They said one might assume that others have the same way of thinking as themselves, and it is a good way to challenge this view and show that different individuals might prefer various interaction styles. 2/6 did not agree with some of the consequences affecting Relations. All the participants agreed that an overview of individual Relations provided more context for making their decisions. Enjoyment of the mechanism varied, but participants not agreeing with the consequences claimed they see potential in the mechanism and that they would change only the consequences. 6/6 felt it should be included in the game.

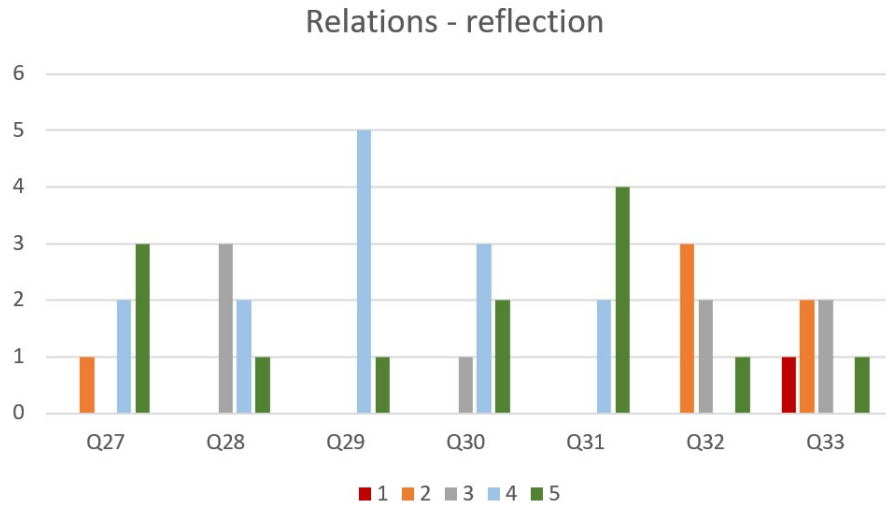


Figure 9.16.: Relations - reflection

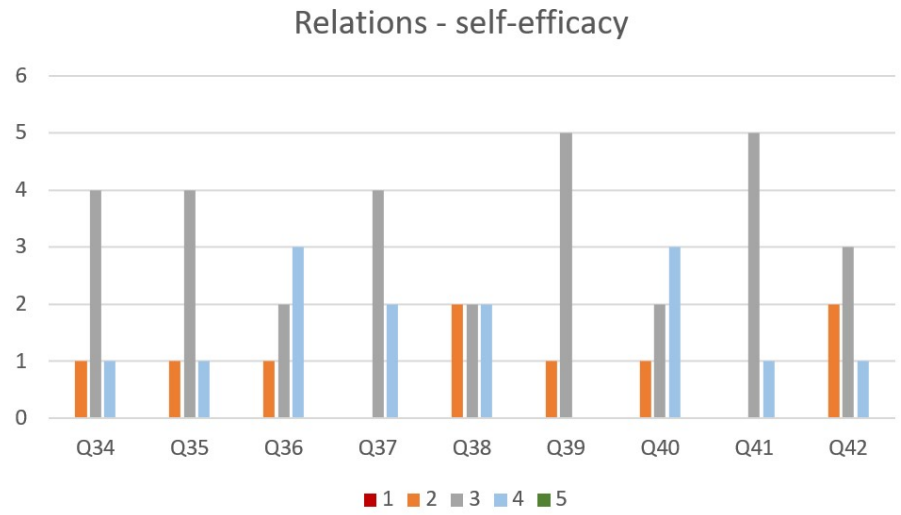


Figure 9.17.: Relations - self-efficacy

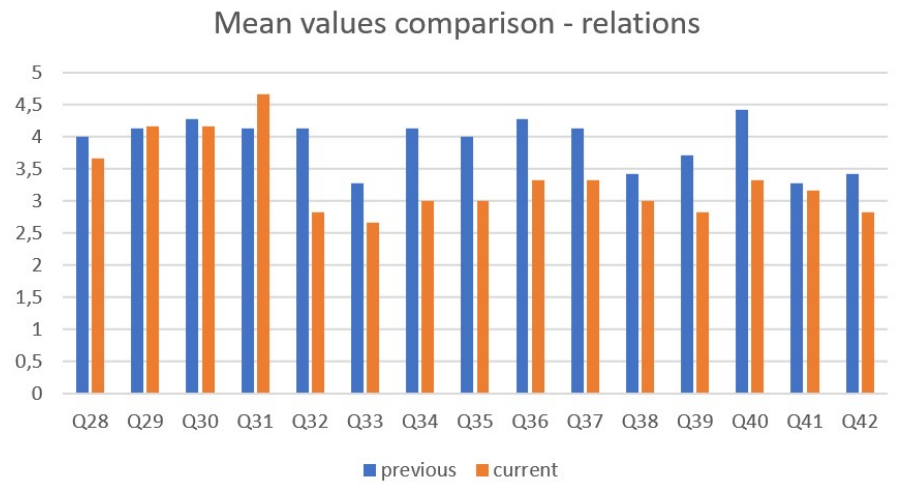


Figure 9.18.: Relations - comparison

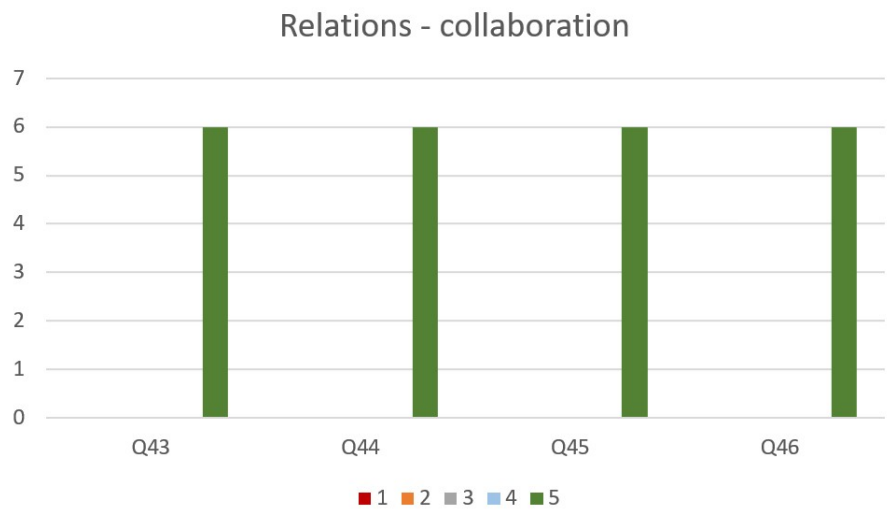


Figure 9.19.: Relations - collaboration

9.6.4. Relations Category

Results in figure 9.20 show mostly agreement with reflection related statements, but 2/6 felt their views have been challenged by the mechanism. Self-efficacy related results were mostly mixed as seen in figure 9.21, weighting heavily on neither agreement or disagreement. Compared to results from the initial evaluation, mean values related to reflection were similar but slightly lower (see figure 9.22). Mean value for the statement *Relations category made me think of what soft skills are needed at work* was however more significantly lower. Values regarding effect on self-efficacy were mostly lower. Questionnaire results related to collaboration in figure 9.23 show agreement, but lower than for Relations. Interview showed that the relation category was seen as a generally acceptable mechanism, and that the game should track how colleagues are affected. At the same time most participants said that it was "another category to min-max", meaning it did not make the game more engaging or exciting. It has been said that adding a fifth category makes the gameplay more mindless. Multiple participants agreed that they focused on one category at the time while playing, the one they had fewest points in, without connecting it to the real world or stopping to think why they make the specific choices, other than trying to not loose. Multiple participants felt that capturing relations as a category took away the need to consider individuals, which was encouraged in the Relations prototype. As such most felt it provided nothing new to the game, aside from another stat they did not consider in depth while playing. 2/6 felt it was hard to see score changes in Relations category. Relations category was deemed by all the participants as not desired inclusion to the game.

Figure 9.20.: Relations category - reflection

Figure 9.21.: Relations category - self-efficacy

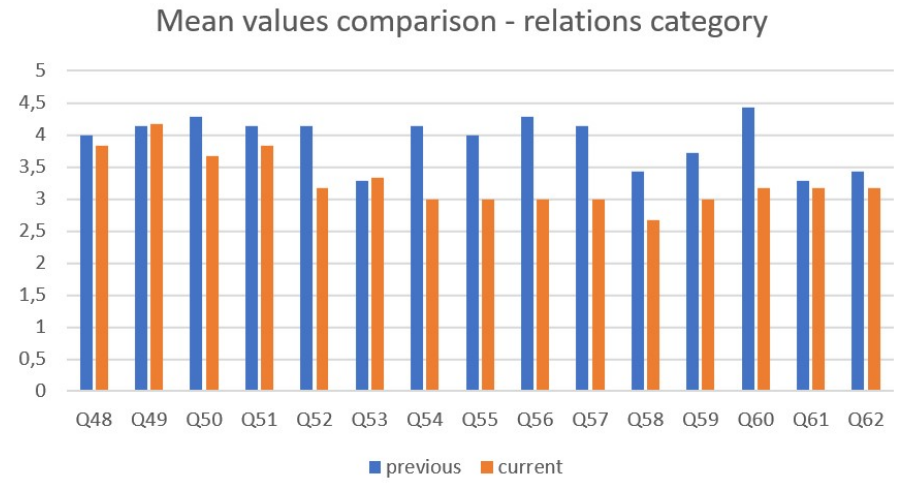


Figure 9.22.: Relations category - comparison

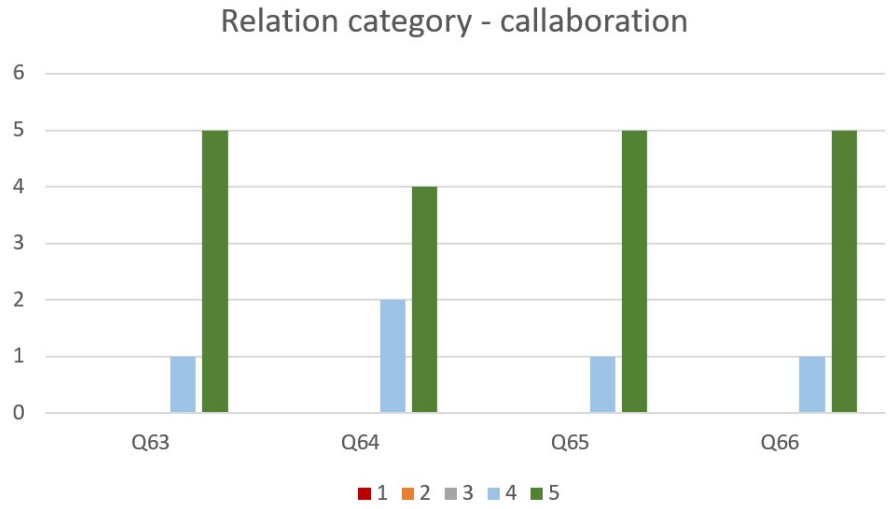


Figure 9.23.: Relations category - collaboration

9.6.5. Sanity Indicator

The results showed in 9.24 were mostly mixed or both neutral and negative. The highest agreement level can be seen in statement regarding believing one would maintain positive attitude at work (3/6). Results related to reflection were mixed as well (see figure 9.25, with some participants being both in strong agreement and no agreement in statements regarding thinking of their choices in similar situations, what soft skills are needed at work and challenging their views. Results comparison in figure 9.26 showed lower values for reflection related questions aside from Q69 *Sanity indicator made me think of what choice*

I would take in a similar situation in the game. The results related to self-efficacy were significantly lower, especially for Q80 *Sanity indicator made me believe I would maintain good relations with my colleagues, customers and supervisors if I try hard enough.* As seen in figure 9.27, 6/6 agreed the mechanism made them want to discuss situations and consequences and compare choices with others. The focus group showed varying attitude towards the mechanic. 2/6 few participants said they did not experience reflection nor increase in self-efficacy, but 6/6 agreed the concept itself might be useful. One participant tried clicking on the Sanity indicator during the interaction, and later stated they would like to receive more details on the sanity status. A few participants stated the mechanism would be better if it tracked energy levels instead of sanity, as it is more relevant, realistic and easier to anticipate consequences of the choices on it. They also disagreed with the consequences of the choices in the prototype, which had a negative effect on their experience. Therefore they imagine the mechanism could have a more positive effect with more realistic content and fair consequences. 6/6 agreed the mechanism made the game more balanced, and liked the idea of taking self into account. They also agreed the indicator should be included in the final version of the game, most saying it would be better to change it to an energy level indicator.

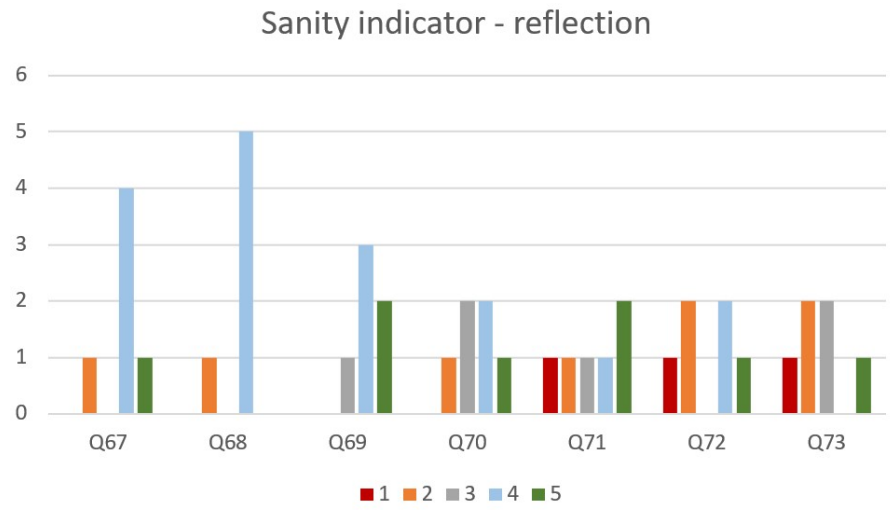


Figure 9.24.: Sanity indicator - reflection

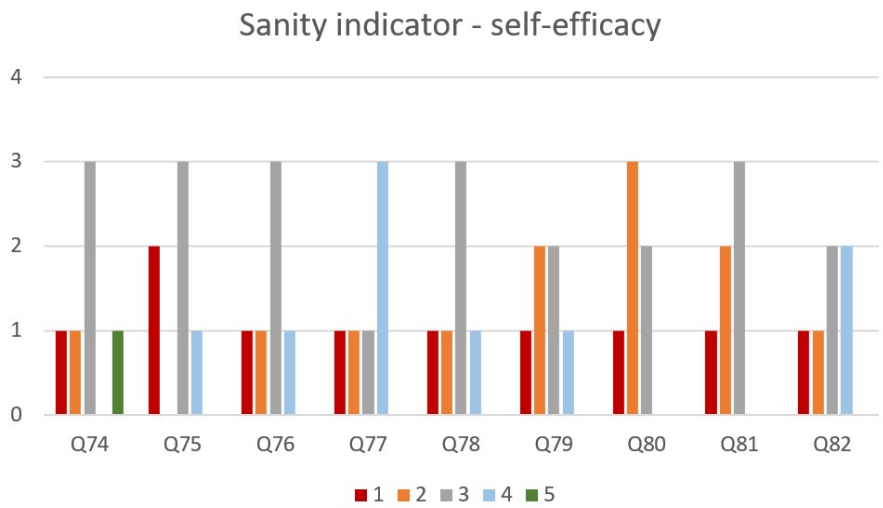


Figure 9.25.: Sanity indicator - self-efficacy

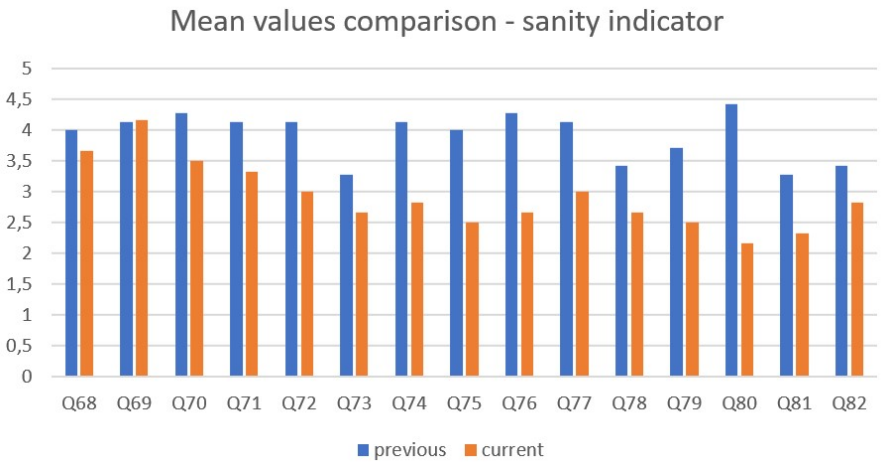


Figure 9.26.: Sanity indicator - comparison

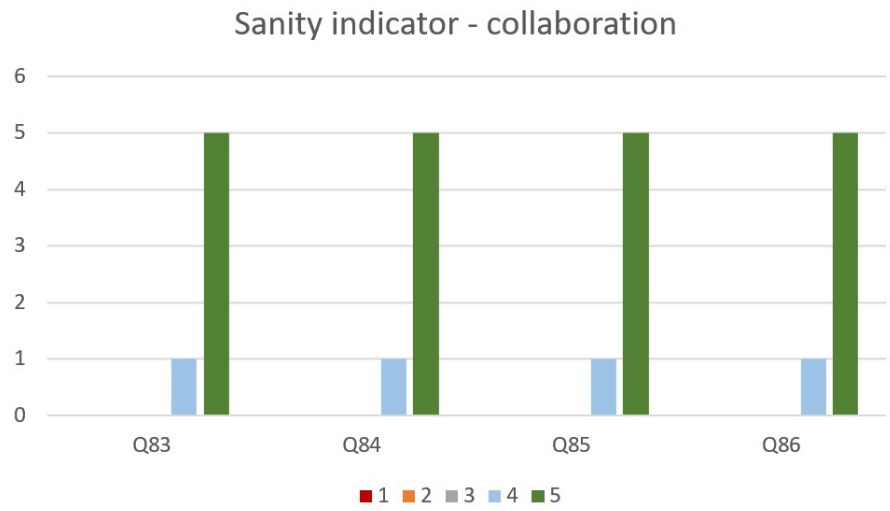


Figure 9.27.: Sanity indicator - collaboration

9.6.6. Sanity Category

Results were mixed about the mechanism triggering reflection (see figure 9.28). 5/6 agreed with Q90 *Sanity category made me think of what choices I would make in the real working life.* Self-efficacy results were mixed as well, see figure 9.29, with mostly negative and neutral standpoints. Comparison of results regarding Sanity category with initial evaluation showed mostly lower mean values as presented in figure 9.30. In the focus group a few participants compared the mechanism to Relations category. They felt both were another counter they did not consider in depth while playing the game, and they felt five or six categories is too many to pay attention to. One participant said they focus on having good enough score than considering what they would do in reality. Sanity category was not a regarded as a useful inclusion to the game.

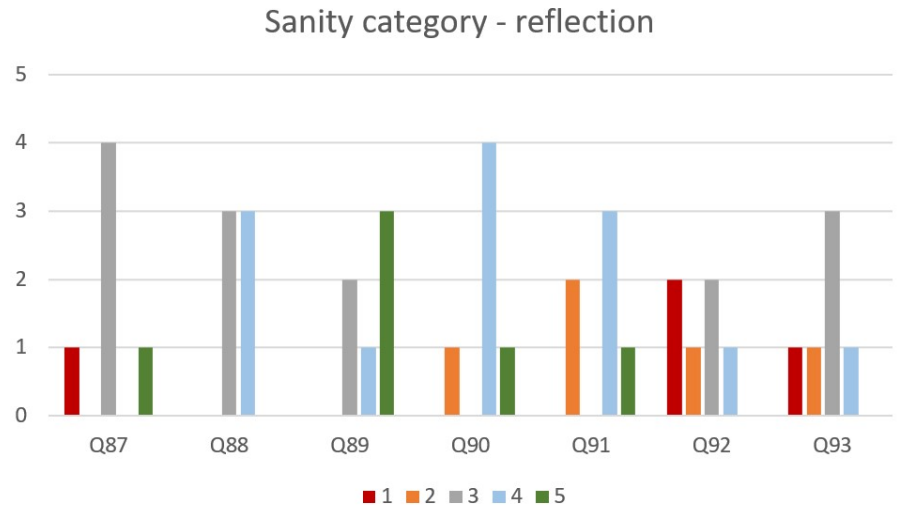


Figure 9.28.: Sanity category - reflection

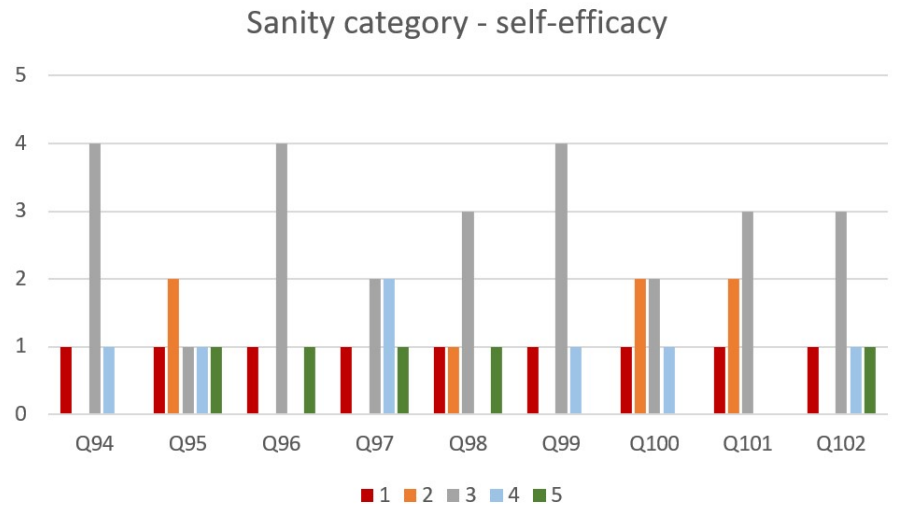


Figure 9.29.: Sanity category - self-efficacy

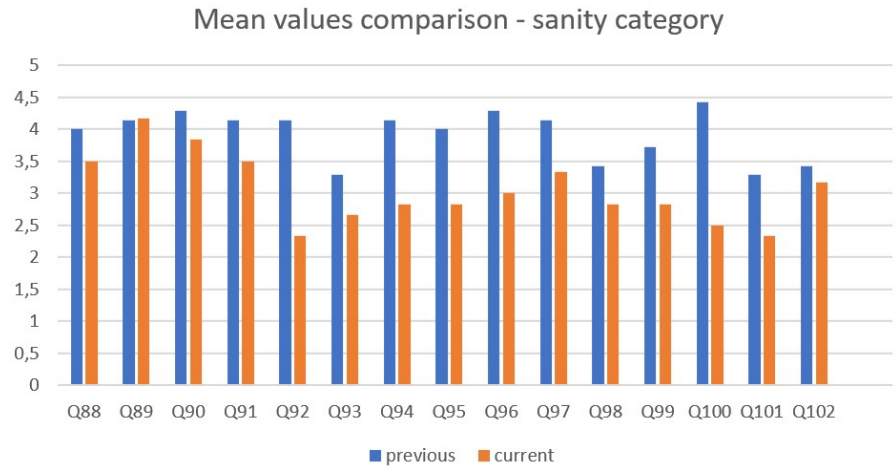


Figure 9.30.: Sanity category - comparison

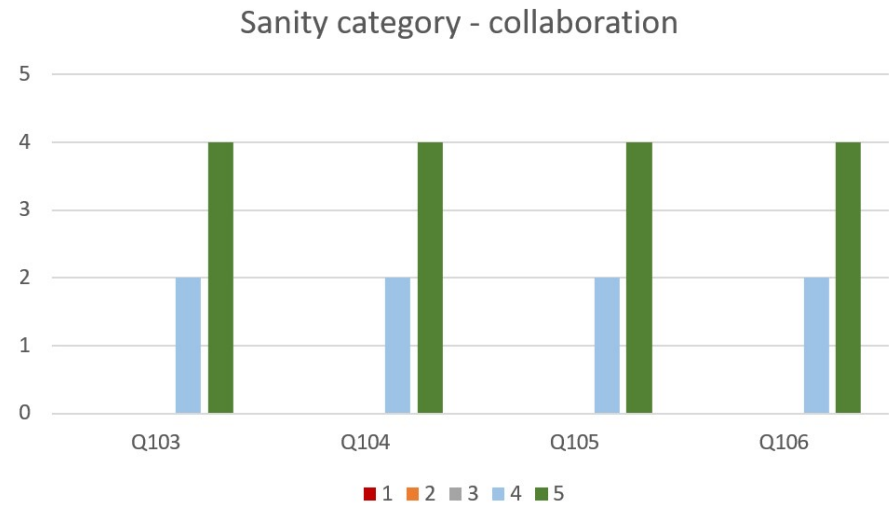


Figure 9.31.: Sanity category - collaboration

9.6.7. Goals

Results related to reflection were mixed, raging from strong disagreement to strong agreement (see figure 9.32). One exception is Q108 *Goals made me think what choice I would take next time in the game*, with all participants agreeing. The self-efficacy results were mostly negative or neutral, as seen in figure 9.33. Comparison with initial evaluation shows mostly lower values. One exception is the statement mentioned above, Q108, with slightly higher mean value. Collaboration related results were almost evenly divided, with four agreeing responses and two not agreeing with each statement, as shown in figure 9.35. Interview showed that many did not necessarily feel mechanism's direct effect

on reflection and self-efficacy, but they saw it as a useful indicator of their progression and a way to gradually increase a challenge in the game. It also made them consider their choices within game boundaries. One participant claimed they enjoyed Goals the most of all the proposed feedback mechanisms, and the interaction made them reflect on their choices, challenged their view on what is needed of soft skills and increased their self-efficacy in all evaluated aspects.

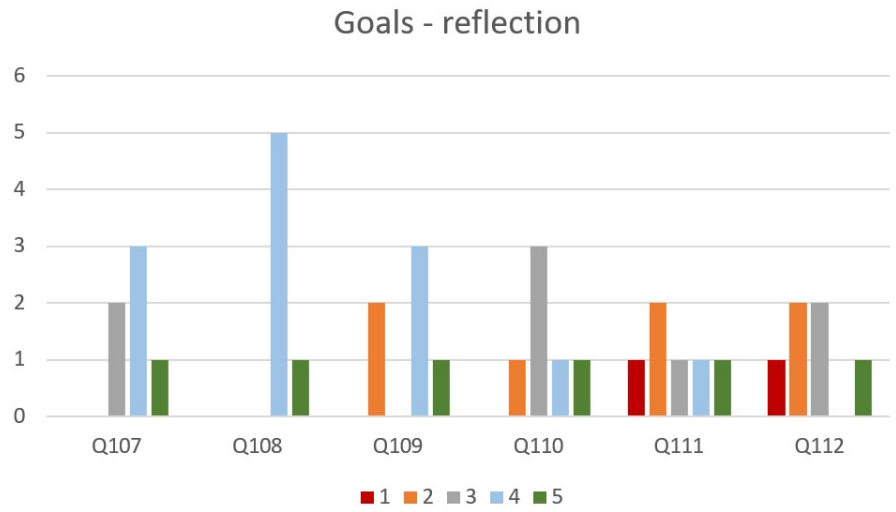


Figure 9.32.: Goals - reflection

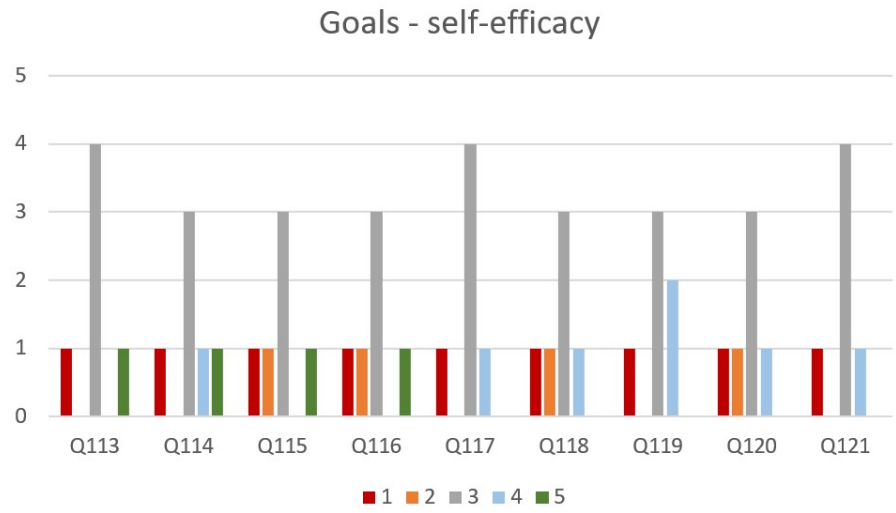


Figure 9.33.: Goals - self-efficacy

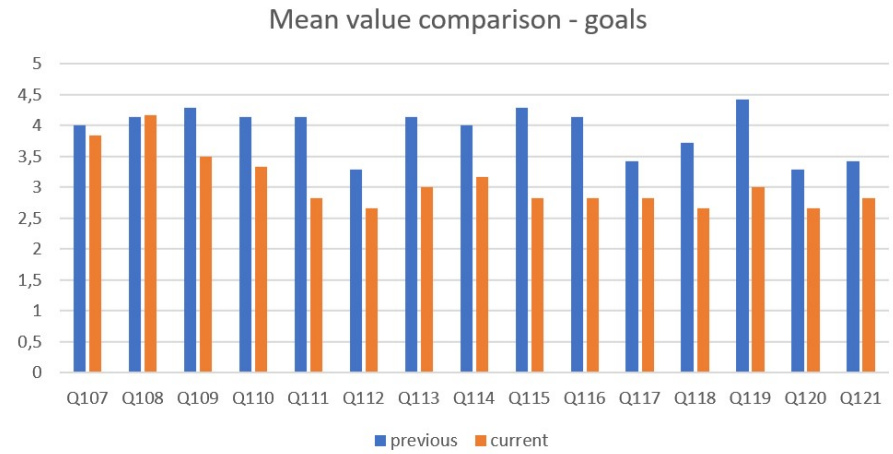


Figure 9.34.: Goals - comparison

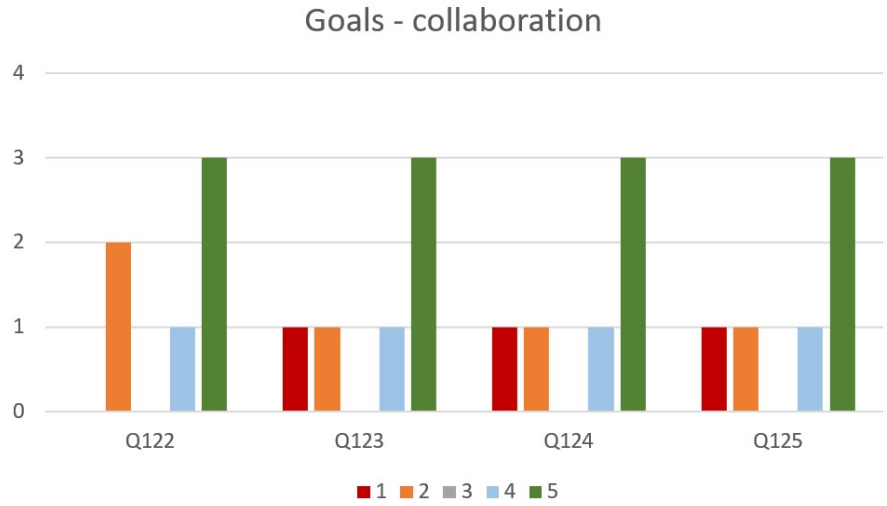


Figure 9.35.: Goals - collaboration

9.7. Discussion

Comparison of mean values showed trend of lower values in this evaluation. Interview and observations revealed however that there were multiple factors affecting the experience: content of the situations and consequences, low number of encountered situations, little time to interact with each prototype, minor bugs and slow response. While certain tendencies might be observed in the results, the samples are too small to propose definite correlations or conclusions.

Only one participant had no work experience prior to this evaluation. Based on the

questionnaire results, feedback mechanisms that were reflection-triggering were Feedback Cards, partially Relations, Relation category, Sanity indicator, partially Sanity category and Goals. Feedback Cards and Relations category seemed to challenge their views on what is needed of soft skills at work. Self-efficacy seems to have been increased for them by Feedback Cards in one aspect as presented in Q21 *Feedback Cards made me believe that with enough effort it would comes easy to me to find reasonable solutions to ethical dilemmas at a workplace.* Otherwise in relation to self-efficacy increase there was disagreement or neutral response. These results seem to resemble Jackson's claim that confidence in own employability might be lowered when being exposed to challenges of the working life [58]. Self-efficacy related to soft skills might be negatively affected or at least not positively affected when one encounters challenges they have not considered before. Initial uncertainty might disappear as one gradually acquires relevant skills. The game provides a simulated experience, where the choices do not affect the real world. This makes for an environment where one can test boundaries and feel more sure of their choices as they play more. This effect might be most relevant to the Sanity indicator and Sanity category, where initial challenge is high. The interaction in this evaluation was very short, and such effect was not possible to observe.

Results conformed with Mason's [72] conclusion that there is no universal feedback benefiting all users alike, as the participants had varying opinions on prototypes' effect. Various backgrounds and working experience resulted in contrasting opinions. For instance, participants with most working experience did not feel challenged by the game and compared it to their work experiences, noticing multiple deviations. Those with less work experience seemed more inclined to question their assumptions about working life, and they claimed the game presented them with various challenges of the working life, such as unpleasant colleagues or the same choices having different results depending on the context.

Self-efficacy results were lower compared to the initial evaluation. This might be due to the effect mentioned above where confidence might be lowered due to unanticipated challenges. The scoring in the prototypes was harsher than in the initial evaluation on account of the game being deemed as too easy. Additionally, a few participants were disagreeing with the consequences presented by the game. This might have resulted in the game being perceived as difficult or unfair, having negative effect on self-efficacy. In general however, much lower mean values compared to the initial evaluation can be observed in statement *<Feedback mechanism> made me believe I would maintain good relations with my colleagues, customers and supervisors if I try hard enough* for each feedback mechanism. This effect might have several causes. Maintaining relationships is a complicated process. It might be perceived as especially difficult in a workplace, where different relationships require various types of maintenance. For instance, relation with a superior might be more professional than with a colleague. This level of complexity was not captured in the prototypes due to few situations showcasing the mechanisms. Additionally, prototypes that did not focus on working relations might naturally affect

self-efficacy in this aspect to a lower degree or not at all.

Relations showed most promising results related to reflection. This might conform with the aforementioned possibility that maintaining relationships at work is a complex and important aspect of the working life. As such Relations might be an appropriate feedback mechanism to make the player consider their behavior in a workplace.

A few tendencies were observed based on DI theory. Participants who claimed they have relational focus seemed to experience more reflection related thoughts when interacting with Sanity indicator prototype. Those focused on visions and ideas seemed to experience more reflection as a result of interacting with Relations. This tendencies are very slight and the sample is too small to determine any correlations.

All participants agreed that the combination of feedback mechanisms they would include in the game are Feedback Cards, Relations, Sanity indicator and possibly Goals. This combination is seen as useful as it takes into account individual relations and the player themselves, while providing specific consequences and a gradually more challenging progression of the game. While the questionnaire results were mixed for Sanity indicator and Goals, the participants made it clear the prototypes were very much limited and they see their potential in learning soft skills given more contextualized, reasonable situations and a longer interaction.

All prototypes were deemed by all participants as something they would like to discuss with others. While some admitted it was due to particular pieces of content seeming absurd or funny to them, the general consensus was that the game including the desired feedback mechanisms with more appropriate content would serve as a conversation piece among colleagues or a basis for a teambuilding event at a workplace. In a typical organized collaborative reflection activity at work one participant shares an experience, which is the object of discussion. The game is structured in a way that makes it possible to stumble upon similar or even the same situations where they have the same role, something that does not happen in the real world. During the observations the participants shared consequences they experienced and compared their choices. Experiencing the same situations with the same possibilities acts as a foundation for a discussion where every participant can contribute with their thoughts, knowledge and perspective. The content being perceived as funny might have its benefits in this context. The feedback mechanisms made the participants want to talk about the game because it would be fun. If some of the situations and consequences were regarded as humorous and interesting but not ridiculous, they have more potential of engaging in a discussion than the serious ones.

The feedback mechanisms that sparked most discussion during interactions with the prototypes, related to irrational content and other aspects of the feedback mechanisms as well, were Relations and Sanity indicator. Sanity category and Relations category did not result in conversations between the participants even though they out-loud regarded

the content as irrational as in other prototypes. Feedback Cards sparked similar discussions, including sharing consequences and intentions. This tendency might indicate that irrationality of the situations is not the most vital factor. Feedback Cards, Relations and Sanity indicator being separated mechanisms made them more visible, which might have made it easier to comprehend or pinpoint the consequences, which could then serve as a conversation piece. Additionally, Relations were the most complex feedback mechanism, including distinct characters with names and faces, while Feedback Cards provided more context to the consequences. This might indicate that the complexity or interaction with various characters provides, and possibly more content in the feedback mechanisms a more appealing conversation topic. In general, Feedback Cards, Relations and Sanity indicator seemed more interesting to the players than their category-based counterparts, which might mean enjoyability might play a role.

10. Discussion

10.1. Research Questions

RQ1: What feedback mechanisms can support reflection in learning work-related soft skills?

Effectiveness of a feedback mechanism with regard to reflection support depends on player's characteristics, such as achievement level, player style. Additionally, in the context of learning work related soft skills, work experience is an important factor linked to the content provided by the feedback mechanisms and the game in general. A combination of several feedback mechanism seems to have most potential of appealing to various types of players, learners and individuals. Furthermore, a variety of feedback mechanisms seems to stimulate conscious consideration of different aspects of the working life, as opposed to one elaborated feedback mechanism, which does not require reflection in order to do well enough in the game. Feedback mechanisms that had elaborated visuals and complexity seemed to inspire reflection, such as Relations. However, such detailed mechanisms might distract from the rest of the game, including other aspects of the working life to consider as an employee. Specific consequences of the choices seem to stimulate reflection as well, such as Feedback Cards. Highest means values across reflection related statements and participants were observed for Relations, Relations category and Feedback Cards, being 3,76, 3,71 and 3,52 respectively. Relations category was however perceived as not appealing by the participants, and Relations feedback mechanism was much preferred. Results from both evaluations showed that categories might support reflection, but must be visible, represent appropriate aspects of the working life and demonstrate fair score changes. Sanity indicator seemed most effective with regard to making the participants to consider why they made the specific choices. While results were mixed otherwise, the participants were enthusiastic about including a similar indicator measuring energy level instead of sanity.

In conclusion, feedback mechanisms that can support reflection in this context are Feedback Cards and Relations. Categories seem to be useful with updated UI while clearly representing appropriate aspects of the working life, but are not sufficient as the sole feedback mechanism. Relations category has potential but might not be as effective over time if there are more than four categories, and a feedback mechanism based on Sanity indicator but representing energy levels might be relevant. However, as the effectiveness of the feedback mechanisms is content dependent, player's characteristics must be taken into account by the game. Additionally, the content must be regarded as relevant by the players. Results from both evaluations show that a multiparameter scoring measure in

form of categories has a potential to capture consequences of the choices that are made.

RQ2: What feedback mechanisms can support self-efficacy in learning work-related soft skills?

Effectiveness of a feedback mechanism is content dependent where challenge of the content is the dominating factor. Player's characteristics, especially work experience, played major role in the evaluation results, and determined perception of the challenge level. Additionally, negative feedback might have negative effect on self-efficacy, making it difficult to determine effectiveness in a short interaction. Based on questionnaire results, feedback mechanisms having highest mean across the participants and self-efficacy related statements were Feedback Cards and Relations, with 3,11 and 3,09 respectively. The most positive responses related to Feedback Cards can be observed in Q21 *Feedback Cards made me believe that with enough effort it would comes easy to me to find reasonable solutions to ethical dilemmas at a workplace.* Relations had most positive responses in Q36 *Relations made me believe that I would manage being respectful and professional at a workplace in any situation if I try hard enough* and Q40 *Relations made me believe I would maintain good relations with my colleagues, customers and supervisors if I try hard enough.* Sanity indicator had most positive responses in Q77 *Sanity indicator made me believe I would manage having a positive attitude in difficult situations at work if I work on it enough.* This possibly shows a tendency where each feedback mechanism specializes in one aspect of soft skills. Results for Goals show that one participant was in strong agreement with all the statements related to self-efficacy, demonstrating that effectiveness of a feedback mechanism is highly subjective. Based on results from both evaluations, a multiparameter scoring measure in form of categories might have positive effect on self-efficacy given proper challenge, visibility, context, representation of appropriate aspects of the working life and realistic situations.

In conclusion, the feedback mechanisms that could support self-efficacy depending on the specific aspect of soft skills seem to be Feedback Cards and Relations. Sanity indicator and Goals might have potential as well, although additional evaluation with proper content and longer interaction need to be conducted for more accurate results. As mentioned above in RQ1, adequacy of the feedback mechanisms is largely determined by player's characteristics and perception of game's relevance.

RQ3: What feedback mechanisms can support collaborative reflection in learning work-related soft skills?

All the participants of the final evaluation agreed that proposed feedback mechanisms Relations, Relations category, Sanity Indicator, Sanity category and Goals made them want to discuss the game, situations and compare their results with others. However, the focus group interview revealed that the reason behind these results was the irrationality and

absurd of the content which was perceived as entertaining. Further discussion revealed that multiple participants see potential of the game in teambuliding sessions or informal discussions among colleagues to reflect together on the situations and consequences. Analysis of the results proved that Relations and Sanity indicator sparked enthusiastic discussion among the participants during interaction, while their category-based counterparts did not. Feedback Cards sparked similar discussions. This results might show that there was other factors that might lead to such reactions, such as complexity or intelligibility of the feedback mechanism, or possibly enjoyability and more content to discuss.

In conclusion, Feedback Cards, Relations and Sanity indicator have the most potential to support collaborative reflection outside of the game. Initial evaluation showed that categories show consequences that might be interesting to discuss with others in an informal setting at work. Relations category, Sanity category and Goals did not show similar potential. Forum and Comparison between Choices should be evaluated in the future.

10.2. Limitations

Results from the initial evaluation, co-design workshop and final evaluation have limited reliability due to sample size, homogeneous background of the participants and time constraints restricting duration of the interactions. The evaluations would need to be conducted with a larger sample and increased variety of backgrounds, such as college students not studying information technology, young adults who are not college students and young adults with little to no work experience.

The prototyping tool Proto.io posed limitations to the development of the prototypes. No support for conditioned statements and other programming functionality lead to the decision of not creating fully functional feedback mechanisms. The final evaluation was under harsh time constraints that did not let the participants interact thoroughly with the presented prototypes.

10.3. Methods

10.3.1. Evaluation Planning Workshop

This method proved reliable in selecting aspects to be evaluated in the existing prototype. Creation of a heuristics list provided a solid starting point rooted in literature. The collaborative nature of the workshop activity allowed for sharing opinions and priorities by the actors involved. The evaluation planning workshop consumed much time and had to be divided in two parts, and most actors were not able to participate in the second one. The discussion had little structure. The method would benefit from a stricter plan

structuring the discussion, as well as a way of steering the discussion on the right track to increase efficiency.

10.3.2. Initial Evaluation

The evaluation structure allowed for collection of data the aspects that were deemed relevant. The initial evaluation proved to have a very broad scope due to results from evaluation planning workshop. As such certain data collected were not directly relevant to the thesis, such as intention to use. However, it allowed to explore aspects of the game that affect the effectiveness of feedback mechanisms, such as content quality. The focus group interview allowed for deeper understanding of the results. However, due to few mobile devices available, the evaluation was divided into two sessions. As a result one focus group consisted of only three participants. The method would be better utilized if more mobile devices were obtained.

A few questions had certain weaknesses. In pre-questionnaire, the table provided for answering Q7 *For each job you have had, specify the branch, if it was full- or part time and how long you have had it in the table below* had unclear headings. Heading *Type of position* was interpreted as the specific position and not full- or part time by a few. Q14 *What types of learning apps do you use?* the option *None* was missing. In the post-questionnaire, Q19 *It was easy to understand the objective in the game* proved to be ambiguously formulated, as results from questionnaires and observations were contradicting.

10.3.3. Final Evaluation

Playing the game before interacting with the prototypes made the participants familiar with the core concept. The objective of the evaluation was clearly conveyed. The evaluation structure where the participants interacted with one prototype, filled out the corresponding section of the questionnaire and then interacted with the next one ensured the impressions were fresh in mind and isolated. Separation of the prototypes made it possible to measure UI's and each feedback mechanism's effect on different aspects of learning. However, due to harsh time constraints, interaction with each prototype had to be reduced to 3-4min duration. This resulted in superficial interactions, where the participants did not have the time to stop and ponder their choices. Additionally, there were not enough mobile devices to accommodate all six participants at the same time. As a result, one group of three participants interacted with a prototype and filled out a part of the questionnaire, while the second group interacted with the previous one. If any participant spent more than five minutes on the questionnaire the other group had to wait. This resulted in unintentional time pressure leading to rushed interactions. Taking turns in interactions with the prototypes proved cumbersome. Due to minor bugs the application had to be reset at every interaction, which was time consuming. As such the evaluation was poorly planned, which likely affected the results in a negative way.

Questions and statements in the pre-questionnaire were understandable and provided desired data. There was however one inconsistency. In question 11 *Which mobile devices do you play on?* one of the options was *mobile game console*. This option was not available in questions 9 and 13, forcing the participants to resort to *other* option. In question 5 *If you are a college student, which year student are you?* there was no option for college students taking an extra year. Options *4. year* and *5. year* were referring to 1. year of the master and 2. year of the master study respectively, which was not clearly conveyed.

Contents of the post-questionnaire proved understandable. The selection of statements allowed for comparison with the initial evaluation. There were however over one hundred statements, and the participants seemed exhausted at the end of the evaluation. In each section regarding a feedback mechanism there were statements linked to potential for collaborative reflection . These statements proved not specific enough, as the participants felt they would like to discuss various aspects of the game with others due to absurd content.

The focus group was a appropriate complimentary source of data, which provided in-depth opinions on several aspects of the designed prototypes. Questions that were asked helped with capturing varying opinions and motivations. The questions could however explore more in depth participants' experience related to reflection and self-efficacy.

10.3.4. Modified MyG Methodology

The modified MyG method used in the co-design workshop proved to be a useful in gathering design ideas and inspiring participants in their own work. However, the goal of the co-design workshop had not been fully achieved, as the proposals included ideas for changing the game's core functionality, instead of merely extending it. It seems the goal was not clearly conveyed. Additionally, a few participants were not certain what the cards should be used for. Next time both goal, process and materials used should be thoroughly explained. A pilot test of the method could be run with impartial individuals in order to identify any misconceptions or confusion.

10.4. Lessons Learned

Work with a master thesis has been a unique experience in numerous aspects. Collaboration with a company in an academic context, extending an existing application and constructing methodology provided challenges I have not encountered before. Additionally, organizing of both evaluations and the co-design workshop required thorough planning and clear vision which had to be well defined throughout the process.

One of the lessons learned was the importance of communicating the focus of the evaluations and the co-design workshop to the participants. It is difficult to anticipate how

they interpret provided context and information and what concepts were understandable. Working with the same topic for a long time resulted in an assumption on my part that individual concepts are self-evident, which might be false. Lack of proper communication and explanation might have lead to unreliable results.

Another important lesson is to plan activities such as evaluation and co-design workshop early, as well as verify any organizational decision. For instance, issues with the final evaluation mentioned in section 10.3 could be avoided by more thorough, early planning and reserving more time for the session. Co-design workshop took more time than planned as well, but it did not seem to affect the results. It is nonetheless essential to ensure enough time is allocated, with respect to participants' and space availability.

Collaboration with Læringsliv AS and Pineleaf AS required clear communication and updating several actors on thesis' status, as well as gathering input from different people on several aspects of the existing prototype. Additionally, each actor had different interests in the project, which required balancing between different needs when defining the scope and making decisions related to evaluations and other activities. It was an interesting and educational experience, where I managed to improve my communication skills and trained myself in decision making.

10.5. Future Work

The prototypes created as a part of the thesis were not complete feedback mechanism implementations due to limitations posed by the prototyping tool. Future work on this count would include more advanced versions of the prototypes presented in chapter 8, including not implemented functionality. Additionally, there are several requirements that were not addressed or were addressed with paper prototypes only. Future work might include covering requirements proposed in sections 8.2 and evaluating their effect on reflection and self-efficacy. Furthermore, other feedback mechanisms could be designed and implemented based on the results from both evaluations.

Future work might also include design and creation of feedback mechanisms to support other aspects related to learning soft skills, such as motivation, usage in a classroom and usage at a workplace. Several points from the heuristics list available in table 6.1 were not thoroughly addressed, which might be done in future studies. However, the heuristics list should have its reliability evaluated.

11. Conclusion

This master thesis' objective was to explore what game feedback mechanisms would support reflection and collaborative reflection and increase self-efficacy linked to work-related soft skills. The initial evaluation has helped with identifying issues and possibilities with feedback. The co-design workshop aided the process of generating ideas for feedback mechanisms and extending requirements. The final evaluation proved multiple design proposals have potential in the matter, but are not effective in their current state. The most prominent feedback mechanisms proved to be Feedback Cards, Relations. Categories in general and Sanity indicator seem to have potential as well, but require improvements.

This thesis contributed a requirements specification and design proposals for several feedback mechanisms. Due to several factors and limitations not all requirements were implemented. Additionally, the created prototypes were superficial. Therefore the contribution resulted in a proof of concept. Further research has to be conducted to develop proper prototypes and evaluate potential of feedback mechanisms Forum and Comparison between Choices.

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A. Heuristics

A.1. Initial heuristics

Table A.1.: Initial heuristics list

Heuristic	Details	Source
Usability		
Visibility of the system status	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time. Provide immediate feedback for user actions. (Specific to the game: The player sees immediate effect of picking an answer. The player can see the status of each category at any time while playing. The player should be aware of the alternative answers they can pick.)	Nielsen, 1994 [77]; Desurvire, 2004 [35]
Connection to the real world	The system should speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.	Nielsen, 1994 [77]
Cognitive load	The user should be provided with no more and no less than the information necessary for making a decision.	Köffel & Haller, 2007 [64]
Recognition rather than recall	The system should promote recognition rather than recall with regards to memory retrieval. All the options, actions and objects should be visible to reduce the memory load. The player does not have to remember information between screens. The system provides enough cues to invoke recognition	Nielsen, 1994 [77]
Aesthetics and minimalistic design	The design does not distract from the content. The extra information does not reduce visibility of the vital information. No unnecessary information is displayed.	Nielsen, 1994 [77]

Error prevention	The system should either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action. There is little room for slips such as misclicks while trying to perform an action. The system provides enough information so that it is simple to avoid mistakes and misunderstandings. Widgets should be at least 1cmx1cm in size. There should be enough space between targets to avoid misclicks.	Nielsen, 1994; [77] Gómez et. al., 2014[48]
Playability		
Winnability	The game must provide an illusion of winnability. The game provides motivation to play.	Desurvire, 2004
Winning Strategy	Game play should be balanced so that there is no definite way to win. There must not be any single optimal winning strategy.	Federoff, 2002 [43]; Korhonen, 2006 [67]
Agency	The player should perceive a sense of control and impact onto the game world. Specific to the game: The player sees effects of the choices they made.	Desurvire, 2004; Korhonen, 2006
(Re)creating an experience (story)	The player is interested in the story line. The story experience relates to their real life and grabs their interest.	Desurvire, 2004
Outcome variation (story)	The Player spends time thinking about possible story outcomes. The player experiences fairness of outcomes.	Desurvire, 2004
Character development (story)	Player is interested in the characters because (1) they are like me; (2) they are interesting to me, (3) the characters develop as action occurs. Specific to the game: The player should be interested in the development of the main character.	Desurvire, 2004
Replayability	The game should be replayable and enjoyable to the player. The challenge should create the desire to play more.	Desurvire, 2004; Koeffel et.al., 2010 [63]
Learning curve	The "learning curve should be shortened". The the player should have "enough information to get immediately started". Tutorials should be able to involve the player quickly and available upon request throughout the entire game. Player is taught skills early that you expect the players to use later, or right before the new skill is needed.	Koeffel et.al., 2010
Failure points	The player should recognise how they lose the game.	Schaffer, 2007

Mistakes	The player should recognise when they make a mistake. The player should recognise occuring trade-offs.	Schaffer, 2007
Learning		
Objective	The player is informed about instructions, rules, objectives and outcomes.	Zaibon, Shiratuddin 2010; [105] Ssemugabi, 2007 [95]
Stimulate recall of prior learning	The game should stimulate recall of what the player learned previously in the game. The game should become harder as it progresses.	Zaibon, Shiratuddin 2010
Practice	The players should practice the new skill to finish the game. (Opportunity for players to confirm their correct understanding, and the repetition increases the likelihood of their retention).	Zaibon, Shiratuddin 2010
Feedback	Meaningful feedback should be provided to inform player about the consequences of their choices and the constructed knowledge. Quantitative feedback is given so that the player is aware of their performance. (Specific to the game: The player receives appropriate (textual) feedback on their choice.)	Zaibon, Shiratuddin 2010; Ssemugabi, 2007
Control	The learner has some freedom to direct their learning and to have a sense of ownership of their learning.	Ssemugabi, 2007
Context	Authentic, contextualised tasks are undertaken rather than abstract instruction. The application enables context- and content-dependent knowledge construction. Learning occurs in a context of use so that knowledge and skills learned will be transferable to similar contexts. The representations are understandable and meaningful, ensuring that symbols, icons and names used are intuitive within the context of the learning task.	Ssemugabi, 2007
Motivation and creativity	Content and interactive features that attract, motivate and retain learners, and promote learner's creativity. Tasks require learners to compare, analyse and classify information, and to make deductions. (active learning and critical thinking) The gameplay should be recognizable, e.g. reminiscent of commercial games to motivate playing while still learning. There should be as much as game content as possible without compromising the learning aspect.	Ssemugabi, 2007; Bjørner and Hansen, 2010 [19]

B. Initial Evaluation - Documents

B.1. Results from evaluation planning workshop

Table B.1.: Results from evaluation planning workshop

Heuristic	**Evaluation relevance**	**Comment**
Visibility of system status	First iteration	This category is closely connected to the feedback the users receives in the game.
Connection to the real world	First iteration	This category is very relevant to the learning goals of the game. The customer is very interested in evaluating this aspect.
Cognitive load	Subsequent iterations	Relevant in general, but not in the first iteration. It can be evaluated through game logs.
Recognition rather than recall		
Aesthetics and minimalistic design	Possibly subsequent iterations	While design was deemed as important in general, the evaluation of this aspect would not be prioritized due little relevance to the scope.
Error prevention	possibly subsequent iterations	While useful to evaluate in general, this aspect is not prioritized.
Winnability	possibly subsequent iterations	It is not yet decided how the player wins the game. As a result it is not possible to evaluate this aspect as of now, but it is relevant to the enjoyment aspect.
Winning strategy	possibly subsequent iterations	The current prototype does not allow for a variation of strategies. However, this aspect is highly relevant.
(Re)creating an experience	First iteration	This aspect was deemed as important to the first iteration due to being closely connected to reflection evaluation. It is also important that the game provides an experience, preferably individual based on taken choices, to engage the player. Sobah has pointed out that it is less relevant as a story aspect and more as a connection to the real world aspect in the context of the game. However, it cannot be evaluated thoroughly due to low complexity of the prototype.
Outcome variation	Subsequent iterations	Relevant especially to the reflection evaluation.

Character development	First iteration	Similarly to (Re)creating an experience, this aspect is closely related to the connection to the real world instead of story. It is highly relevant, but it will not be thoroughly evaluated due to the prototype not being advanced.
Replayability	possibly subsequent iterations	This aspect is highly relevant with regard to game's success. It cannot be evaluated in such an early stage of the process.
Learning curve	Relevant to subsequent iterations, possibly only the final evaluation	Relevant, but in the focus of the project
Stimulate recall of prior learning	Irrelevant	This aspect is not relevant in the context of the game.
Feedback	First iteration	This heuristic is the core of the feedback evaluation. It is closely connected to visibility of the system status.
Mistakes	possibly subsequent iterations	While relevant in general, it is out of scope for the project.
Failure points	possibly subsequent iterations	Important in general, but not possible to evaluate at this stage as it is not yet decided if the player should be able to lose the game.
Context	First iteration	The game is largely based on the idea of contextualized learning, making this heuristic highly relevant.
Objective	First iteration	Basic elements such as instructions and rules could be evaluated, but not outcomes.
Practice	Subsequent iterations	Practice should be in focus early to determine how often situations of the same type should appear and how similar they should be. However, this aspect is out of scope in the early stages of the project.
Stimulate recall of prior learning	Irrelevant	This category was deemed irrelevant to the game.
Control	possibly subsequent iterations	It is important to evaluate control with regard to motivation and engagement, but it is not prioritized yet.
Motivation and creativity	Subsequent iterations	Motivation is an important aspect of the game, but not creativity as such. Curiosity is of interest however. Both could be evaluated later with a more advanced prototype and different type of evaluation.

B.2. Pre-questionnaire - Initial Evaluation

Spørreskjema – læringsspill om myke ferdigheter på i arbeidslivet

Dette skjemaet skal fylles ut før interaksjonen med spillet.

ID: _____

Generelt

1. Hvor gammel er du?

☐ 18-19
☐ 20-23
☐ 24-26

2. Hvilket kjønn er du?

☐ Mann
☐ Kvinne
☐ Annet

3. Hvilken utdanning har du?

☐ grunnskole
☐ videregående skole (fortsatt i utdanning)
☐ videregående skole (fullført)
☐ høyskole/universitet (fortsatt i utdanning)
☐ høyskole/universitet (fullført)

4. Hvis du er student, hvilket år går du på studiet ditt?

☐ 1. år
☐ 2. år
☐ 3. år
☐ 4. år
☐ 5. år
☐ er ikke student

Arbeidserfaring

*Med **jobb** menes her en betalt fast- eller deltidsstilling.*

5. Har du jobb nå?

☐ ja
☐ nei

6. Hvor mange jobber har du hatt? Skriv på linjen under.

_____

7. For hver jobb du har hatt, spesifiser bransje, om det var fast- eller deltidsstilling og hvor lenge du har hatt denne jobben i tabellen under.

Bransje	Type stilling	Hvor lenge

Bruk av mobile enheter, spill og apper

8. Hvilke mobile enheter bruker du? (huk av en eller flere)
☐ smarttelefon
☐ annen mobiltelefon
☐ nettbrett / iPad
☐ smartklokke
☐ ingen
Annet: _____

9. Omtrent hvor mange timer i uken bruker du på mobile enheter?
☐ 0-2 timer
☐ 3-6 timer
☐ 6-10 timer
☐ 11-15 timer
☐ >15 timer

Definisjon: ***Et spill*** *er en lek eller aktivitet med faste regler man engasjerer seg i for å ha det gøy.*

10. Hvilke mobile enheter spiller du spill på? (huk av en eller flere)
☐ smarttelefon
☐ annen mobiltelefon
☐ nettbrett / iPad
☐ smartklokke
☐ ingen
Annet: _____

11. Omtrent hvor mange timer i uken spiller du på mobile enheter?
☐ 0-2 timer
☐ 3-6 timer
☐ 7-10 timer
☐ >10 timer

Definisjon: ***Læringsapp*** *er en applikasjon på en mobilenhet som blir brukt for å tilegne seg ny kunnskap eller øve seg på spesifikke ferdigheter.*

12. Hvilke mobile enheter bruker du læringsapper på? (huk av en eller flere)
☐ smarttelefon
☐ annen mobiltelefon
☐ nettbrett / iPad
☐ smartklokke
☐ ingen
Annet: _____

13. Omtrent hvor mange timer i uken bruker du læringsapper på mobile enheter?
☐ 0-2 timer
☐ 3-6 timer
☐ 7-10 timer
☐ >10 timer

14. Hvilke typer læringsapp bruker du? (huk av en eller flere)
☐ quiz
☐ læringsspill
☐ interaktiv encyklopedi
☐ videoforedrag
☐ interaktivt bibliotek
☐ tutorials (opplæringsprogram eller gjennomgang av hvordan noe lages eller gjøres)
☐ matteapp
☐ gloseprøve
Annet: _____

Myke ferdigheter og arbeidslivet

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig aller uenig**	**Uenig**	**Svært uenig**
15. Jeg er flink til å håndtere stressende situasjoner.					
16. Jeg ser for meg at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
17. Jeg tror jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
18. Jeg er flink til å samarbeide med andre.					
19. Jeg ser for meg at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.					
20. Jeg ser for meg at jeg hadde klart å ha en positiv holdning i vanskelige situasjoner på jobb hvis jeg jobber nok med det.					
21. Jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg prøver hardt nok.					
22. Med nok innsats så tror jeg at jeg hadde klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
23. Jeg er flink til å kommunisere mine meninger og lytte til andre sine meninger.					
24. Jeg ser for meg at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
25. Med nok innsats tror jeg at det hadde blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
26. Jeg hadde beholdt roen om jeg møtte på misforståelser eller uenigheter på jobb fordi jeg stoler på mine evner.					

Fokus

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
27. Jeg har et relasjonelt fokus, med vekt på engasjement og et sosialt perspektiv.					
28. Jeg har fokus på struktur og sak gjennom et logisk perspektiv.					
29. Jeg har fokus på endringer, visjon og ideer.					

Kommentarer:

B.3. Pre-guestionnaire - Results from Initial Evaluation

Likert scale: 5 - strongly agree, 4 - agree, 3 - neither agree or disagree, 2 - disagree, 1- strongly disagree.

Table B.2.: Pre-questionnaire results from initial evaluation

	Question	**39079**	**58780**	**34785**	**62214**	**92417**	**76092**	**01286**
1	Hvor gammel er du?	24-26	24-26	24-26	24-26	24-26	20-23	24-26
2	Hvilket kjønn er du?	mann	mann	mann	kvinne	kvinne	mann	mann
3	Hvilken utdanning har du?	Høyskole / universitet (fortsatt i utd.)	Høyskole / universitet (fortsatt i utd.)	Høyskole / universitet (fortsatt i utd.)	Høyskole / universitet (fortsatt i utd.)	Høyskole / universitet (fortsatt i utd.)	Høyskole / universitet (fortsatt i utd.)	Høyskole / universitet (fortsatt i utd.)
4	Hvis du er student, hvilket år går du på studiet ditt?	5. år	5. år	5. år	4. år	5. år	5. år	5. år
5	Har du jobb nå?	ja	nei	ja	ja	nei	ja	ja
6	Hvor mange jobber har du hatt? Skriv på linjen under.	4	1	8	5	2	7	4
7	For hver jobb du har hatt, spesifiser bransje, om det var fast- eller deltidsstilling og hvor lenge du har hatt denne jobben i tabellen under.							
8	Hvilke mobile enheter bruker du? (huk av en eller flere)	smarttelefon, nettbrett/iPad	smarttelefon, nettbrett/iPad, annet: nintendo switch	smarttelefon, nettbrett/iPad, annet: konsoll	smarttelefon	smarttelefon	smarttelefon	smarttelefon
9	Omtrent hvor mange timer i uken bruker du på mobile enheter?	6-10 timer	>15 timer	>15 timer	11-15 timer	6-10 timer	6-10 timer	3-6 timer
10	Hvilke mobile enheter spiller du spill på? (huk av en eller flere)	smarttelefon	smarttelefon, annet: nintendo switch	smarttelefon, annet: 3DS	smarttelefon	smarttelefon	ingen	smarttelefon
11	Omtrent hvor mange timer i uken spiller du på mobile enheter?	3-6 timer	>10 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer
12	Hvilke mobile enheter bruker du læringsapper på? (huk av en eller flere)	smarttelefon	smarttelefon	smarttelefon	smarttelefon	smarttelefon	ingen	smarttelefon
13	Omtrent hvor mange timer i uken bruker du læringsapper på mobile enheter?	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer
14	Hvilke typer læringsapp bruker du? (huk av en eller flere)	quiz	quiz	quiz	quiz, læringsspill, interaktiv encyclopedi, interaktivt bibliotek, gloseprøve	quiz, læringsspill	ingen	gloseprøve
15	Jeg er flink til å håndtere stressende situasjoner.	4	3	4	3	2	4	4
16	Jeg ser for meg at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	4	4	4	4	4	4	4
17	Jeg tror jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	5	3	4	4	3	5	3
18	Jeg er flink til å samarbeide med andre.	4	4	5	5	4	4	4
19	Jeg ser for meg at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	3	5	4	5	4	5	5
20	Jeg ser for meg at jeg hadde klart å ha en positiv holdning i vanskelige situasjoner på jobb hvis jeg jobber nok med det.	4	5	4	4	3	4	4

21	Jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg prøver hardt nok.	3	3	3	3	3	5	3
22	Med nok innsats så tror jeg at jeg hadde klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	3	3	4	4	4	4	3
23	Jeg er flink til å kommunisere mine meninger og lytte til andre sine meninger.	5	4	4	3	4	4	4
24	Jeg ser for meg at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	5	5	4	5	4	5	4
25	Med nok innsats tror jeg at det hadde blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	4	2	3	4	3	4	2
26	Jeg hadde beholdt roen om jeg møtte på misforståelser eller uenigheter på jobb fordi jeg stoler på mine evner.	4	3	3	4	2	5	3
27	Jeg har et relasjonelt fokus, med vekt på engasjement og et sosialt perspektiv.	4	4	3	4	3	3	3
28	Jeg har fokus på struktur og sak gjennom et logisk perspektiv.	5	5	4	4	4	5	5
29	Jeg har fokus på endringer, visjon og ideer.	3	2	3	4	3	4	4

B.3.1. Work Experience Results from Initial Evaluation

Table B.3.: Work experience results from initial evaluation

ID	Bransje	Type stilling	Hvor lenge
39079	Kirke (kirkegårdsarbeider)	Sommerstilling	3 somre
	Kirke (kirketjener)	Deltid	1 år
	IT (økonomi)	Deltid / sommerstilling	3 år
	IT (konsulent)	Sommerstilling	1 sommer
58780	Butikkansatt	Deltid	18 måneder
34785	Butikkmearbeider (rema 1000)	somerstilling	1 sommer
	Butikk (Ekspert: selger, varelevering)	fast stilling	6 måneder
	IT-konsulting	Sommerstilling	3 somre
	IT-konsulting	Deltid	3 måneder
62214	Butikk (kassemedarbeider, ekstrahjelp)	Sommerstilling	2 somre
	Bed & breakfast (resepsjonist, vaskehjelp, nattevakt)	Sommerstilling	2 somre
	Kafé (servitør, barista)	Deltid	1 år
	Sit (resepsjonist)	Sommerstilling	2 somre
	Clas Ohlson (butikkmedarbeider)	Deltid	3,5 år
92417	Butikk (selger)	Deltid	1 år
	Realfagsløypene (guide)	Deltid	6 uker
76092	HPC	Deltid	2 måneder
	HPC	Deltid	5 måneder
	HPC	Deltid	2 måneder
	Akademia	Deltid	2 år
	Akademia	Deltid	3 måneder
	Sikkerhet	Deltid	8 måneder
	Sikkerhet	Deltid	2 måneder
01286	Oppdrettsnæring	Sommerstilling	3 somre
	Veiarbeid	Sommerstilling	2 uker
	Skibsverft	Sommerstilling	2 somre
	Programvareutvikler	Deltid / sommerstilling	10 måneder

B.4. Post-questionnaire - Initial Evaluation

Spørreskjema – læringsspill om myke ferdigheter i arbeidslivet

Dette skjemaet skal fylles ut etter interaksjonen med spillet.

ID: _____

Spill – generelt inntrykk

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
1. Spillet var lett å bruke.					
2. Spillet var mentalt krevende.					
3. Ved å spille spillet forbedret jeg mine myke ferdigheter.					
4. Om spillet blir gitt ut så hadde jeg spilt det.					

På skala fra 1-10, hvordan vil du vurdere spillet:

	1-10
5. Hvor gøy var spillet? (1 – kjedelig, 10 – gøy)	_____
6. Hvor spennende var spillet? (1 – uinteressant, 10 – spennende)	_____
7. Vekket spillet ubehag hos deg? (1 – ubehagelig, 10 – behagelig)	_____

Spill – brukbarhet

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
8. Det var lett å forstå at det er tre valgalternativer.					
9. Det var lett å forstå hvordan man velger et alternativ.					
10. Det var lett å velge et alternativ.					
11. Det var lett å forstå at valgene har konsekvenser.					
12. Konsekvensene av valgene var tydelig presentert til spilleren.					
13. Det var lett å forstå at valgene resulterer i kompromisser.					
14. Det var lett å forstå hvilke deler av spillet blir påvirket av valgene mine.					
15. Det var lett å undersøke hvor bra jeg gjorde det i spillet.					
16. Det var lett å forstå hva ikonene øverst på skjermen representerer.					
17. Det var lett å forstå hva funksjonen til ikonene øverst på skjermen er.					
18. Ikonene øverst på skjermen er meningsfulle.					
19. Det var lett å forstå hva som er målet i spillet.					

Spillet - læring

Definisjon: ***Myke ferdigheter*** *er en kombinasjon av personlighet, holdninger og sosiale ferdigheter, som f.eks. samarbeidsevner og integritet.*

Generelt

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
20. Spillet fikk meg til å tenke på hva jeg kunne gjort bedre i spillet.					
21. Spillet fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
22. Spillet fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					
23. Spillet fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
24. Spillet fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
25. Spillet fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
26. Spillet utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
27. Spillet fikk meg til å reflektere over mine myke ferdigheter.					
28. Spillet motiverte meg til å forbedre mine myke ferdigheter i virkeligheten.					
29. Jeg kan overføre erfaringer fra spillet til det virkelige arbeidslivet.					
30. Konsekvenser av valgene mine i spillet var avgjørende for mitt utbytte av å spille spillet.					
31. Situasjonene og valgmulighetene jeg møtte i spillet var avgjørende for mitt utbytte av å spille spillet.					

Bevissthet

Spillet gjorde meg bevist på følgende aspekter av arbeidslivet:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
32. Mitt forhold med kunden i spillet.					
33. Mitt forhold med medarbeidere i spillet.					
34. Mitt forhold til arbeidsmiljøet i spillet.					
35. Mitt forhold til økonomi i spillet.					

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
36. Situasjonene gjorde meg bevist på kunden, medarbeidere, arbeidsmiljø og økonomi i spillet.					
37. Valgmulighetene gjorde meg bevist på kunden, medarbeidere, arbeidsmiljø og økonomi i spillet.					
38. Kategoriene (representert av ikonene øverst på skjermen) gjorde meg bevist på kunden, medarbeidere, arbeidsmiljø og økonomi i spillet.					
39. Spillet ga meg passende mengde med tilbakemeldinger.					

Kategorier

***Kategoriene** ble representert av ikonene øverst på skjermen i spillet.*

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
40. Kategorier er en god måte å representere på hva man skal ta hensyn til i arbeidslivet.					
41. Kategoriene ga meg en god oversikt over konsekvensene av valgene mine på de forskjellige aspektene arbeidslivet.					

42. Kategoriene ga meg en god oversikt over hva jeg er flink til som en potensiell ansatt.					
43. Kategoriene ga meg en god oversikt over hva jeg kunne forbedret som en potensiell ansatt.					
44. Kategoriene ga meg bedre oversikt over mine myke ferdigheter.					
45. Kategorisering hjalp meg med å reflektere over mine myke ferdigheter.					
46. Jeg var interessert i hvor mange poeng jeg hadde i de ulike kategoriene.					

Realisme og opplevelse

Hovedpersonen *er personen du styrte i spillet.*

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
47. Hovedpersonen møtte på dilemmaer som kunne skjedd på en arbeidsplass.					
48. Situasjonene var utfordrende.					
49. Jeg ser for meg at jeg kunne møtt på lignende situasjoner i virkeligheten.					
50. Spillet er lett å leve seg inn i.					
51. Konsekvensene av valgene i spillet var realistiske.					
52. Konsekvensene av valgene i spillet var meningsfulle.					
53. Konsekvensene av valgene i spillet var rettferdige.					
54. Jeg brydde meg om skjebnen til hovedpersonen.					

56. Jeg følte at hovedpersonen kunne vært meg.					
57. Jeg spilte spillet som om hovedpersonen var meg.					
58. Jeg var nysgjerrig på konsekvensene av valgene jeg tok i spillet.					

Myke ferdigheter og arbeidslivet

Basert på ditt utbytte av å spille spillet og hvordan interaksjonen påvirket dine meninger og ferdigheter, hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig aller uenig**	**Uenig**	**Svært uenig**
59. Jeg er flink til å håndtere stressende situasjoner.					
60. Jeg ser for meg at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
61. Jeg tror jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
62. Jeg er flink til å samarbeide med andre.					
63. Jeg ser for meg at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis går tilstrekkelig inn for det.					
64. Jeg ser for meg jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg jobber nok med det.					
65. Jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg prøver hardt nok.					
66. Med nok innsats så tror jeg jeg hadde klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
67. Jeg er flink til å kommunisere mine meninger og lytte til andre sine.					

68. Jeg ser for meg at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
69. Men nok innsats tror jeg at det hadde blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
70. Jeg hadde beholdt roen om jeg møtte på misforståelser eller uenigheter på jobb fordi jeg stoler på mine evner.					

Kategorisystem

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
71. Et sett med kategorier der status på hvert aspekt av arbeidslivet er synlig støtter læring i større grad enn et poengsystem der kun totalsummen er synlig til brukeren.					
72.Et kategorisystem der kategoriene representerer ulike aspekter av arbeidslivet gir tilbakemeldinger som kan hjelpe med å forbedre myke ferdigheter.					
73. Et kategorisystem der kategoriene representerer ulike aspekter av arbeidslivet utgjør en tilstrekkelig basis for å reflektere over valgene i spillet.					
74. Fire (4) er riktig antall kategorier for å representere hva man skal ta hensyn til i arbeidslivet.					

Andre kommentarer:

B.5. Post-questionnaire - Results from Initial Evaluation

Likert scale: 5 - strongly agree, 4 - agree, 3 - neither agree or disagree, 2 - disagree, 1- strongly disagree.

Table B.4.: Post-questionnaire results from initial evaluation

		39079	**58780**	**34785**	**62214**	**92417**	**76092**	**01286**
1	Spillet var lett å bruke.	4	5	3	4	4	3	4
2	Spillet var mentalt krevende.	4	4	2	2	2	2	1
3	Ved å spille spillet forbedret jeg mine myke ferdigheter.	3	3	2	4	3	2	3
4	Om spillet blir gitt ut så hadde jeg spilt det.	3	2	2	4	3	1	2
5	Hvor gøy var spillet? (1 – kjedelig, 10 – gøy)	6	7	4	5	4	3	4
6	Hvor spennende var spillet? (1 – uinteressant, 10 – spennende)	5	3	5	5	7	4	3
7	Vekket spillet ubehag hos deg? (1 – ubehagelig, 10 – behagelig)	1	7	5	9	10	9	10
8	Det var lett å forstå at det er tre valgalternativer.	2	2	1	2	2	1	2
9	Det var lett å forstå hvordan man velger et alternativ.	2	4	3	3	4	4	5
10	Det var lett å velge et alternativ.	4	4	3	3	3	2	4
11	Det var lett å forstå at valgene har konsekvenser.	5	2	5	4	4	5	3
12	Konsekvensene av valgene var tydelig presentert til spilleren.	4	2	3	5	4	4	3
13	Det var lett å forstå at valgene resulterer i kompromisser.	3	4	4	4	4	3	4
14	Det var lett å forstå hvilke deler av spillet blir påvirket av valgene mine.	4	3	3	4	4	4	4
15	Det var lett å undersøke hvor bra jeg gjorde det i spillet.	4	4	3	4	5	5	5
16	Det var lett å forstå hva ikonene øverst på skjermen representerer.	3	3	4	4	4	4	4
17	Det var lett å forstå hva funksjonen til ikonene øverst på skjermen er.	4	3	4	4	4	4	5
18	Ikonene øverst på skjermen er meningsfulle.	5	4	4	4	4	4	4
19	Det var lett å forstå hva som er målet i spillet.	3	4	5	4	4	5	5
20	Spillet fikk meg til å tenke på hva jeg kunne gjort bedre i spillet.	3	2	3	5	3	4	4
21	Spillet fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	4	5	4	5	4	3	3
22	Spillet fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	4	3	3	5	5	4	5
23	Spillet fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	5	5	3	5	4	4	4

24	Spillet fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	5	3	4	5	4	4	4
25	Spillet fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	3	4	4	5	5	5	3
26	Spillet utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	3	2	3	5	4	3	3
27	Spillet fikk meg til å reflektere over mine myke ferdigheter.	4	3	4	5	5	4	4
28	Spillet motiverte meg til å forbedre mine myke ferdigheter i virkeligheten.	4	3	2	5	5	3	2
29	Jeg kan overføre erfaringer fra spillet til det virkelige arbeidslivet.	4	3	3	5	5	3	3
30	Konsekvenser av valgene mine i spillet var avgjørende for mitt utbytte av å spille spillet.	5	2	4	5	2	4	5
31	Situasjonene og valgmulighetene jeg møtte i spillet var avgjørende for mitt utbytte av å spille spillet.	4	3	4	5	3	4	5
	Spillet gjorde meg bevist på følgende aspekter av arbeidslivet:							
32	Mitt forhold med kunden i spillet.	4	4	3	4	5	4	3
33	Mitt forhold med medarbeidere i spillet.	4	3	3	4	5	4	4
34	Mitt forhold til arbeidsmiljøet i spillet.	3	4	3	5	4	4	4
35	Mitt forhold til økonomi i spillet.	5	2	3	2	4	2	2
36	Situasjonene gjorde meg bevist på kunden, medarbeidere, arbeidsmiljø og økonomi i spillet.	4	3	3	5	4	3	3
37	Valgmulighetene gjorde meg bevist på kunden, medarbeidere, arbeidsmiljø og økonomi i spillet.	3	3	3	4	5	4	4
38	Kategoriene (representert av ikonene øverst på skjermen) gjorde meg bevist på kunden, medarbeidere, arbeidsmiljø og økonomi i spillet.	3	4	3	4	5	4	4
39	Spillet ga meg passende mengde med tilbakemeldinger.	2	2	2	3	2	3	2
40	Kategorier er en god måte å representere på hva man skal ta hensyn til i arbeidslivet.	4	2	4	5	5	4	4
41	Kategoriene ga meg en god oversikt over konsekvensene av valgene mine på de forskjellige aspektene arbeidslivet.	4	2	4	5	5	4	3
42	Kategoriene ga meg en god oversikt over hva jeg er flink til som en potensiell ansatt.	4	4	2	4	4	4	3
43	Kategoriene ga meg en god oversikt over hva jeg kunne forbedret som en potensiell ansatt.	3	3	2	4	3	4	3

44	Kategoriene ga meg bedre oversikt over mine myke ferdigheter.	3	2	2	4	4	4	3
45	Kategorisering hjalp meg med å reflektere over mine myke ferdigheter.	4	2	3	4	5	4	2
46	Jeg var interessert i hvor mange poeng jeg hadde i de ulike kategoriene.	5	2	3	5	4	3	4
47	Hovedpersonen møtte på dilemmaer som kunne skjedd på en arbeidsplass.	4	4	5	5	5	5	4
48	Situasjonene var utfordrende.	3	4	3	4	3	2	2
49	Jeg ser for meg at jeg kunne møtt på lignende situasjoner i virkeligheten.	5	4	5	5	5	4	4
50	Spillet er lett å leve seg inn i.	4	2	4	5	4	3	3
51	Konsekvensene av valgene i spillet var realistiske.	3	3	2	3	4	4	2
52	Konsekvensene av valgene i spillet var meningsfulle.	4	4	3	4	4	3	2
53	Konsekvensene av valgene i spillet var rettferdige.	4	2	2	3	3	4	3
54	Jeg brydde meg om skjebnen til hovedpersonen.	5	2	1	5	5	3	2
56	Jeg følte at hovedpersonen kunne vært meg.	4	3	3	5	5	4	3
57	Jeg spilte spillet som om hovedpersonen var meg.	5	4	4	3	5	5	5
58	Jeg var nysgjerrig på konsekvensene av valgene jeg tok i spillet.	4	5	4	4	4	4	5
59	Jeg er flink til å håndtere stressende situasjoner.	4	4	4	2	3	4	3
60	Jeg ser for meg at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	4	4	4	4	4	5	4
61	Jeg tror jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	5	3	4	4	3	5	4
62	Jeg er flink til å samarbeide med andre.	4	5	5	4	4	4	4
63	Jeg ser for meg at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis går tilstrekkelig inn for det.	3	5	4	4	4	5	5
64	Jeg ser for meg jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg jobber nok med det.	5	4	4	4	4	4	4
65	Jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg prøver hardt nok.	4	3	3	3	3	5	3
66	Med nok innsats så tror jeg jeg hadde klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	4	3	4	3	4	5	3
67	Jeg er flink til å kommunisere mine meninger og lytte til andre sine.	5	4	4	3	3	4	4

68	Jeg ser for meg at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	5	4	4	5	4	5	4
69	Men nok innsats tror jeg at det hadde blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	4	2	3	4	3	4	3
70	Jeg hadde beholdt roen om jeg møtte på misforståelser eller uenigheter på jobb fordi jeg stoler på mine evner.	4	3	3	3	3	5	3
71	Et sett med kategorier der status på hvert aspekt av arbeidslivet er synlig støtter læring i større grad enn et poengsystem der kun totalsummen er synlig til brukeren.	4	3	4	5	5	5	4
72	Et kategorisystem der kategoriene representerer ulike aspekter av arbeidslivet gir tilbakemeldinger som kan hjelpe med å forbedre myke ferdigheter.	4	4	4	5	5	4	3
73	Et kategorisystem der kategoriene representerer ulike aspekter av arbeidslivet utgjør en tilstrekkelig basis for å reflektere over valgene i spillet.	4	2	4	4	4	3	2
74	Fire (4) er riktig antall kategorier for å representere hva man skal ta hensyn til i arbeidslivet.	2	2	3	4	3	3	3

B.6. Usability Test Guidelines

General

- turn off irrelevant devices
- do not engage in conversations to avoid bias

Observation

- stay out of line of sight and be silent
- do not distract testers
- write down question you would like to have answered later

Notes

- one note per observation for easy categorizing
- use observation template
- useful categories: quote, system error, user error, strategy, search, navigation sequence, suggestion, comment, ambiguity, unclear

Observer guidelines from Nielsen Norman Group, used by permission. Original: `https://www.nngroup.com/articles/observer-guidelines`

Introduction

- introduce yourself
- introduce the application
- explain the agenda
- explain the purpose of the test
- explain the application will be tested and not participants
- ask participants to think out loud for better results
- explain that help cannot be provided during testing
- encourage to ask question even though they cannot be answered immediately
- confidentiality agreement
- ask if there are any questions

B.7. Interview Guide

Intervjuguide for gruppeintrevju

- Hva mener du var tilbakemeldinger i spillet?
- Hva synes du om tilbakemeldingene, hvordan kan de forbedres?
- Følte du at det var nok informasjon om hvordan du ligger an?
- Hva slags tilbakemeldinger kunne gjort spillet mer effektivt (for å lære myke ferdigheter) (lengde, timing, tekstlig eller annet format, snilt/slemt)?
- Hva synes du om kategorisystemet, antall kategorier?
- representerer de arbeidslivet?
- Hva synes du om realismen i spillet?
- Hva synes du om tekstmengden?
- Hvordan bør større mengde tekst presenteres?

C. Workshop Documents

C.1. MyG customized deck

Points

A metric used to measure an activity or characteristic of the user.

To consider:

- How are points attributed?
- Can points be taken away (eg: penalty)?
- Are points visible only to the user or publicly shared in a community?
- Are points redeemable?
- Can users give points to each other?
- Do points reflect health? Likeability? Reputation? Engagement? Experience?

1

Awards

Award the user in recognition for effort or/and achievement.

To consider:

- Do awards replace levels?
- Is there a tiered system for awards?
- Does the award reflect the context of the achievement?
- Are users aware of awards available? Or is it a surprise?
- How to encourage users to pursue awards?
- What is the timing of the reward? Immediate? Delayed?

2

Levels

Provide the user with visual feedback to where they position themselves in their gaming experience over time.

To consider:

- How to pace difficulty and complexity with the levels?
- What metaphor to adopt as visual representation of each level (eg: precious metals or character roles)?
- What users expect in terms of experience with each level

3

Progression

Provide visual feedback to the user on current status of progress.

To consider:

- When to switch from indicating how much progress has been achieved to how much is remaining for completion?
- What visual representation to use? Progress bar? A pixelated image?
- Is it really important to reach 100%?
- Once 100% is achieved, what to do next?

4

Quests

Give the user a contextual challenge to pursue and achieve.

To consider:

- Can quests be cooperative?
- How to design quests aligned with the level of experience of the users, thus encouraging flow?
- Can a user create quests?
- What happens when quests run out?
- Are quests supported by stories (eg: save the princess from the dragon)?
- Are quests structured with dependencies?

5

Time

Give the user a limited set time for completion of an activity/task.

To consider:

- How to measure time?
- What happens when time runs out?
- Can a user acquire or buy more time?
- Can a user pause or suspend time?
- Is the user made visually aware of time passing by?
- Is there a penalty as time passes? Or when time runs out?

6

Power Up

Give the user an additional ability that gives them increased benefits and advantages.

To consider:

- When and how to give the user the power up?
- What the user needs to do to get the power up?
- Are users aware of what power up options exist? And what needs to be done to get them?
- Is a power up time limited or not?
- Is the power up too disruptive?

7

Fate

Affect the outcome of the user's action in an unpredictable way in either positive or negative way.

To consider:

- How to calibrate fate so the user eventually has a positive outcome to avoid frustration?
- How does fate affect a group of users?
- Can a user be cursed? Or charmed?
- How to counter curses?

8

Pattern Recognition

Give the user the opportunity of discerning the underlying workings of reality and unravelling its complexity.

To consider:

- What patterns to consider?
- Are patterns explicit (eg: puzzles)?
- How to balance sense of frustration, boredom and achievement of uncovering patterns?
- What to do if users discover the patterns governing the virtual economy?

9

Feedback

Inform the user where and what they are doing with regards to an objective or an action taken.

To consider:

- Can one adopt a visual metaphor to encapsulate a complex set of variables?
- Is it possible and relevant to include random feedback?
- Does the maturity of the user influence the amount of feedback given?
- Can users provide social feedback to one another?

10

Grow

Give the user the means to nurture and grow an entity.

To consider:

- What is an entity (eg: virtual pet, crops, business, people, community)?
- Can users grow entities together as a group?
- How frequent must nurturing take place?
- What happens to the entity when nurturing is no longer taking place?

11

Leaderboard

Leaderboards provide the means for users to compare themselves to one another.

To consider:

- Is it possible for users to customize different rankings of the leaderboard?
- Place users in middle of ranking and indicate what needs to be done to improve. For those in the top, just provide list
- Should the leaderboard accommodate privacy? Who can see the rankings?
- Can user opt out of ranking?

12

Gifting

Transfer of ownership without transaction, which triggers the need for users to reciprocate.

To consider:

- How to avoid stalking and harassment?
- How can users acquire gifts?
- Are gifts purchased with real or virtual money?

13

Hero

The user accepts a calling for a unique challenge that requires them to battle circumstances.

To consider:

- Is the aim of the hero to save another user? Or achieve an altruist goal?
- Does a user need to complete a set of challenges towards a goal?
- Are users allowed to setup a call for a hero?
- Does one empower a hero with special powers and abilities?

14

Call to Arms

Rally the users within a community around a cause.

To consider:

- How does a user announce and communicate a call to arms?
- How are users aware of existing call to arms?
- What is the lifecycle of a call to arms?
- Are causes small or epic?

15

Barter

To discuss the value of something for exchange by proposing offers and counter offers.

To consider:

- Does bartering require exchange to be successful?
- How to support the bartering?

16

Race

A means to start a competition between users, where the first to reach a given status wins.

To consider:

- What boundaries are involved?
- How is the race initiated?
- What is the goal to reach?
- Can there be spectators?
- What is the prize?

17

Teamwork

Means to team up to achieve a goal.

To consider:

- What resources are shared?
- What aspects of the progression are affected by the collaboration?
- How is the reward shared upon achieving the goal?

18

Instant Messaging

Means of real-time text communication.

To consider:

- How are users aware of each other?
- Can users set up a group chat? Channels?
- Should there be constraints for messaging others?

19

Forum

A place of discussion in the form of posted messages.

To consider:

- What is the hierarchy of the posts?
- How to filter discussions?
- Can there be private discussions?
- Should there be constraints for posting and commenting?
- Should users be able to post anonymously?
- Should there be moderation?
- Should users take on roles in the discussion?

20

Reflection scenario

Reflect on how you interact with your peers.

21

Reflection scenario

Reflect on your real life experience of similar situations.

22

Reflection scenario

Reflect on how you interact with your superiors.

23

Reflection scenario

Reflect on how your choices affect others.

24

Reflection scenario

Reflect on how you take care of your own needs and values against others.

25

C.2. Design Proposals

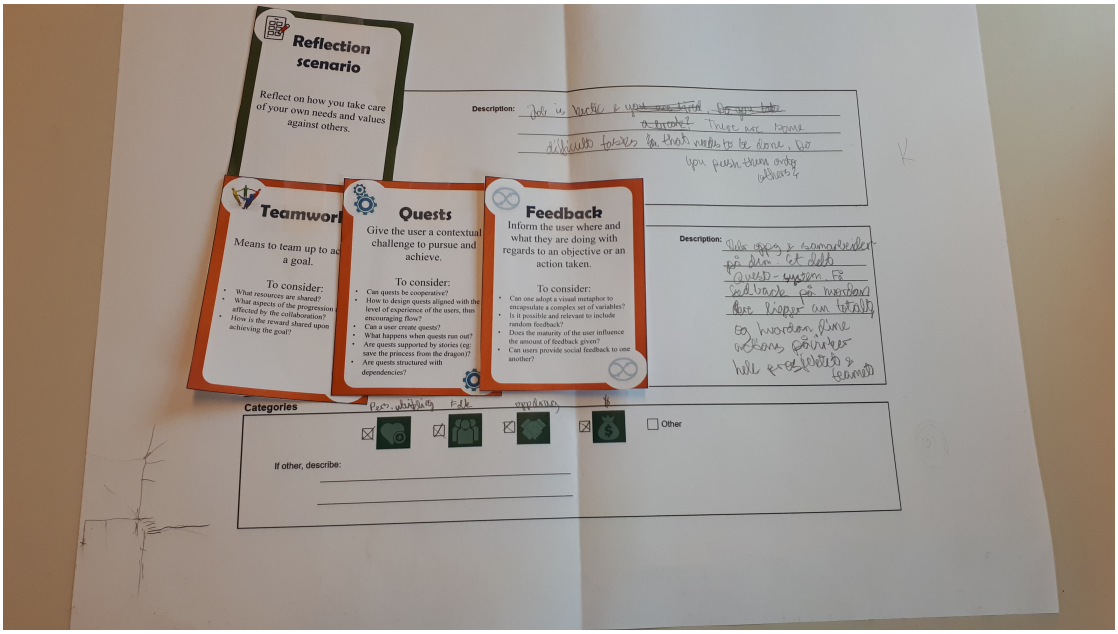

Figure C.1.: Design proposal 1 reconstructed

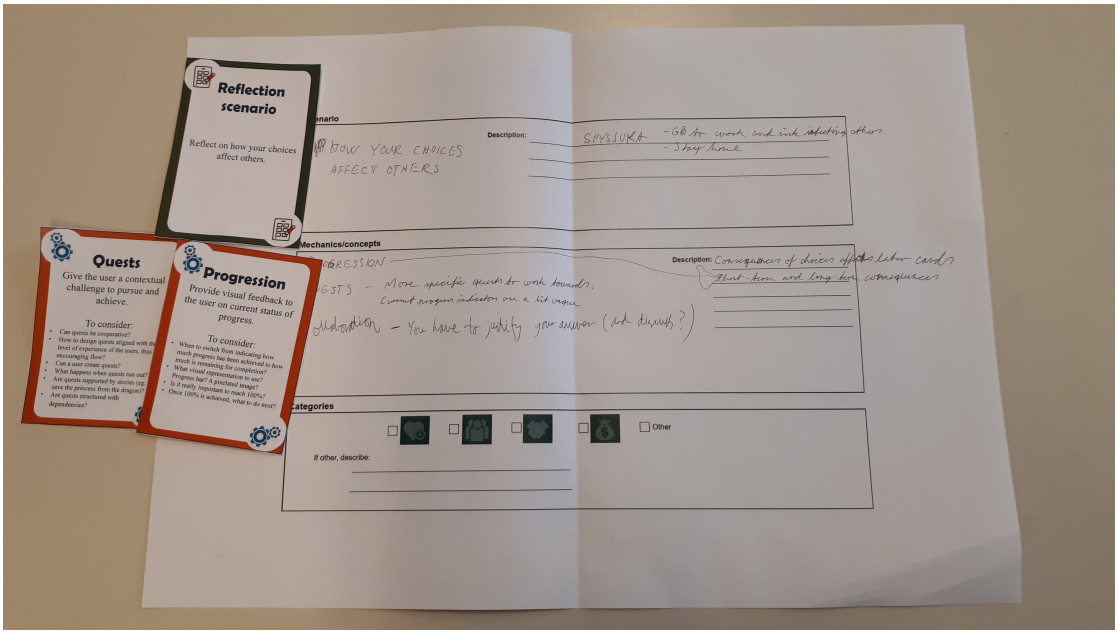

Figure C.2.: Design proposal 2

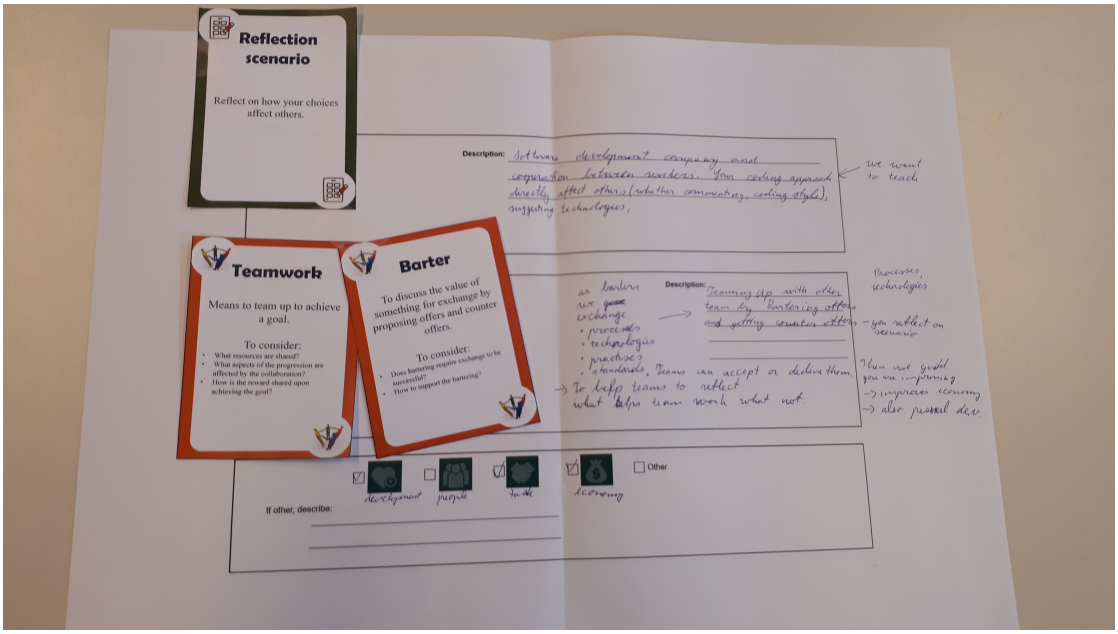

Figure C.3.: Design proposal 3

D. Final Evaluation - Documents

D.1. Pre-questionnaire - Final Evaluation

Spørreskjema – læringsspill om myke ferdigheter på i arbeidslivet

Dette skjemaet skal fylles ut før interaksjonen med spillet.

ID: _____

Generelt

1. Har du tidligere deltatt i en evaluering eller workshop i dette prosjektet?

☐ ja ☐ nei

2. Hvor gammel er du?

☐ 18-19
☐ 20-23
☐ 24-26
☐ 26+

3. Hvilket kjønn er du?

☐ Mann
☐ Kvinne
☐ Annet

4. Hvilken utdanning har du?

☐ grunnskole
☐ videregående skole (fortsatt i utdanning)
☐ videregående skole (fullført)
☐ høyskole/universitet (fortsatt i utdanning)
☐ høyskole/universitet (fullført)

5. Hvis du er student, hvilket år går du på studiet ditt?

☐ 1. år
☐ 2. år
☐ 3. år
☐ 4. år
☐ 5. år
☐ er ikke student

Arbeidserfaring

*Med **jobb** menes her en betalt hel- eller deltidsstilling.*

6. Har du jobb nå?

☐ ja
☐ nei

7. Hvor mange jobber har du hatt? Skriv på linjen under.

_____

8. For hver jobb du har hatt, spesifiser bransje, om det var hel-, deltidsstilling eller sommerjobb og hvor lenge du har hatt denne jobben i tabellen under.

Bransje	Heltid/deltid/sommerstilling	Hvor lenge

Bruk av mobile enheter, spill og apper

9. Hvilke mobile enheter bruker du? (huk av en eller flere)

☐ smarttelefon
☐ annen mobiltelefon
☐ nettbrett / iPad
☐ smartklokke
☐ ingen
Annet: _____

10. Omtrent hvor mange timer i uken bruker du på mobile enheter?
☐ 0-2 timer
☐ 3-6 timer
☐ 6-10 timer
☐ 11-15 timer
☐ >15 timer

Definisjon: ***Et spill*** *er en lek eller aktivitet med faste regler man engasjerer seg i for å ha det gøy.*

11. Hvilke mobile enheter spiller du spill på? (huk av en eller flere)
☐ smarttelefon
☐ annen mobiltelefon
☐ nettbrett / iPad
☐ smartklokke
☐ mobil spillkonsoll
☐ ingen
Annet: _____

12. Omtrent hvor mange timer i uken spiller du på mobile enheter?
☐ 0-2 timer
☐ 3-6 timer
☐ 7-10 timer
☐ >10 timer

Definisjon: ***Læringsapp*** *er en applikasjon på en mobilenhet som blir brukt for å tilegne seg ny kunnskap eller øve seg på spesifikke ferdigheter.*

13. Hvilke mobile enheter bruker du læringsapper på? (huk av en eller flere)
☐ smarttelefon
☐ annen mobiltelefon
☐ nettbrett / iPad
☐ smartklokke
☐ mobil spillkonsoll

☐ ingen
Annet: _____

14. Omtrent hvor mange timer i uken bruker du læringsapper på mobile enheter?
☐ 0-2 timer
☐ 3-6 timer
☐ 7-10 timer
☐ >10 timer

15. Hvilke typer læringsapp bruker du? (huk av en eller flere)
☐ quiz
☐ læringsspill
☐ interaktiv encyklopedi
☐ videoforedrag
☐ interaktivt bibliotek
☐ tutorials (opplæringsprogram eller gjennomgang av hvordan noe lages eller gjøres)
☐ matteapp
☐ gloseprøve
☐ ingen
Annet: _____

Fokus

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
16. Jeg har et relasjonelt fokus, med vekt på engasjement og et sosialt perspektiv.					
17. Jeg har fokus på struktur og sak gjennom et logisk perspektiv.					
18. Jeg har fokus på endringer, visjon og ideer.					

Kommentarer:

D.2. Pre-questionnaire - Results from Final Evaluation

Likert scale: 5 - strongly agree, 4 - agree, 3 - neither agree or disagree, 2 - disagree, 1- strongly disagree.

Table D.1.: Pre-questionnaire results from final evaluation

#	Question / statement	50602	78531	43109	23245	10568	87206
1	Har du tidligere deltatt i en evaluering eller workshop i dette prosjektet?	nei	ja	nei	nei	nei	ja
2	Hvor gammel er du?	20-23	24-26	20-23	24-26	20-23	24-26
3	Hvilket kjønn er du?	kvinne	mann	kvinne	mann	mann	mann
4	Hvilken utdanning har du?	høyskole / universitet (fortsatt i utd.)	høyskole / universitet (fortsatt i utd.)	høyskole/ universitet (fortsatt i utd.)	høyskole / universitet (fullført)	høyskole / universitet (fortsatt i utd.)	høyskole / universitet (fullført)
5	Hvis du er student, hvilket år går du på studiet ditt?	3	5	3	ekstra år (6)	1	5
6	Har du jobb nå?	nei	ja	nei	nei	ja	ja
7	Hvor mange jobber har du hatt? Skriv på linjen under.	1	4	0	3	3	7
8	For hver jobb du har hatt, spesifiser bransje, om det var hel-, deltidsstilling eller sommerjobb og hvor lenge du har hatt denne jobben i tabellen under.						
9	Hvilke mobile enheter bruker du? (huk av en eller flere)	smarttelefon	smarttelefon	smarttelefon	smarttelefon, smartklokke	smarttelefon	smarttelefon, nettbrett/iPad, spillkonsoll
10	Omtrent hvor mange timer i uken bruker du på mobile enheter?	>15 timer	6-10 timer	11-15 timer	6-10 timer	3-6 timer	>15 timer
11	Hvilke mobile enheter spiller du spill på? (huk av en eller flere)	mobil spillkonsoll	smarttelefon	smarttelefon	smarttelefon	smarttelefon	smarttelefon, nettbrett/iPad, spillkonsoll
12	Omtrent hvor mange timer i uken spiller du på mobile enheter?	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer
13	Hvilke mobile enheter bruker du læringsapper på? (huk av en eller flere)	smarttelefon	smarttelefon	smarttelefon	smarttelefon	smarttelefon	smarttelefon
14	Omtrent hvor mange timer i uken bruker du læringsapper på mobile enheter?	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer	0-2 timer
15	Hvilke typer læringsapp bruker du? (huk av en eller flere)	videoforedrag	quiz, læringsspill, gloseprøve	læringsspill	quiz, læringsspill, tutorials, gloseprøve	quiz, videoforedrag	quiz
16	Jeg har et relasjonelt fokus, med vekt på engasjement og et sosialt perspektiv.	3	3	4	4	3	4
17	Jeg har fokus på struktur og sak gjennom et logisk perspektiv.	4	4	4	4	4	4
18	Jeg har fokus på endringer, visjon og ideer.	2	4	3	4	4	5

D.2.1. Work Experience Results from Final Evaluation

Table D.2.: Work experience results from final evaluation

ID	Bransje	Type stilling	Varighet
50602	Museum	sommerstilling	3 somre
87206	Dagligvare	sommerstilling	2 måneder
	salg/service	deltid	9 måneder
	IT-konsulent	sommerstilling	1 måned
	utdanning	deltid	1 år
	IT-konsulent	sommerstilling	2 måneder
	IT-konsulent	sommerstilling	2 måneder
	IT-konsulent	deltid	7 måneder
78531	fiskeoppdrett	sommerstilling	3 somre
	skipsverft	sommerstilling	2-3 somre
	veiarbeid	sommerstilling	2 uker
	IT	deltid/sommerstilling	1,5 år
43109	-	-	-
23245	industri	heltid (lærling)	4 år
	lærer	heltid	1 uke
	studentassistent	deltid	4 måneder
10568	IT	heltid	12 måneder
	utdanning	deltid	4 måneder
	strøm	sommerstilling	2 måneder

D.3. Post-questionnaire - Final Evaluation

Spørreskjema – læringsspill om myke ferdigheter i arbeidslivet

Dette skjemaet skal fylles ut etter interaksjonen med prototypene.

ID: _____

1. Brukergrensesnitt

Kategoriene *ble representert av ikonene øverst på skjermen i spillet.*

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
1. Det var lett å forstå at valgene resulterer i kompromisser.					
2. Det var lett å undersøke hvor bra jeg gjorde det i spillet.					
3. Det var lett å forstå hva kategoriene representerer.					
4. Det var lett å forstå hva funksjonen til kategoriene er.					
5. Ikonene til kategoriene er meningsfulle.					
6. Kategoriene ga meg en god oversikt over konsekvensene av valgene mine på de forskjellige aspektene av arbeidslivet.					
7. Det var lett å forstå at kategoriene er trykkbare.					

Definisjon: ***Myke ferdigheter*** *er en kombinasjon av personlighet, holdninger og sosiale ferdigheter, som f.eks. samarbeidsevner og integritet.*

2. Tilbakemeldingskort

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
8. Tilbakemeldingskort fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
9. Tilbakemeldingskort fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					
10. Tilbakemeldingskort fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
11. Tilbakemeldingskort fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
12. Tilbakemeldingskort fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
13. Tilbakemeldingskort utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
14. Tilbakemeldingskort fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
15. Tilbakemeldingskort fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
16.Tilbakemeldingskort fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.					
17. Tilbakemeldingskort fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.					
18. Tilbakemeldingskort fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.					

19. Tilbakemeldingskort fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
20. Tilbakemeldingskort fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
21. Tilbakemeldingskort fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
22. Tilbakemeldingskort fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.					
23. Tilbakemeldingskort gjorde at jeg ønsket å diskutere spillet med andre.					
24. Tilbakemeldingskort gjorde at jeg ønsket å sammenligne valgene mine med andre sine.					
25. Tilbakemeldingskort gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.					
26. Tilbakemeldingskort gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.					

3. Relasjoner

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
27. Relasjoner fikk meg til å tenke på hvordan mine valg hadde påvirket andre i virkeligheten.					
28. Relasjoner fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
29. Relasjoner fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					

30. Relasjoner fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
31. Relasjoner fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
32. Relasjoner fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
33. Relasjoner utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
34. Relasjoner fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
35. Relasjoner fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
36. Relasjoner fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.					
37. Relasjoner fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.					
38. Relasjoner fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.					
39. Relasjoner fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
40. Relasjoner fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
41. Relasjoner fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
42. Relasjoner fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.					
43. Relasjoner gjorde at jeg ønsket å diskutere spillet med andre.					

44. Relasjoner gjorde at jeg ønsket å sammenligne valgene mine med andre sine.					
45. Relasjoner gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.					
46. Relasjoner gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.					

4. Relasjoner – kategori

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
47. Kategori Relasjoner fikk meg til å tenke på hvordan mine valg hadde påvirket andre i virkeligheten.					
48. Kategori Relasjoner fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
49. Kategori Relasjoner fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					
50. Kategori Relasjoner fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
51. Kategori Relasjoner fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
52. Kategori Relasjoner fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
53. Kategori Relasjoner utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
54. Kategori Relasjoner fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
55. Kategori Relasjoner fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					

56. Kategori Relasjoner fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.					
57. Kategori Relasjoner fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.					
58. Kategori Relasjoner fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.					
59. Kategori Relasjoner fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
60. Kategori Relasjoner fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
61. Kategori Relasjoner fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
62. Kategori Relasjoner fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.					
63. Kategori Relasjoner gjorde at jeg ønsket å diskutere spillet med andre.					
64. Kategori Relasjoner gjorde at jeg ønsket å sammenligne valgene mine med andre sine.					
65. Kategori Relasjoner gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.					
66. Kategori Relasjoner gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.					

5. «Sanity» indikator

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
67. «Sanity» indikator fikk meg til å tenke på hvordan mine valg hadde påvirket meg selv i virkeligheten.					
68. «Sanity» indikator fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
69. «Sanity» indikator fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					
70. «Sanity» indikator fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
71. «Sanity» indikator fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
72. «Sanity» indikator fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
73. «Sanity» indikator utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
74. «Sanity» indikator fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
75. «Sanity» indikator fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
76. «Sanity» indikator fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.					
77. «Sanity» indikator fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.					
78. «Sanity» indikator fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.					

79. «Sanity» indikator fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
80. «Sanity» indikator fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
81. «Sanity» indikator fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
82. «Sanity» indikator fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.					
83. «Sanity» indikator gjorde at jeg ønsket å diskutere spillet med andre.					
84. «Sanity» indikator gjorde at jeg ønsket å sammenligne valgene mine med andre sine.					
85. «Sanity» indikator gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.					
86. «Sanity» indikator gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.					

6. Sanity - kategori

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
87. Kategori Sanity fikk meg til å tenke på hvordan mine valg hadde påvirket andre i virkeligheten.					
88. Kategori Sanity fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
89. Kategori Sanity fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					

90. Kategori Sanity fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
91. Kategori Sanity fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
92. Kategori Sanity fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
93. Kategori Sanity utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
94. Kategori Sanity fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
95. Kategori Sanity fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
96. Kategori Sanity fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis går tilstrekkelig inn for det.					
97. Kategori Sanity fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.					
98. Kategori Sanity fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.					
99. Kategori Sanity fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
100. Kategori Sanity fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
101. Kategori Sanity fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
102. Kategori Sanity fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.					
103. Kategori Sanity gjorde at jeg ønsket å diskutere spillet med andre.					

104. Kategori Sanity gjorde at jeg ønsket å sammenligne valgene mine med andre sine.					
105. Kategori Sanity gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.					
106. Kategori Sanity gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.					

7. Mål

Hvor enig er du i følgende påstander:

	Svært enig	**Enig**	**Hverken enig eller uenig**	**Uenig**	**Svært uenig**
107. Mål fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.					
108. Mål fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.					
109. Mål fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.					
110. Mål fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.					
111. Mål fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.					
112. Mål utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.					
113. Mål fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.					
114. Mål fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.					
115. Mål fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis går tilstrekkelig inn for det.					

116. Mål fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.					
117. Mål fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.					
118. Mål fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.					
119. Mål fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.					
120. Mål fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.					
121. Mål fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.					
122. Mål gjorde at jeg ønsket å diskutere spillet med andre.					
123. Mål gjorde at jeg ønsket å sammenligne valgene mine med andre sine.					
124. Mål gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.					
125. Mål gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.					

Andre kommentarer:

D.4. Post-questionnaire - Results from Final Evaluation

Likert scale: 5 - strongly agree, 4 - agree, 3 - neither agree or disagree, 2 - disagree, 1- strongly disagree.

Table D.3.: Post-questionnaire results from final evaluation

		50602	78531	43109	23245	10568	87206
1	Det var lett å forstå at valgene resulterer i kompromisser.	2	2	3	3	4	4
2	Det var lett å undersøke hvor bra jeg gjorde det i spillet.	3	4	4	4	5	3
3	Det var lett å forstå hva kategoriene representerer.	4	3	2	3	4	4
4	Det var lett å forstå hva funksjonen til kategoriene er.	3	3	3	3	4	4
5	Ikonene til kategoriene er meningsfulle.	4	3	3	4	4	4
6	Kategoriene ga meg en god oversikt over konsekvensene av valgene mine på de forskjellige aspektene av arbeidslivet.	2	3	4	4	5	4
7	Det var lett å forstå at kategoriene er trykkbare.	4	4	2	2	2	3
8	Tilbakemeldingskort fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	3	4	3	4	3	4
9	Tilbakemeldingskort fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	4	4	4	5	4	3
10	Tilbakemeldingskort fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	4	4	4	4	4	3
11	Tilbakemeldingskort fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	4	4	4	4	5	3
12	Tilbakemeldingskort fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	3	3	3	4	3	3
13	Tilbakemeldingskort utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	3	1	4	2	3	3
14	Tilbakemeldingskort fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	3	2	2	4	4	4
15	Tilbakemeldingskort fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	3	2	2	3	4	3
16	Tilbakemeldingskort fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	4	2	2	4	5	3
17	Tilbakemeldingskort fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.	5	3	2	4	3	3
18	Tilbakemeldingskort fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.	4	2	3	4	3	2

19	Tilbakemeldingskort fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	3	2	3	3	2	3
20	Tilbakemeldingskort fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	2	3	2	4	3	3
21	Tilbakemeldingskort fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	4	3	4	4	4	3
22	Tilbakemeldingskort fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.	3	3	2	4	4	3
23	Tilbakemeldingskort gjorde at jeg ønsket å diskutere spillet med andre.	4	5	4	5	5	5
24	Tilbakemeldingskort gjorde at jeg ønsket å sammenligne valgene mine med andre sine.	4	5	5	5	5	5
25	Tilbakemeldingskort gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.	4	5	5	5	5	5
26	Tilbakemeldingskort gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.	4	5	5	5	5	5
27	Relasjonerfikk meg til å tenke på hvordan mine valg hadde påvirket andre i virkeligheten.	2	4	4	5	5	5
28	Relasjoner fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	3	4	3	5	3	4
29	Relasjonerfikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	4	4	4	5	4	4
30	Relasjonerfikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	4	4	4	5	5	3
31	Relasjoner fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	4	5	5	5	5	4
32	Relasjonerfikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	2	2	3	5	3	2
33	Relasjoner utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	2	1	3	5	3	2
34	Relasjoner fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	3	3	3	2	4	3
35	Relasjonerfikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	3	3	2	4	3	3
36	Relasjonerfikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	4	3	2	3	4	4
37	Relasjoner fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.	4	3	3	4	3	3

38	Relasjoner fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.	3	4	2	2	4	3
39	Relasjoner fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	3	3	3	3	2	3
40	Relasjonerfikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	4	3	3	4	4	2
41	Relasjoner fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	4	3	3	3	3	3
42	Relasjoner fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.	4	2	3	2	3	3
43	Relasjoner gjorde at jeg ønsket å diskutere spillet med andre.	5	5	5	5	5	5
44	Relasjoner gjorde at jeg ønsket å sammenligne valgene mine med andre sine.	5	5	5	5	5	5
45	Relasjoner gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.	5	5	5	5	5	5
46	Relasjoner gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.	5	5	5	5	5	5
47	Kategori Relasjoner fikk meg til å tenke på hvordan mine valg hadde påvirket andre i virkeligheten.	4	4	4	4	5	3
48	Kategori Relasjoner fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	4	4	4	4	4	3
49	Kategori Relasjoner fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	4	4	5	4	5	3
50	Kategori Relasjoner fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	3	4	4	4	4	3
51	Kategori Relasjoner fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	3	4	4	4	5	3
52	Kategori Relasjoner fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	3	2	3	4	3	4
53	Kategori Relasjoner utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	3	2	4	5	3	3
54	Kategori Relasjoner fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	4	2	3	3	3	3
55	Kategori Relasjoner fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	3	2	3	4	3	3
56	Kategori Relasjoner fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	3	3	2	4	3	3
57	Kategori Relasjoner fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.	4	3	2	4	2	3
58	Kategori Relasjoner fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.	2	2	3	3	3	3

59	Kategori Relasjoner fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	3	2	3	4	3	3
60	Kategori Relasjoner fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	2	2	2	5	4	4
61	Kategori Relasjoner fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	3	2	3	5	3	3
62	Kategori Relasjoner fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.	3	2	2	5	4	3
63	Kategori Relasjoner gjorde at jeg ønsket å diskutere spillet med andre.	5	5	5	5	5	4
64	Kategori Relasjoner gjorde at jeg ønsket å sammenligne valgene mine med andre sine.	5	5	4	5	5	4
65	Kategori Relasjoner gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.	5	5	5	5	5	4
66	Kategori Relasjoner gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.	5	5	5	5	5	4
67	«Sanity» indikator fikk meg til å tenke på hvordan mine valg hadde påvirket meg selv i virkeligheten.	4	2	4	4	5	4
68	«Sanity» indikator fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	4	2	4	4	4	4
69	«Sanity» indikator fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	4	4	4	5	5	3
70	«Sanity» indikator fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	3	2	4	5	4	3
71	«Sanity» indikator fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	2	1	5	5	4	3
72	«Sanity» indikator fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	2	1	4	5	4	2
73	«Sanity» indikatorutfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	2	1	3	5	3	2
74	«Sanity» indikatorfikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	3	1	3	5	3	2
75	«Sanity» indikator fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	3	1	3	4	3	1
76	«Sanity» indikator fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	3	1	2	4	3	3
77	«Sanity» indikator fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.	4	1	3	4	4	2
78	«Sanity» indikator fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.	4	1	2	3	3	3
79	«Sanity» indikator fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	2	1	2	4	3	3

80	«Sanity» indikatorfikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	2	1	3	3	2	2
81	«Sanity» indikator fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	2	1	3	3	3	2
82	«Sanity» indikator fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.	4	1	3	3	4	2
83	«Sanity» indikator gjorde at jeg ønsket å diskutere spillet med andre.	5	5	5	5	5	4
84	«Sanity» indikator gjorde at jeg ønsket å sammenligne valgene mine med andre sine.	5	5	5	5	5	4
85	«Sanity» indikator gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.	5	5	5	5	5	4
86	«Sanity» indikator gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.	5	5	5	5	5	4
87	Kategori Sanity fikk meg til å tenke på hvordan mine valg hadde påvirket andre i virkeligheten.	3	1	3	3	5	3
88	Kategori Sanityfikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	3	4	3	4	4	3
89	Kategori Sanity fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	3	5	4	5	5	3
90	Kategori Sanity fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	4	4	4	5	4	2
91	Kategori Sanity fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	2	4	4	5	4	2
92	Kategori Sanity fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	2	1	3	4	3	1
93	Kategori Sanity utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	2	3	3	4	3	1
94	Kategori Sanity fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	3	1	3	4	3	3
95	Kategori Sanity fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	2	1	2	5	4	3
96	Kategori Sanity fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	3	1	3	5	3	3
97	Kategori Sanity fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.	4	1	3	5	3	4
98	Kategori Sanity fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.	3	1	2	5	3	3
99	Kategori Sanity fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	3	1	3	4	3	3

100	Kategori Sanity fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	2	1	2	4	3	3
101	Kategori Sanity fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	3	1	3	3	2	2
102	Kategori Sanity fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.	3	1	3	5	3	4
103	Kategori Sanity gjorde at jeg ønsket å diskutere spillet med andre.	5	5	5	5	4	4
104	Kategori Sanity gjorde at jeg ønsket å sammenligne valgene mine med andre sine.	5	5	5	5	4	4
105	Kategori Sanity gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.	5	5	5	5	4	4
106	Kategori Sanity gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.	5	5	5	5	4	4
107	Mål fikk meg til å tenke på hvorfor jeg tok de spesifikke valgene.	3	4	4	5	4	3
108	Mål fikk meg til å tenke på hvilket valg jeg hadde tatt neste gang i lignende situasjoner i spillet.	4	4	4	5	4	4
109	Mål fikk meg til å tenke på hvilket valg jeg hadde tatt i lignende situasjoner i det virkelige arbeidslivet.	4	2	4	5	4	2
110	Mål fikk meg til å tenke på om jeg kunne gjort et bedre valg i enkelte situasjoner.	3	2	4	5	3	3
111	Mål fikk meg til å tenke på hva som kreves av myke ferdigheter på jobb.	2	1	3	5	4	2
112	Mål utfordret mitt syn på hva som kreves av myke ferdigheter på jobb.	2	1	3	5	3	2
113	Mål fikk meg til å tro at jeg kunne løst de fleste problemer relaterte til samarbeid på en arbeidsplass hvis jeg går tilstrekkelig inn for det.	3	1	3	5	3	3
114	Mål fikk meg til å tro at jeg hadde klart å være selvmotivert på jobb hvis jeg jobber nok med det.	3	1	3	5	4	3
115	Mål fikk meg til å tro at jeg hadde klart å være respektfull og profesjonell uansett situasjon i jobbsammenheng hvis jeg går tilstrekkelig inn for det.	3	1	2	5	3	3
116	Mål fikk meg til å tro at jeg hadde klart å ha positiv holdning i vanskelige situasjoner på jobb hvis jeg prøver hardt nok.	3	1	2	5	3	3
117	Mål fikk meg til å tro at jeg hadde lett klart å finne kompromisser i situasjoner med interessekonflikt på jobb hvis jeg jobber nok med det.	3	1	3	4	3	3
118	Mål fikk meg til å tro at med nok innsats så hadde jeg klart å løse konflikter mellom medarbeidere eller meg selv og en medarbeider der jeg ikke ser en åpenbar løsning.	2	1	3	4	3	3
119	Mål fikk meg til å tro at jeg hadde vært flink å opprettholde gode relasjoner med både medarbeidere, kunder og arbeidsgiveren hvis jeg prøver hardt nok.	3	1	3	4	4	3
120	Mål fikk meg til å tro at med nok innsats hadde det blitt lett for meg å finne fornuftige løsninger på etiske dilemmaer på en arbeidsplass.	3	1	2	4	3	3
121	Mål fikk meg til å tro på mine evner til å beholde roen om jeg møtte på misforståelser eller uenigheter på jobb.	3	1	3	4	3	3
122	Mål gjorde at jeg ønsket å diskutere spillet med andre.	5	2	5	5	4	2

123	Mål gjorde at jeg ønsket å sammenligne valgene mine med andre sine.	5	1	5	5	4	2
124	Mål gjorde at jeg ønsket å diskutere situasjoner fra spillet med andre.	5	1	5	5	4	2
125	Mål gjorde at jeg ønsket å diskutere konsekvensene av valgene mine med andre.	5	1	5	5	4	2

D.4.1. Comments

78531: Gode mål med interessante tilbakemeldinger og konsekvenser hadde kanskje vært interessant. sanity hadde gjort seg bedre kanskje som energi gjennom en arbeidsdag. Lite av dette fikk meg til å relatere til ekte situasjoner, men kunne vært morsomt for å skape diskusjoner blant flere spillere.
23245: Relasjoner fikk meg mest til å tenke over egne valg og hva jeg selv tenker. Likte også mål.

D.5. Interview Guide

Intervjuguide for gruppeintrevju

- Hvilke prototyper følte dere forbedret kvaliteten på tilbakemeldinger?
- Hva synes dere om mengden av tilbakemeldinger de ulike prototypene tilbyr?
- Hva er det prototypene fikk dere til å tenke på? Hvordan ble deres holdninger med tanke på å være ansatt påvirket?
- Hvilke mekanismer føler dere bør inkluderes I spillet?
- Var det noen prototyper som skilte seg ut?
- Hva slags potensial ser dere for å reflektere med andre?