

Lars Jørgen Fredheim

Mobile Application for Graduate Employability Skills

A proof-of-concept

Master's thesis in Computer Science

Supervisor: Sobah Abbas Petersen

Co-supervisor: Hege Annette Olstad

June 2021

Lars Jørgen Fredheim

Mobile Application for Graduate Employability Skills

A proof-of-concept

Master's thesis in Computer Science
Supervisor: Sobah Abbas Petersen
Co-supervisor: Hege Annette Olstad
June 2021

Norwegian University of Science and Technology
Faculty of Information Technology and Electrical Engineering
Department of Computer Science



Norwegian University of
Science and Technology

Abstract

As students journey through university, they are all fixated on one common end goal – graduating with flying colors and landing their dream job. In order to achieve this, however, they must begin to prepare as early as possible. The GES App project aims to help students in this process, by introducing them to the importance of transferable graduate level abilities, known as graduate employability skills, by the means of a mobile app. Through this thesis, a framework for the initial draft of the GES App is developed, as well as an interactive proof-of-concept prototype, meant to illustrate the core functionalities around skill acquisition and evidencing. The finished prototype visualizes this framework in a comprehensive fashion. While not being unanimously satisfactory among the users that were asked to test it, it serves as a skeleton for future development and additional features.

Sammendrag

I det studenter gjennomfører sin utdanning, har de alle ett mål for øyet – å gå ut med toppkarakterer og lande drømmejobben. For å oppnå dette må de imidlertid begynne og forberede seg så tidlig som over hodet mulig. GES App prosjektet ar som mål å hjelpe studenter gjennom denne prosessen ved å introdusere dem for viktigheten av overførbare evner og ferdigheter, bedre kjent som ansettelsesferdigheter, ved hjelp av en mobil app. Gjennom denne oppgaven skal jeg utvikle et rammeverk for det første utkastet av GES-appen, samt en interaktiv proof-of-concept prototype, som har til hensikt å illustrere kjernefunksjonaliteten rundt tilegnelse og bevis av ferdigheter. Den ferdige prototypen visualiserer dette rammeverket på en omfattende måte. Selv om det ikke ble enstemmig tilfredshet blant brukerne som tok del i brukertesting, vil den fungere som et skjelett for fremtidig utvikling og ekstra funksjonalitet.

Contents

- 1. Introduction..... 1**
 - 1.1. *European Project* 1
 - 1.2. *Problem Description*..... 1
 - 1.3. *Research Goals*..... 1

- 2. Research Methods 2**
 - 2.1. *Structured Literature Review*..... 2
 - 2.2. *Interview* 2
 - 2.3. *Case Studies* 2

- 3. Literature Review..... 3**
 - 3.1. *GES App Intellectual Output* 3
 - 3.1.1. *Definitions*..... 3
 - 3.1.2. *Frameworks* 4
 - 3.1.3. *Employability* 4
 - 3.2. *Focus Group Interview Session* 5
 - 3.2.1. *Participants* 5
 - 3.2.2. *Recruiting rules*..... 5
 - 3.2.3. *Conclusions* 6
 - 3.3. *Review of Current Practices* 10
 - 3.3.1. *LinkedIn*..... 10
 - 3.3.2. *Wide Assessment*..... 12
 - 3.3.3. *MyShowcase* 13
 - 3.3.4. *Skill Tracker* 14
 - 3.4. *Crowdsourcing* 15
 - 3.5. *Skill Acquisition* 16
 - 3.5.1. *Model*..... 16
 - 3.5.2. *Evidence*..... 17
 - 3.6. *Gamification* 18

- 4. Framework 19**
 - 4.1. *Previously Proposed Outline* 19
 - 4.2. *GES App Framework* 20
 - 4.2.1. *Skills* 20
 - 4.2.2. *Evidence*..... 20
 - 4.2.3. *Crowdsourced repositories* 21

- 5. Prototype Iteration 1..... 22**
 - 5.1. *Partner Meeting*..... 22
 - 5.2. *Design* 22

| | | |
|-----------|--|-----------|
| 5.3. | <i>Feedback</i> | 25 |
| 5.4. | <i>Evaluation</i> | 26 |
| 6. | Prototype Iteration 2 | 28 |
| 6.1. | <i>Tasks</i> | 28 |
| 6.2. | <i>Design</i> | 28 |
| 6.3. | <i>Test Prototype</i> | 33 |
| 7. | Final Evaluation | 34 |
| 7.1. | <i>Research Methods</i> | 34 |
| 7.2. | <i>Data Collection and Analysis</i> | 34 |
| 7.3. | <i>Prototype</i> | 35 |
| 7.3.1. | System Usability Scale..... | 35 |
| 7.3.2. | Additional Evaluation..... | 35 |
| 7.3.3. | Nielsen’s 10 Usability Heuristics..... | 36 |
| 8. | Results and Discussion | 37 |
| 8.1. | <i>System Usability Scale</i> | 37 |
| 8.2. | <i>Additional Evaluation</i> | 38 |
| 8.3. | <i>Research Goals</i> | 40 |
| 9. | Future Works | 41 |
| | Bibliography | 42 |
| | Appendix A – NSD Approved Privacy Statement | 44 |
| | Appendix B – Interview Session Transcript Summary | 47 |

1. Introduction

Students of higher educational institutions all share a similar goal – to graduate with good grades and go on to land their dream job. In order for that to become a reality, however, students should start preparing for employment as soon as they are enrolled.

1.1. European Project

The Graduate Employability Skills App is an Erasmus+ collaborative European project effort. The partners involved are the University of the West of Scotland, the Norwegian University of Science and Technology, the University of Peloponnese, and Cardinal Stefan Wyszyński University in Warsaw. The goal of this project is to develop a mobile app which will allow students to plan, record, and evidence procurement of graduate employability skills as they journey through university. The app will assemble an interactive record of skills, activities, and evidence.

The project defines the term GES both as *graduate* employability skills and *global* employability skills interchangeably across their publications (Boyle et al., 2020a; Boyle et al., 2020b). For the sake of clarity and with the purpose of this thesis in mind, I will stick with graduate employability skills, as the target audience is indeed graduate students.

1.2. Problem Description

As part of the Norwegian team at NTNU, I have been tasked with creating a proof-of-concept interactive prototype of the graduate employability skills mobile app. The prototype will serve as a first complete draft of the application before development of the actual app starts. As such, the foundation of this prototype will have to be sound and grounded in literature every step of the way.

1.3. Research Goals

As part of my research, I will have to develop a framework which the prototype will have to abide by. This framework should encompass the importance of acquiring employability skills and define what it entails to possess a given skill so that the students will have the highest chance of gaining employment. In addition, as the framework will be tied to a mobile app, the activities should reflect that as well. Given these goals, the following two research questions have been formulated.

RQ1: What parts of students' skill acquisitions are most relevant in an employability setting?

RQ2: How can this be tailored to fit inside a mobile application?

2. Research Methods

Before the development of the interactive prototype can commence, a review of existing literature and solutions will have to be performed. This to get a feel for what the existing literature has concluded and what existing solutions are attempting to solve. In addition, getting a grasp of what students would want and need in an application like this will further help in tailoring it towards the intended userbase.

2.1. Structured Literature Review

The European partners have already performed a comprehensive literature review on employability skills and existing frameworks. A summary of their findings, and how they relate to my own findings as part of the interview session and case studies will, will be presented.

2.2. Interview

To thoroughly get an understanding for how active students process their employability skills, what third party solutions they utilize to achieve this, and what features they would want in an application like this, a focus group interview was conducted. Questions are to be defined in advance, as to stay on topic and not let the participants wander too far off.

2.3. Case Studies

There is a plethora of online solutions available for students aimed towards helping them keep track of their skills. But which of them are the most popular ones? And which of them are active students utilizing the most? These are questions that will be answered by interview session, and the identified platforms will be analyzed in detail to pinpoint common traits, positive aspects, negative aspects, and improvement potential. All of which will be compared to produce a framework for the GES App.

3. Literature Review

As mentioned in chapter 2, a comprehensive literature review on employability skills has already been conducted by the European partners of the Erasmus+ project. As such, I will in this chapter summarize their findings, and compare them with my own findings from the interview session and in-depth studies of existing solutions. Once compared, the findings will be presented in terms of their potential usefulness towards defining the framework the app will be based on.

3.1. GES App Intellectual Output

Seeing as this thesis is tied to the aforementioned European Erasmus+ project, it is only natural to present an overview of what they have discovered as part of their literature review up until this point. This entail definitions of graduate employability skills, existing frameworks, and perspectives on employability from different actors.

3.1.1. Definitions

At its core, employability skills are skills businesses and employers look for in candidates in order to deem them employable (Boyle et al., 2020a). That is, a set of skills required to perform what is expected in the workplace. However, upon reviewing the literature of said skills, the project partners have discovered that terms like competencies, abilities, and attitudes are all included, which can result in confusion when attempting to create a basic definition, as many of these terms are used synonymously.

They further argue that skills, attitudes, and abilities can all be defined using competence, as there is a myriad of definitions that encompass all of these terms in one way or another. Cedefop (2017, as cited in Boyle et al., 2020a), defines competence as *“actually achieved learning outcomes, validated through the ability of the learner autonomously to apply knowledge and skills in practice, in society, and at work”*. That is, being able to apply the mental operations needed to transform knowledge into skills, as well intelligently applying relevant skills in situations where said skill is needed. Attitudes will often influence behavior in a given situation, but because they are rarely a result of a formal teaching or learning process, they are a lot more personal than any of its counterparts.

The teaching process conventionally practiced by educators revolves around the idea of assessing the students in a very binary way, focusing on what they learned rather than how they learned it and how they may apply this knowledge in the future. As a result, the students might get so caught up in insignificant details that they fail to see the bigger picture, affecting how they might apply this competence in the future. Being able to judge and act appropriately in a range of different contexts is what will enable one to succeed in a workplace environment. But only seeing ones competencies for what they are on their own might obscure the fact that a competence might be a combination of a number of other competencies. With that in mind, it will be important to make students aware of not only which competencies they possess, but how they obtained them and how they relate to others.

As we have seen, competence entails a lot more than the concept of skills on their own. And as such, a distinction between the terms skills, competences, attitudes, and abilities is proposed, in order to prevent more confusion, as employability skills is a term used by both employers and employees.

3.1.2. Frameworks

There have been a multitude of attempt at creating a framework for defining relevant employability skills around the world. The European project partners have compared seven of them – three from the U.K., two from the USA, and two from Australia. Each of the frameworks have identified a set of categories and subsequent skills they consider relevant. While not completely identical, the similarity between each of the frameworks are substantial. After a thorough comparison, the project partners were able to identify six skills that were present in all seven frameworks in some way or another. The identified skills are listed below.

- Communication skills
- Teamwork skills
- Learning and academic skills
- Digital/IT skills
- Workplace skills
- Self-management in the workplace

The listed skills are in no way a be-all and end-all in the pursuit of defining which skills are most important. This is merely a comparison among a select few defined frameworks. However, it stands as a solid foundation in terms of generic skills that should be included in the app, as there is no denying they are some of the most sought-after employability skills. At least from a theoretical perspective.

3.1.3. Employability

Students have a generally poor idea of what employability entails as they enter university. However, these views change as their education progresses, and in general they seem to be aware of the importance of GES, as a degree on its own does not sufficiently guarantee employment. When asked to list GES, students cite teamwork, communication, time management, and problem solving as the most important ones.

Weligamage et al. (2003, as cited in Boyle et al., 2020a) mentions a 'competency gap' among graduates in which skills employers expect candidates to have are lacking, resulting in a lot of unemployment. These include skills like communication, decision making, problem solving, leadership, emotional intelligence, and social ethics.

Interestingly, most of the skills within this competency gap are already known to students, as they have been cited as the most important ones. While most students will have been faced with scenarios in which they would have to challenge each of these aforementioned skills during their time in university, it is clear that they have not been

sufficiently challenged to meet the standard expected by employers in a professional setting. The skills mentioned can be classified as soft skills (Choudary, 2014, as cited in Date, 2017), in that they are not technical but rather intrapersonal and interpersonal (Laker & Powell, 2011). They rely on your ability to interact with yourself and others, which requires a lot more practice than technical hard skills for most people. An increased awareness, and thus increased exposure to said skills might be the way to go in order to close this gap.

3.2. Focus Group Interview Session

The project partners developed a template for conducting a focus group interview session that will be used to extract information about how students plan and keep track of their employability skills. While I did make some changes, additions, and reductions to the original script, the vast majority of questions and content were provided by the project partners. My work primarily consisted of recruiting participants, conducting the interview, and processing the results.

3.2.1. Participants

Table 3-1: Interview session participants

| | |
|-----|--|
| RE1 | 25-year-old male, Master’s degree in Computer Science (5 th year), two years in startup business and a summer job as a software developer in a consulting firm. |
| RE2 | 28-year-old male, Master’s degree in Computer Science (5 th year), worked in retail and as an airport security guard. |
| RE3 | 26-year-old male, Master’s degree in Computer Science (5 th year), worked at a software company for two years. |
| RE4 | 27-year-old male, Master’s degree in Civil Engineering (5 th year), worked part-time in a construction firm. |
| RE5 | 26-year-old male, Master’s degree in Computer Science (5 th year), previous internships at NAV and a consultant firm. |

3.2.2. Recruiting rules

The participants were all selected based on previous collaborative work conducted at NTNU. I have been involved in at least one project with each of the participants, so they were all acquaintances. Due to the nature of the study and the need to both record and transcribe the interviews, the participants had to be made aware of how their data would be used. So, a privacy statement was made, explaining the overall study, what data would be collected, and how it would be treated. The statement was then sent in to be approved by the NSD (the Norwegian Centre for Research Data). Upon approval, requests were sent out to participants using Facebook Messenger. Once they confirmed their interest in participating in the study, they were all sent a copy of the privacy statement, and the interviews were scheduled. The interviews themselves were performed using Zoom and Microsoft Teams. Due to a misunderstanding, there was a total of five individual interviews conducted, instead of one large focus group interview.

As a result, an overall flow where each participant shares their viewpoint which in turn could have inspired other participants was not achieved. The findings summarized in appendix B are a collection of answers gathered from these five interviews, attempted to mirror a focus group interview.

3.2.3. Conclusions

All participants were fifth year MSc students about to enter the job market in a few months and have a vast arsenal of skills in their tool belt. Some seemed more reflected than others in terms of what skills they are developing and what employers are looking for. However, when presented with a concept like the GES app, they all presented a wide range of features and functionalities they deem relevant and beneficial.

3.2.3.1. GES

The concept of employability skills seemed misunderstood by the participants, as they were mainly focused on very domain-specific technical skills and abilities as opposed to more globally applicable skills. A reason for this might be the homogeneity of the group and the majority of the participants being computer science students, who think they will be judged on their technical skills more than anything in an employability setting. So being able to adequately convey what employability skills are as a whole and give the user a reason to care about their own will be key. That being said, most of them were able to cite relevant non-technical skills acquired during their studies as well. Among the most popular ones were teamwork and communication, which is understandable, seeing as a master's degree involves a lot of group projects, where said skills are very relevant. In terms of employer needs and demands, a lot of focus seemed to be on the ability to fit in and adapt to the current practices in the workplace, as well as being able to continuously learn new things.

The participants described the process of entering the job market as a laborious one. Finding jobs to apply for, the need to tailor your CV to each employer's needs, the lack of practical experience, the anxiety and self-doubt associated with waiting for a response and comparing yourself with other potential candidates, and the stress of adapting to a completely new workflow after years of university studies. In addition, finding a job you actually want where you will be able to keep your enthusiasm up in the years to come, and not just grabbing the first job you can get your hands on "just because" seems to be a worry for some of them.

None of the participants actively and systematically plan, track, and record their skill development. They rely heavily on memory and update their CV and/or LinkedIn profile when they must, for instance when applying for a job. One participant mentioned that they maintain their skills by using them often and continuously. While this might sound good on the surface, it is not a sure way to keep track of everything one has done over the course of a five-year education. Some of them seemed aware that the way they are doing things is inadequate, while others felt like they were in control and did not need an app to keep track of things.

In terms of skill certificates, the participants mentioned grades from university, as well as certification processes like the ones found on LinkedIn and Amazon Web Services (AWS), so that might be a source of inspiration, although this might be mostly relevant for technical students. One participant mentioned certificates play no significant role unless the employers themselves are looking for them, and that if an app were to serve this purpose, they would have to be able to trust it. The others seemed positive to the idea, as there is no real substitute as of now. A universal standard for quantifying skills was also mentioned to further ensure trust in the app.

3.2.3.2. App

The consensus among the participants seemed to be that they would like a hybrid solution. For more labor-intensive work that requires a lot of input from the user, say, in a reflection process, they would prefer a laptop or desktop environment. And for easy and light navigational work, like tapping through screens, browsing through skills, or sharing with others, a mobile environment would be preferable. Therefore, it will be imminent to find a balance in regard to the amount of work needed. Not too much, which will feel excessive and demotivating for the students, and not too little, so that the students feel like they are not getting anything in return in terms of value.

The most cited currently used solution is LinkedIn. But as one participant mentioned, it is used mostly to track what you know, and not to improve your skills. Therefore, it will be important for the app to indicate what the user can do to improve.

Most participants seemed eager to have a high level of control over their data. Both in terms of restricting who has access to it, but also an easy way of sharing it with others, either through the app, or exported as separate documents. The ability to integrate it with other third-party apps and sites was another feature most of them wanted to see. Whether that'd be LinkedIn, or other proprietary sites employers use when listing jobs. So, the ability to import information and skills directly from the app without having to copy-paste everything was something they all wanted to see. *"The less the user has to do, the more the user will do."*

Social features like comparing your skills with friends or other employees, as well as a search functionality where employers could find people with a specific skillset was also mentioned. Furthermore, a way for employers to endorse skills they appreciate by leaving a like or some kind of sign of approval on your profile might encourage further skill development. This would require a personal profile section, which one participant mentioned they wanted.

The app should also suggest skills based on your current education and which skills are most sought after in that line of work and do so in a way that will encourage improvement. A good rating system that will easily let the user quantify their skills might encourage even further improvement. Other gamification features should be implemented if done right. One respondent answered they were afraid some might start to hoard skills in order to build their profile and gain achievements and mentioned that said achievements should provide some additional value, otherwise they would be rendered useless in a professional setting. The same went for any potential in-app game

– it needs to be relevant and have a purpose, and not be included as a pure entertainment feature.

Answers in regard to app usage varied vastly, from once a year to a couple times a week. However, they all agreed a periodical reminder from the app would be beneficial in order for the users to not completely forget about it. They also wanted some information about where to look for jobs, as it is not always easy to find them all.

3.2.3.3. Requirements

Below the requirements identified from the focus group interview are listed. The requirements are formulated as user stories and ordered based on priority and relevance in regard to neighboring requirements. Each requirement is backed up by one or more responses from the focus group interview, and the numbers represent which question it originates from, which can be read in its entirety in appendix B. As a rule of thumb, requirements with a single reference are labeled as low priority, ones with two references as medium, and ones with three or more as high. However, certain requirements that were not adequately discussed in the interviews, that are considered of high necessity by the European researchers, have been bumped up to high priority regardless of number of cross-references. This affects requirements number 1, 5, 6, 9, and 10. In addition, dependencies between requirements have also made it necessary to alter some priorities. In this instance, requirement number 27 has been upgraded to a medium priority due to its dependency to requirement number 28.

Table 3-2: Requirements identified from interview session

| Id | As a... | I want... | So that... | Priority | Backed by |
|----|---------|---|--|----------|-------------------------|
| 1 | User | To add my education | I can get relevant skill suggestions and job opportunities | High | 15, 17 |
| 2 | User | To add my courses | I can give a detailed description of my education | High | 14, 15, 17, 20 |
| 3 | User | To add my grades | I can use them as a skill certificate | High | 14, 15, 17, 20, 22a |
| 4 | User | To add my past and present projects | I can share what I am working on | High | 13, 15, 17, 19, 22a, 23 |
| 5 | User | To add my internships | I can display relevant work experiences | High | 17, 22a |
| 6 | User | To add my skills | I can display my strengths | High | 13, 17 |
| 7 | User | To add references | I can have credible sources that can vouch for my skills | High | 14, 17, 19 |
| 8 | User | To add pictures | I can further illustrate an entry | Medium | 17, 19 |
| 9 | User | To reflect | I get a deep understanding for my experiences and abilities, and use it to prove my skills | High | 13 |
| 10 | User | The app to encourage reflection for each entry | All entries can be elaborated | High | 13, 20 |
| 11 | User | To generate a CV based on the entries I have tracked in the app | I do not have to write down the same information twice | High | 9, 13, 18, 19 |
| 12 | User | The app to suggest new skills based on my | I can identify holes in my skillset and become the best version of myself | High | 17, 19, 22a, 23 |

| | | | | | |
|----|------|--|--|--------|----------------|
| | | education and current skills | | | |
| 13 | User | The app to suggest finishing incomplete tasks | No work is wasted | Medium | 17, 19 |
| 14 | User | To quantify my level of skill | To use as a skill certificate and compare with other users | High | 15, 19, 20, 23 |
| 15 | User | To compare my skills with other users | I can see where I range in comparison to others | Medium | 11,23 |
| 16 | User | Gamification features | The app becomes more appealing | High | 3, 23, 24 |
| 17 | User | To acquire skill certificates through quizzes and challenges | My skills are backed up with real data | High | 14, 20, 24 |
| 18 | User | To compete with other users on the same skill level as me | I am challenged at an appropriate level | Low | 24 |
| 19 | User | To transfer information from the app to third-party forms and websites | I can take full advantage of everything I have logged in the app | High | 15, 18, 19 |
| 20 | User | The app to be intuitive, responsive, and easy to use | I don't have to spend a lot of time getting used to it | High | 4, 16, 19 |
| 21 | User | The app to require little effort | Using it will not feel like a lot of work | High | 16, 18, 21 |
| 22 | User | To communicate with employers | I can present my skills to them directly in the app | High | 15, 19, 23 |
| 23 | User | To see open positions that fit my skillset | I can apply to the most relevant jobs | Medium | 11, 23 |
| 24 | User | Employers to give feedback on skills they appreciate | I am motivated to work even harder | Medium | 19, 23 |
| 25 | User | Employers to find me based on my skills | They can contact me about relevant positions | Medium | 19, 22a |
| 26 | User | To communicate with other users | We can share thoughts and experiences | Medium | 2, 19 |
| 27 | User | A personal profile | I can display all relevant information in one place | Medium | 19 |
| 28 | User | My profile to display a level of completeness based on current skills | I am motivated to continuously improve it | Medium | 23, 24 |
| 29 | User | Full control over my data | I know who can access it | Low | 18 |
| 30 | User | To share parts of or my entire profile | Employers can see relevant information about me | Medium | 15, 19 |
| 31 | User | To export selected parts of my profile to a PDF | I can share data from the app with people that do not have the app | Low | 19 |
| 32 | User | A feature that will allow educational institutions or companies to back an entry on my profile | My profile will gain credibility | Low | 23 |
| 33 | User | A text-to-speech feature | Users with visual impairments can use the app | Low | 22b |
| 34 | User | A reminder after a set amount of time of inactivity | I don't forget about the app | Low | 21 |
| 35 | User | Skill certificates to expire after a set amount of time | I keep my skills up to date | Low | 21 |

3.3. Review of Current Practices

The concept of storing skills and experiences in one place is certainly not a new concept. Whenever a person applies for a job, one of the first tasks is usually to hand over their CV, which is a structured document that should give the employer a good overview of who you are. As such, the document usually contains a list of one's education, work experiences, and key skills, as well as a set of other essential things (Rolfe, 2019). The CV is a good place to store information about yourself that could come in handy in an employment situation. However, that would require one to continuously update their CV as new skills and experiences are acquired. And as we have just seen in chapter 3.2, that is rarely the case, as none of the respondents reported of having any structure or schedule when it comes to doing so.

Fortunately, there are other solutions available that are more suited for this kind of bookkeeping. In this section four such solutions will be examined in detail, in order to identify what they are doing right, and what could be done better. These include LinkedIn, Wide Assessment, MyShowcase, and Skill Tracker.

3.3.1. LinkedIn

LinkedIn is the most popular professional network in the world, with 756 million members in over 200 countries as of June 2021. Their mission statement is to "*connect the world's professionals to make them more productive and successful*". It is a powerful platform with a myriad of different functionalities. On the surface level, LinkedIn looks like a social network much like Facebook. Users create a profile, add information about themselves, create posts about things that interest them, and as the title might suggest – link up with other users and build a network.

The profile section is in many ways structured like an interactive CV, as users are able to add information about themselves, work experiences, education, skills, and interests. Work experiences and education can be linked with businesses and educational institutions if they have a profile of their own on LinkedIn. The most interesting part in regard to this study, however, is the skills. A person is allowed to add upwards of 50 different skills to their profile, three of which can be pinned to allow for extra exposure. When adding a skill, the user is presented with a search field where they look for any skill of their liking. Should the skill not reside in the search results, it can still be added, which is a nice touch, as having each achievable skill represented in their databases would be a rather unrealistic task. But more interestingly, below the search field, the user is also presented with a selection of skill suggestions, which are all based on the user's profile. By doing this, it takes some of the pressure off of the users by reminding them of skills they might possess but have forgotten to add to their profile. As suggestions are based on my profile and how it relates to other users with similar profiles, it could also be a good idea to look into and perhaps acquire some of these skills as well, in order to stay competitive.

A downside of allowing everyone to add whatever skill they want to their profile it results in a lot of duplicate or very similarly worded skills. And thus, resulting in the suggestion box having the chance of being populated with a skill that the user already is in

possession of. As mentioned earlier, keeping track of every single skill is next to impossible, but the way LinkedIn filters these new skills in with existing ones is certainly not perfect. A small blemish in the grand scheme of things, but worth mentioning, nonetheless.

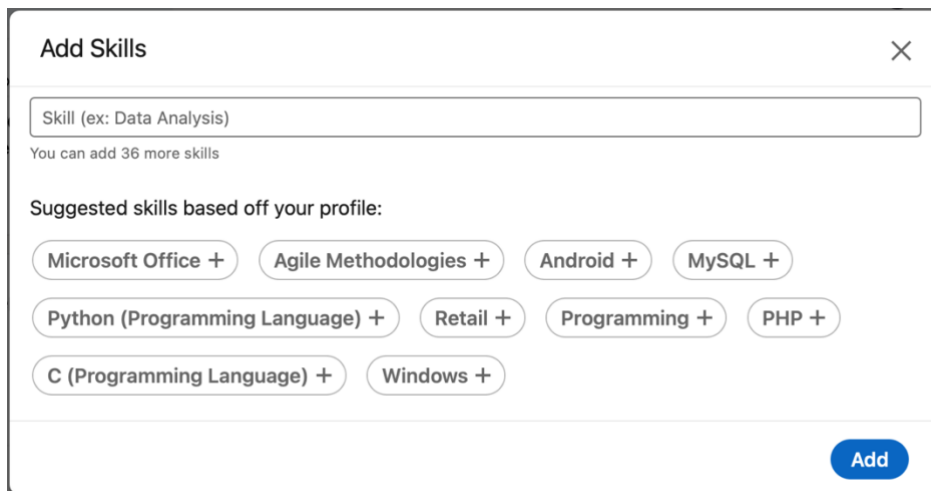


Figure 3-1: Adding new skill on LinkedIn

Certain skills are more easily quantified than others. And for a lot of those, LinkedIn offers a variety of skill assessment quizzes. These quizzes include a set of multiple-choice questions, and if the users places within the top 30%, they will receive a skill badge. A great way to highlight skills one is particularly proficient in. Another way to get recognition is via other members. For any skill on a user's profile, any member of their network can endorse that skill by hitting a little plus icon next to it. They will then be prompted to answer two voluntary questions about how good the person in question is at said skill, as well as how you know this person possesses it. Again, these are voluntary, so endorsing someone is in reality only a one-click process. Rapanta & Cantoni (2016) concluded that most people make such endorsements without sufficiently calculating the effects it can have, which begs the question – are they of any value at all? As discovered during the preliminary interview session in chapter 3.2, students do not necessarily find these endorsements very reliable. Wu et al. (2018) proposed a framework for solving this issue by calculating the degree of false endorsements using regression analysis and found the endorser's level of expertise on a particular skill to be the best indication of a true endorsement. That is, the higher level of skill a person has, the more competent they are at identifying others with said skills.

Users are able to export both their own profile, as well as any other member's profile, to a PDF. This PDF will include work experience, education, and highlighted skills. The option to select which parts to include in the PDF is reserved for premium subscribers.

More than anything, LinkedIn is a social network aimed at connecting employers and recruiters with potential candidates. Users are able to see who visited their profile, as well as be notified whenever they appear within the search results of any given person or business. There is also an entire section dedicated to job listings, where users can see available positions suited for their set of skills. While not within the scope of this thesis, it certainly is possible to add it to the list of potential future works.

3.3.2. Wide Assessment

Wide Assessment is a recruitment platform which aims to automate the recruitment process of IT professionals. It offers candidates an easy way to create skill profiles, and companies an easy way to list open positions and compare candidates. While the platform is built for both candidates and companies, the main focus of this review will be on the candidate functionalities, as that aligns more with the purpose of this thesis.

Candidates are able to add skills as well as practical experiences to their profiles. When adding skills, the user is first asked which industry and subsequent field they are linked to. From there, skills can be picked from a generated list of suggested skills, that can be expanded further to reveal more skills, or found by searching for a specific skill. If said skill does not exist, the user can send a suggestion for it to be added to the repository but will not be able to add it to their profile until it is approved. As a final step, users are then asked to self-report their skill level for each of the skills on their profile, which is based on a four-tier hierarchy.

Table 3-3: Wide Assessment skill level hierarchy

| | |
|-------------------|---|
| 1 – Basic | Skills one knows, but have insufficient practical experience with |
| 2 – Play | Skills one has practical experience with, but not in a professional setting |
| 3 – Pro | Skills one has professional practical experience with |
| 4 – Expert | Skills one is considered better than other professionals in |

In addition, users can pick five skills they wish to highlight. These skills will be displayed on the user's profile in a graph format, as a way of directing the attention of potential companies towards skills that are important.

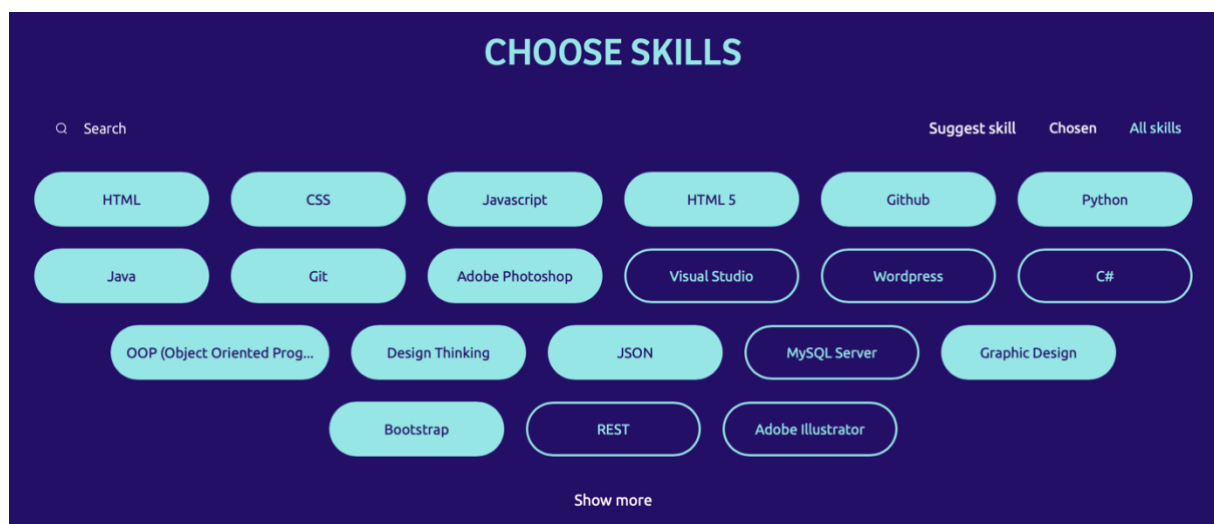


Figure 3-2: Adding a new skill on Wide Assessment

Unlike LinkedIn, only pre-approved skills can be added. The fact that the platform is for tech people, which limits the number of relevant skills, as well as having a heavily monitored skill repository, mitigates the issue of having similar or duplicate skills under different names. The downside is that if one possesses a very niche skill that is not present, the user will need to await approval before adding it.

Experiences users can add are split into three categories.

Table 3-4: Wide Assessment experience categories

| | |
|------------------|--|
| Education | Anything from a primary school course to a full PhD degree |
| Work | Professional experience with a company |
| Projects | Any project related experience |

For each entry, the user can attach relevant documents and connect. So, if some physical or digital artifacts were produced and/or published as a result of said experience, they can be added to further illustrate and evidence their experiences. In addition, the platform also allows the user to link these experiences with one or more skills on their profile, which provides a way of evidencing skills as well – connecting each and every entry of the user’s profile. Skills are supported by a set of experiences, which again is supported by a set of artifacts.

As mentioned in chapter 3.3.1, LinkedIn offers its users a way of exporting their profile to a PDF, in a CV format. Wide Assessment has a built in LinkedIn reader, which will read and interpret any CV downloaded from LinkedIn and generate and add experiences to the user’s profile automatically. An illustration of LinkedIn’s massive impact in the recruitment business, given their enormous userbase. Instead of forcing their users to do things their way, they acknowledge LinkedIn’s presence, and allow for cross-platform compatibility.

Wide Assessment pride themselves in offering solid anonymity for its users. For candidates this means that only companies they approve will be able to see their complete profile. Additionally, they can also blacklist companies, which will hide their profile from them entirely.

According to O’Neill (2021), the number of unemployed people in the world is approximately 193.7 million as of 2021 and projected to reach 200 million by the end of 2023. It would be naïve to assume that every one of these individuals have access to modern technology in the pursuit of a career. However, many do, and these are the ones the GES App is meant to cater to. As mentioned initially, Wide Assessment is built for the tech industry. In the grand scheme of things, this is quite a narrow scope. By keeping it this way, they have been able to monitor crowdsourced user data to a satisfactory degree. However, some very good concepts have been utilized in this platform that could be universally implemented in a global application. Adding skills and experiences, and linking them together, is certainly not exclusive to the tech industry. Students from any background can apply this to their own education, and is something to keep in mind for the GES App.

3.3.3. MyShowcase

MyShowcase is an online browser-based ePortfolio platform for individuals, educators, employers, and apprenticeships. A portfolio is a collection of work meant to summarize a person’s abilities. The addition of an ‘e’ simply implies that it is an electronic version. This means that it can hold virtually any piece of digital data, and as the name suggests, it is easily shared and distributed.

As an individual, the user can store their experiences, achievements, and accomplishments. The platform allows for a myriad of different types of artifacts to be uploaded, including everything from notes to maps and videos. These artifacts can then be displayed in personalized showcases as a digital presentation, to evidence ones work and experiences. That being said, they don't bring much value on their own, as they just pile up inside a folder named "Stuff" by default, which can become quite cluttered really fast. Only when added to an adequately named showcase do they provide context.

Educators can track and monitor all of their learners' progress and performance. In addition, they also have the ability to create and issue IMS certified Open Badges. These verifiable digital badges containing all sorts of information about the recipient, issuer, criteria, as well as additional data necessary to evidence the acquisition (*IMS Open Badges, 2020*). After receiving a badge, the learner can then include it as they would any other artifact in their showcases.

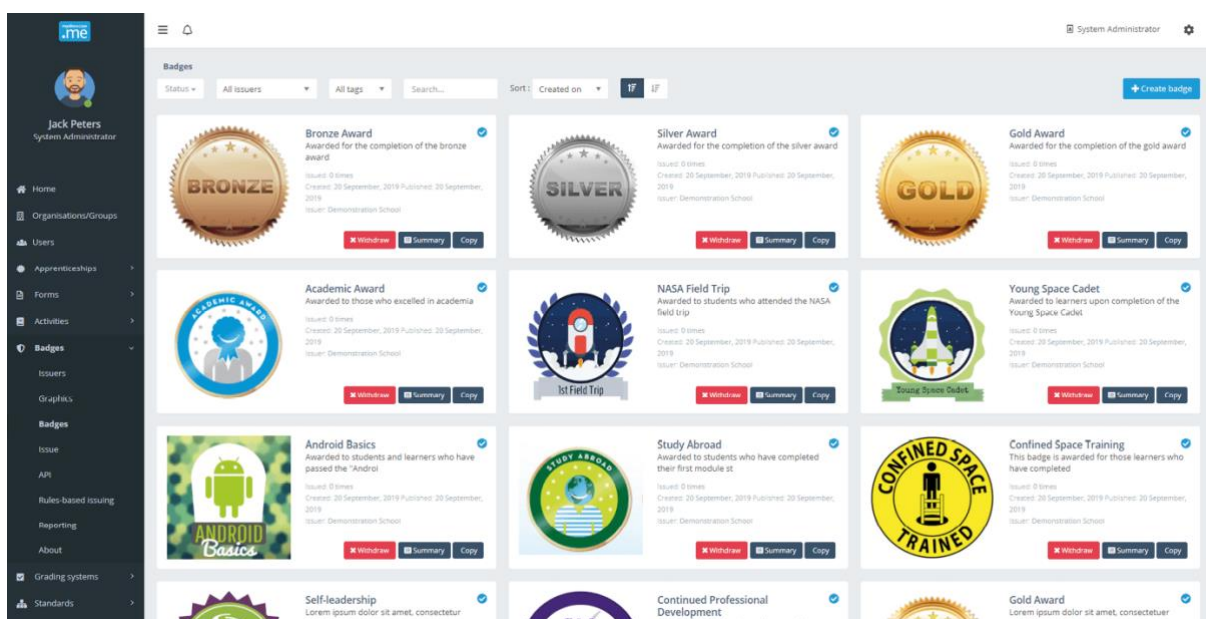


Figure 3-3: MyShowcase badges

These badges are an interesting take on providing concrete evidence for one's skills and experiences. The fact that they are verifiable and contain a great deal of information supports their legitimacy, but as discovered in chapter 3.2, a great deal of skepticism was displayed towards third party acknowledgements. Unless employers specifically look for said badges, some felt utilizing them at all would be a waste of time and effort. However, according to IMS, there are approximately 475,000 available badges that can be earned, and as of 2020, more than 43 million badges have been issued (*Badge Count 2020, 2020*). So, while not a familiar concept among the interviewees, their presence should definitely not be ignored.

3.3.4. Skill Tracker

Skill Tracker is a platform created by a team of educational experts aimed towards tracking students' development of ATL (approaches to learning) skills. Categories of said skills include thinking skills, communication skills, self-management skills, research skills, and social skills (Gillett, 2014). From a student perspective, the app should enable them

to understand and become more aware of the skills they are developing, which in turn should help them identify gaps in their skillset.

The activity of logging skills is advertised to take no more than three minutes, including providing evidence for the acquisition of said skill, which is required. It is very much linked to the students' educational program, as one will have to choose which class the skill pertains to when adding it. In addition, the students are also asked to categorize the skill within the ATL definition, as well as self-report their level of skill at the time of logging. They also have the ability to upload attachments, although there seems to be a hard limit on the number of attachments allowed per skill.

In order to fully utilize the app's potential, it seems the entire educational institution has to commit to it. I was able to request and gain access to a demo of the mobile app, but the functionality was rather scarce. There was only a finite set of predefined skills to choose from, and the app itself was very unreliable, crashing on multiple occasions. However, Kahn et al. (2016) reported being able to add both a library of skills relevant for their Veterinary School, as well as specifying which level of skill the students should achieve.

Skill Tracker is the only platform among the ones reviewed in this section that is not free by default. While this might encourage educational institutions to fully fund it for their students, the ones that don't leave the students having to pay for it themselves. Among the interviewees in chapter (**#X-REF: interview**), only one participant even mentioned pricing at all, completely unprompted. As such, it is intuitive to deduce that the remaining participants assumed the app will be free. And with a range of other free solutions readily available, both in browser- and app-format, the annual subscription fee presented by the Skill Tracker platform might scare off a large group of potential users.

3.4. Crowdsourcing

As seen with both LinkedIn, Wide Assessment and Skill Tracker, crowdsourcing is heavily utilized. Defined as a way of outsourcing work to a large group of potential actors (Hammon & Hippner, 2012) it is a great way of collecting large amounts of data. Unless a lot of work is needed to process the data, it is undeniably cost cutting, and can potentially increase customer loyalty by letting them take part in the innovation.

Expecting any platform to be able to list any and all achievable skills from the get-go is both unreasonable and impractical. Therefore, letting users supply non-existing skills for others to use is a sound solution. The different platforms have, as we have explored, taken different approaches to this. LinkedIn allows anyone to add any skill to their profile, which floods the repository, and results in a heap of near identical skills disguised in different names. Wide Assessment allows its users to suggest skills to be added to the repository but is unable to add it to their profile until it is approved by the team. This results in a lot less duplicates, but means the users have to patiently wait for it to be approved, and potentially forget about it before it happens. As a brand-new app, embracing any and all user input from the start will ensure an initial boost in available data, that can potentially be dialed back in the future should it appear to be going out of control. So crowdsourcing skills will be a must to get the app off the ground.

3.5. Skill Acquisition

The main goal of the app will be to allow students to log their skills. As we have discovered, this is an activity that most students do very infrequently. By only reserving time to update their list of skills when they have to, they run the risk of forgetting skills they have previously acquired. This is especially true if they have only used said skill a few times, as it might not have had the opportunity to enter the long-term memory, and thus the information will decay over time (Jonides et al., 2008). As such, making it possible to add skills while on the go, before the student forgets about it, will be important. During the interview session in chapter 3.2, the respondents almost unanimously agreed that for this process to make sense in a mobile environment, tasks cannot be too time consuming. Therefore, interactions must be quick and easy to comprehend.

3.5.1. Model

Platforms like LinkedIn, Wide Assessment, and Skill Tracker all offer their users a way of adding skills to their profile. This can also be achieved using MyShowcase, although it has to be done implicitly by providing concrete evidence through showcases. Depending on what line of work the student is aiming for, this might be the better solution, however, due to its flexibility and customizability, whereas on the former three platforms users are forced to conform to rules in regard to how skills are displayed and how much information can be added.

Wide Assessment and Skill Tracker were the only two platforms where users also have the ability to self-report their level of skill. They both utilize a four-level scale, ranging from minor knowledge and minimal to no practical experience, to expert level knowledge and plenty of experience. For the GES App I have chosen to let users self-report their level of skill using the five-stage model of adult skill acquisition, also known as the "Dreyfus model of skill acquisition", first published in 1980 (Dreyfus, 2004; Baillie et al., 2016; Kirkpatrick & MacKinnon, 2012).

Table 3-5: Dreyfus model of skill acquisition

| | |
|------------------------------|---|
| 1 – Novice | Dependent on rules and guidelines |
| 2 – Advanced beginner | Situational characteristics determine which rules to follow |
| 3 – Competent | Able to plan, and can perform under pressure |
| 4 – Proficient | Able to prioritize based on intuition |
| 5 – Expert | Profound understanding, fully reliant on intuition and experience |

In a case study of nursing practice and education, Benner (2004) concluded that the novice level was reserved for first year students, and that only once graduated did they progress to being an advanced beginner. After a year or two in practice they would again level up, to the competent stage, and reach the final levels after even more years of practice. While this might be true in the nursing practice, in the case of computer science, where students are exposed to technical skills early on, and continuously improve on them through their education, side projects, and even summer internships, to name a few, the possibility of exceeding past the novice level before graduating is certainly not out of reach. At the same time, being able to see all the levels in the very

beginning might act as a reality check for many who might think they are closing in on expert level skills when they in fact might only be on level two or three.

Park (2015) argues that in order to accurately quantify one’s own level of competence, each level should be simple, clear, and accurately described. In addition, he added a new level at the very bottom, which he named “Absolute beginner”, as well as renamed “Novice” as “Beginner”, for the sake of consistency. The new bottom level implies exactly as it suggest – the user is a complete beginner and knows almost nothing at all.

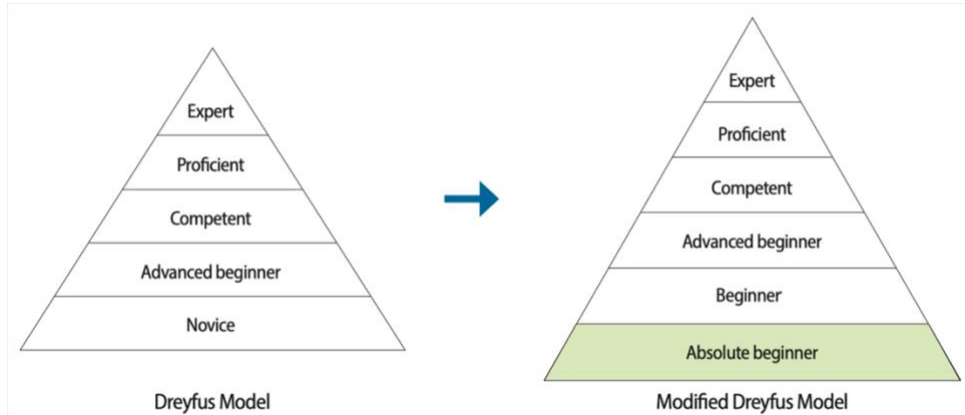


Figure 3-4: Dreyfus Model vs. Modified Dreyfus Model (Park, 2015)

While the idea of having each level be as accurately described and easily interpretable as possible makes sense, especially for a beginner, the addition of an “Absolute beginner” level seems a bit excessive. Unless students are constantly aware of what skills they are acquiring and improving at any given time, I would argue that most would not even recognize it at as a skill until they have reached the novice level. There would also not be much incentive to log skills in the app that one knows nothing about, as the point of having it there at all relies on it being of value in an employability setting. The value being actual knowledge of the skill as well as verifiable evidence. The only scenario at which logging skills one knows nothing about could be of any value to a student is if that particular skill is part of a larger long-term plan and means of achieving an end goal.

3.5.2. Evidence

Possessing skills is the ultimate goal, but in order to back it up, some form of evidence is required. Otherwise, students can simply add as many skills as they want to their profile, without having to defend their claims.

LinkedIn, Wide Assessment, MyShowcase and Skill Tracker all support the ability to provide evidence in some way or another. Which types each platform offers is listed in the table below.

Table 3-6: Ways of providing evidence available in existing solutions

| | |
|------------------------|--|
| LinkedIn | Work experience, assessment quizzes, endorsements |
| Wide Assessment | Files, links, educational modules, work experience, projects |
| MyShowcase | Files, links, reflection notes, showcases, badges |
| Skill Tracker | Files, reflection notes, experiences |

All of the above-mentioned evidence methods were also mentioned by one or more of the interviewees in chapter 3.2 as ideal to include in the app. One additional method mentioned was the idea of having references as part of the evidence. Much like one would put references on a CV, one could also have ones in the app that could vouch for one or more skill. LinkedIn's endorsement functionality is somewhat similar to this, but is lacking in terms of level of trust,

3.6. Gamification

As a core goal of the app is to implement gamification features in one way or another, it is important to understand what they entail, and how to implement it in a meaningful way. It should provide an additional value to the user on top of what the app is already offering to further boost their motivation. Adding said features just for the sake of adding them and have them become nothing more than meaningless gimmicks the users will not care for is something that should be avoided at all costs.

During the focus group interview sessions discussed in chapter 3.2, participants were asked to list desirable features for the app. One person in particular mentioned a gamification feature as desirable, specifically, a way of measuring profile completeness. He wanted a measurable concept of how complete each skill was and whether he was missing any skills that people within the same area of study usually possess. When explicitly asked about gamification features, the overall consensus seemed to be a positive attitude towards the idea. Again, mentioning a way of grading or measuring profiles as a motivational boost. On the question of whether they would like to play an online game related to the app, participants positive to the idea mentioned skill-based quiz games and being able to compete against strangers on the same skill level as themselves as potential solutions.

However, some still presented a level of skepticism towards both online games as well as gamification as a whole. One fear among some of the participants seemed to be that some users might start hoarding skills and achievements for the sake of reaching a high social status within the app. Circling back to what was mentioned above, features should not be added for the sake of having them there and achieving a skill in and of itself should not add a huge value to a user's profile unless it is backed up with relevant material like experiences and reflections.

One participant in particular seemed somewhat negative towards gamification in general. If the features are not useful or do not provide any value, they should be avoided, as they would serve little purpose towards the end goal. And as far as a potential online game is concerned, he stated that if the only purpose is entertainment, it would be a waste of time, hence including it would not be beneficial at all.

4. Framework

As mentioned in chapter 1, a framework will have to be developed for which the application will have to abide by. Following the output from the literature review, this chapter introduces and illustrates this proposed framework in detail.

4.1. Previously Proposed Outline

Following the intellectual output of the literature review performed by the European partners, as discussed in chapter 3.1, also summarized in Scott (2021), they proposed focusing on four areas for students to work on in what they call the "Skills repository". These areas include (1) knowledge, (2) skills, (3) attitudes, and (4) values.

Knowledge can be divided into direct and indirect knowledge. Direct knowledge concerns first-hand contact with the subject, often called "*knowledge by acquaintance*", whereas indirect knowledge concerns what the subject knows, often called "*propositional knowledge*" (Zagzebski, 2017). For the sake of this app, the most relevant of the two is certainly the former, as students will gain this kind of knowledge after having encountered situations that increase their knowledge for each individual experience.

When a person has gained a substantial amount of knowledge on a given subject, they can then transform this knowledge into a skill, by applying it in practice. Skills – more specifically employability skills – is the main theme of this app and should therefore naturally be positioned front and center. Students gain a vast arsenal of new skills as they journey through their education, as a result of both knowledge applied from lectures and practical experiences. However, as discovered in chapter 3.2, systematic and frequent documentation of improved and newly acquired skills and experiences is a rather rare phenomenon. Most students update this on a necessity basis, i.e., before applying for a job, rather than as a way of keeping regular track of their progression.

Attitudes and values are a lot less tangible than the first two areas. OECD (2019) defines them as "*principles and beliefs that influence one's choices, judgements, behaviors and actions on the path towards individual, societal and environmental well-being*". In the realm of decision making, values influence what people find to be important and how they prioritise. Attitudes influences behavior, based on the aforementioned values and beliefs, and decides whether a person's reaction in any given situation or context is positive or negative.

While this version of a skill repository makes sense, and certainly is doable, I have chosen to aim my focus towards students' skill acquisitions, where I have used knowledge gained from experiences as a way of evidencing skills. Attitudes and values are, as mentioned, not as tangible, and somewhat hard to quantify, which is why I have left this to be solved in future versions of the app, discussed in more detail in chapter 9.

4.2. GES App Framework

Below is the proposed framework for the GES App, which is all centered around the acquisition of skills. Each part of the framework is then described in detail.

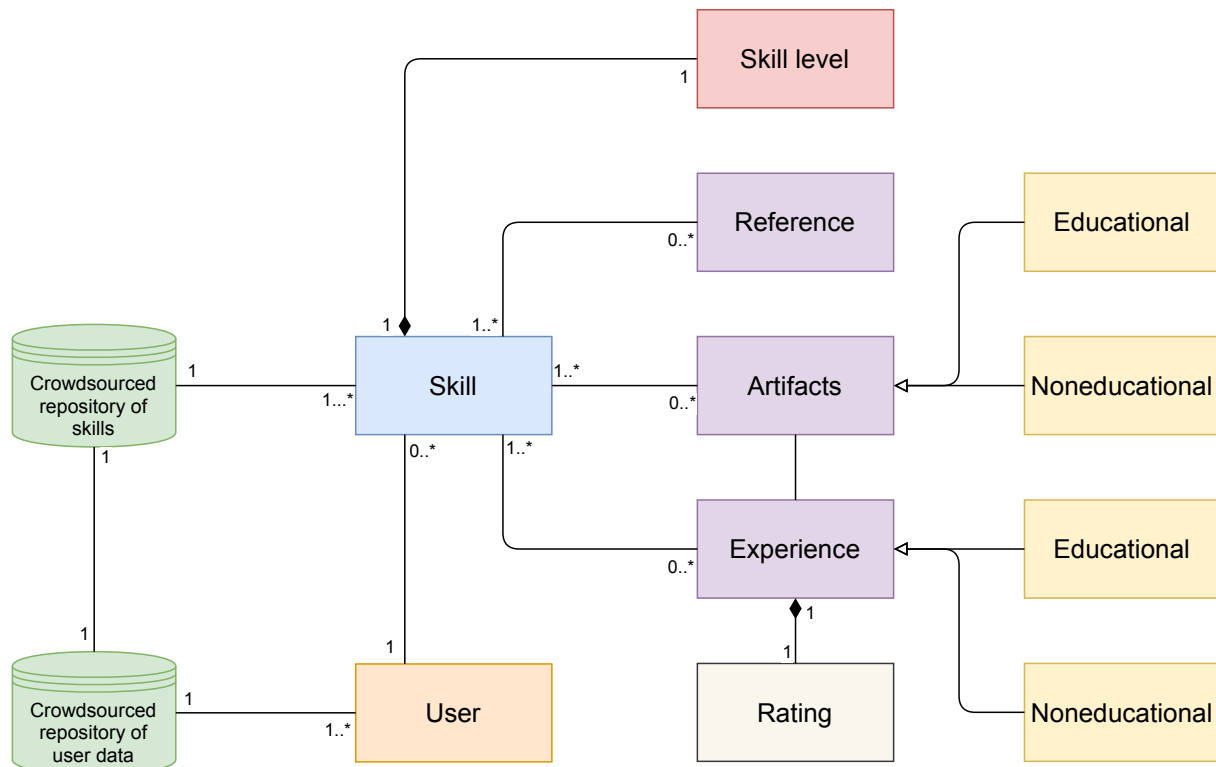


Figure 4-1: GES App Framework

4.2.1. Skills

The goal of the app is for students to have one place where they log and keep track of all their skills that might come in handy in an employment situation. Therefore, the framework is centered around the concept of skills, and how to adequately describe them. A user can possess zero or more skills, which all have a self-reported skill level attached to them. As mentioned in chapter 3.5.1, students will be able to base their level of skill on the Dreyfus model for skill acquisition, from novice to expert.

4.2.2. Evidence

Following the output of the literature review on skill acquisition in chapter 3.5, providing the students with options to evidence their skills is of utmost importance. Following in the lines of the existing platforms studied, as well as feedback received from the interviewees, the three types of evidence available are experiences, artifacts, and references. So as a student adds a new skill to their profile, they are able to evidence them by one or more of said concepts.

Experiences – “This is what I did”. A concrete process a student has gone through, like a semester project, a workshop, a presentation, etc. An experience can be used to evidence one or more skills, and can be achieved through an educational process, like a university course, or through a noneducational process, like a summer internship. The student will be asked a series of reflective questions upon logging a new experience in order to quantify performance and overall success.

Artifacts – “This is what I made”. Outputs from experiences, like a piece of software, a research paper, a design document, etc. Like experiences, artifacts can also be used to evidence one or more skills, and be produced through educational or noneducational incentive.

References – someone who can verify ones claim of possessing a (set of) skill(s), much like how one would list references on a CV. This can include people like team members, educators, supervisors, etc.

Because an experience or an artifact in reality can easily improve more than one skill at once, the ability to link them to more than one skill became a necessity. Wide Assessment solved this in a very similar fashion, so a great deal of credit should be dealt to it. Additionally, because artifacts are defined as “outputs” from experiences, being able to link an experience with a set of artifacts, or vice versa, was also necessary.

4.2.3. Crowdsourced repositories

As we have seen from the review of current practices, most of them utilize some form of crowdsourcing to obtain a collection of skills the users can add to their profile, and this app will be no different. A selection of the most common and sought-after employability skills will be present from the very beginning. Should students wish to add skills to their profile that isn’t currently present in the public skill repository, they are free to do so. In addition, they will be encouraged to share the skill with the repository so others can add it to their profile as well.

The second repository is a collection of user data, which is a database intended to hold voluntarily shared user data that maps educational data with obtained skills. By doing so, the app will learn from its users and be able to intelligently suggest new skills to users based on what is popular in their field of study if they do not already possess it. This addition was inspired by the overall consensus among the interviewees in chapter 3.2 that having the app suggest new and relevant skills would be a very welcomed supplement. Not only will the students then be able to log skills they acquire on their own, but also be reminded of skills they potentially *should* possess given their line of education that they currently do not. Again, this portion will be completely voluntary, but in order to utilize the app’s maximum potential, students should be highly encouraged to participate.

5. Prototype Iteration 1

As there was never an intent to build a working application, but rather a proof-of-concept interactive prototype, both iterations were developed using Figma. In this chapter I will go through the design of the first iteration, the feedback received, and how it was evaluated.

5.1. Partner Meeting

On the 21st of April 2021 all the European partners were gathered in a Microsoft Teams meeting to present and evaluate design ideas and general thoughts on the project. I presented the overall framework put forward in chapter 4 for the other partners for the first time, and then went on to run a quick demonstration of the prototype.

5.2. Design

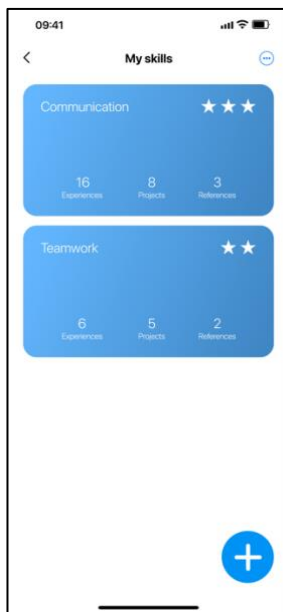


Figure 5-1 illustrates a subsection of the app where the student's skills will be illustrated using a simple card format. Each card includes the name of the skill, the self-reported skill level is denoted by a collection of stars, and any evidence for said skill is positioned towards the bottom, with the number of experiences, artifacts (previously named projects), and references. In the bottom right corner, the user can hit the plus button to add another skill to their profile. The button in the top right corner is a default iOS action button that can be programmed to do a range of different things. The idea behind using it in this prototype was to adjust sorting order among the listed skills, although that functionality was never added. The back button in the top left corner is intended to take the student back to their user profile, which had yet to be created.

Figure 5-1: My skills

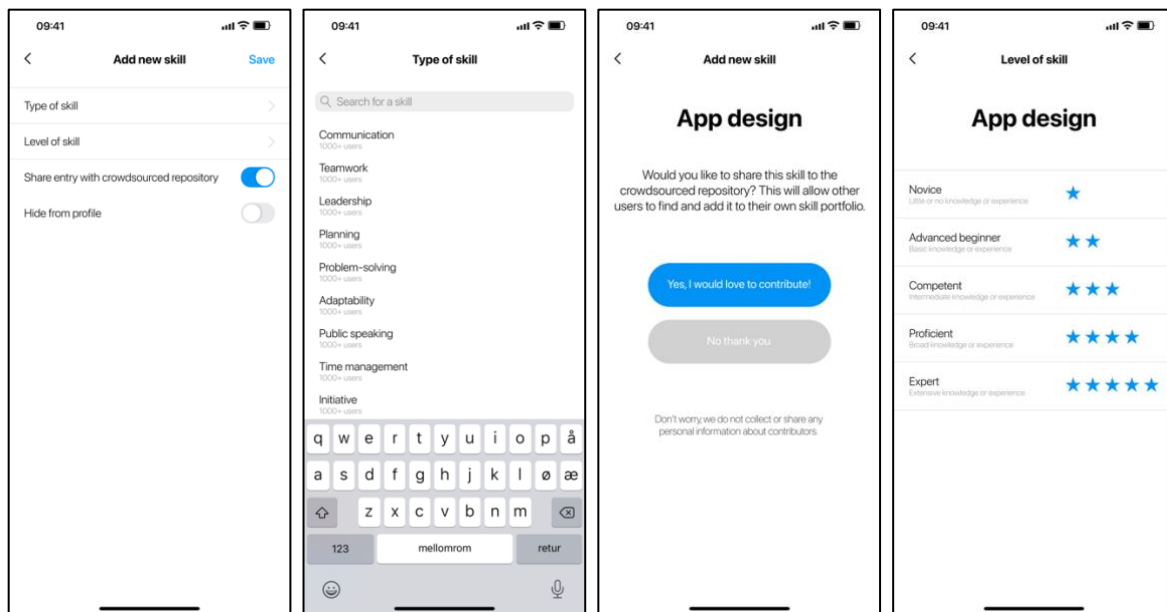


Figure 5-2: Adding new skill

Figure 5-2 illustrates the process of adding a new skill to the student’s profile. The student starts off by selecting the type of skill to be added (1). They are prompted with a search field which lists all the skills currently present in the repository (2). If the desired skill isn’t immediately visible, the student can search for the specific skill. Should the skill not reside in the repository at all, it can still be added to the student’s profile. If that is the case, the student is then the app will ask the student if they wish to add the skill to the public crowdsourced repository, making it available for everyone (3). Once type of skill is selected, the student is asked to self-report their level of skill by selecting one of the five levels of the Dreyfus scale, illustrated with stars (4). Before completing, the student has to decide whether they want to share their acquisition of said skill with the crowdsourced repository of user data, and whether the skill should be visible or hidden from their profile. Once finished, a new card will appear in their list of skills, as seen in Figure 5-1, and the student can then interact with it to provide evidence.

Figure 5-3 illustrates the process of adding an experience to the newly acquired “App Design” skill. The student is asked to select the timeframe of the experience (2), which skills it helped improve (3), and where the experience took place (4). If the experience took place in university, the student is then asked to select which course it was a part of (5). To finish up, the student adds a brief description (6), one’s role (7) and responsibilities (8), positives (9), negatives (10), and an overall rating (11). Once everything has been entered, an overview page of the newly added experience will be presented (12).

A reader with attention to detail might have noticed that some of the screens in this series of interaction are missing the blue “Continue” button on the bottom of the screen. The reason for this is that some steps in the process require the student to select *one* option, like picking a location for the experience in (4), whereas others require the student to interact with several options, like setting a start and end date in (2). As such, steps that require *one* interaction have a little grey arrow on the far right of each option, to indicate that tapping it will take the student to the next step.

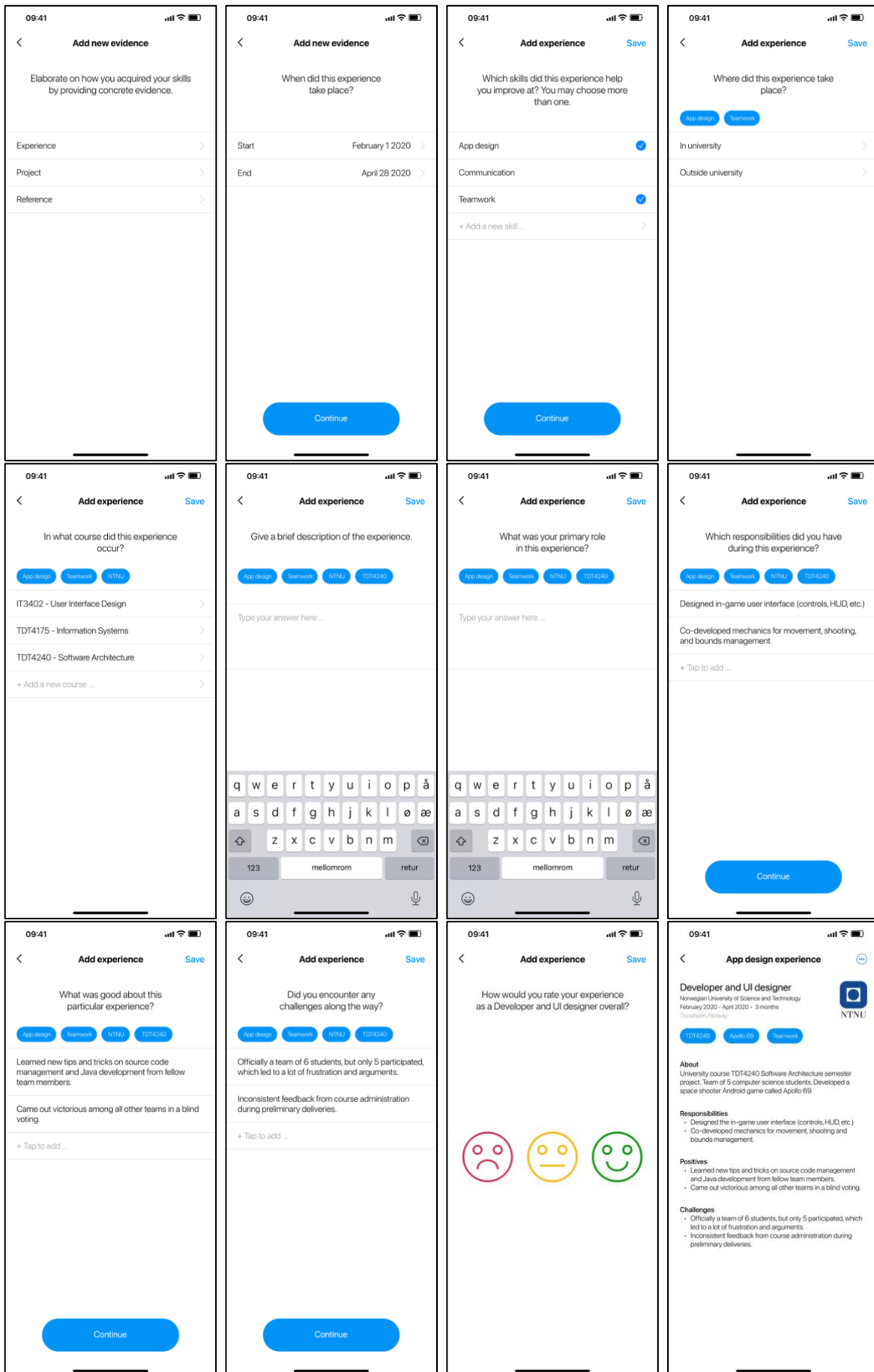


Figure 5-3: Adding an experience

There is also a blue "Save" button in the top right corner on each step of the way. While the ultimate goal is to abide by the interviewees' wishes of keeping the interactions short and concise, so to not take up too much of their time, something will inevitably come up at some point, which would force the student to disregard the progress they have made with logging their experience. By tapping the "Save" button, the progress is stored in the app, and the student can pick it up from where they left off whenever they have time to finish.

The three blue buttons on the overview page (12) are meant to act as interactive tags. The experience was achieved through the university course "TDT4240", so tapping on said tag should in theory list all skills and evidence obtained in said class by filtering out any irrelevant data. The "Apollo 69" tag represents an artifact that was produced as a result of the experience, so tapping on it would open the page for that artifact. In similar fashion, the "Teamwork" tag would open any evidence that supports the acquisition of teamworking skills.

5.3. Feedback

Following the demonstration, the project partners shared their opinion on the prototype and mentioned some interesting ideas for the next iteration.

As of iteration 1, artifacts were named "Projects". One partner questioned the meaning behind it, as it got quite confusing when put up next to "Experiences". The naming convention had been borrowed from Wide Assessment platform without much afterthought being put into it. I suggested renaming it to digital "Artifacts", as it is a more universally accepted term meaning any form of visual item intended to enhance a representation of one's learning (*Creating a Digital Artifact*, 2021). The partners agreed to the change.

A valid source of concern was presented in regard to privacy. More specifically, how user uploaded data, namely artifacts, were treated. It was pointed out that some might be scared to share their work in the app if they weren't completely aware of how it was stored and who had access to it. Definitely relevant in the year 2021 and the age of GDPR. This was one area I had not put much thought into, as I had been busy visualizing the front end of the app, rather than the back end.

Several project partners wanted to know if there was a way for students to export what they had logged in the app to a CV in a PDF format. I assured them that it was indeed on the list of functionalities that were going to be implemented by the second iteration, as this was a feature several of the competing platforms had already.

It was pointed out that the app might be a bit much for a first-time user, and that some form of instructional material or an instructional component should be added to aid in the process. A valid point indeed. It is quite easy to forget how a fresh pair of eyes might see a new interface for the first time after you have spent hours on your own creating it, to the point where navigating it hardly requires thinking at all.

Other partners had presented a self-evaluation scale with only three levels, and questions were asked in regard to whether my five-level Dreyfus scale was a bit excessive. However, it was later mentioned that as long as they are labeled adequately, the students would be able to understand them. What works better in practice remains to be seen.

Following the conversation on having detailed descriptions, the concept of creating a glossary for all the skills was suggested. This would require a registry where students could look up a specific skill and see exactly what it entails to possess said skill. Who would supply this glossary with definitions was not discussed.

In order to fill the competency gap, discussed in chapter 3.1.3., a partner suggested letting alumni add relevant information and tips in the app to help future students. An interesting (and potentially valuable) feature that can be added in future versions. However, it is outside the scope of this thesis, so it will not be addressed further in the next iteration.

A final note was added on the sharing functionalities within the app. More specifically, sharing a skill with the crowdsourced repository of skills and sharing the acquisition of a skill with the crowdsourced repository of user data. While the description given when introducing the framework made sense, one partner mentioned that it didn't necessarily come through as clear when actually logging skills. Sharing the acquisition is toggled by a slider in Figure 5-2 (1), whereas sharing the skill itself is toggled on a screen of its own in Figure 5-2(3). Suggestions on making this more transparent were brought up and will be taken into consideration when developing the second iteration.

5.4. Evaluation

This first iteration of the prototype, alongside the instructional illustration of the intended framework, I believe adequately represented where I wanted the app to go. It was certainly lacking in functionality, as there were only a couple of tasks that could be completed. Ideally most of the intended functionality should have been working, so that even more feedback could have been extracted from the project partners. That was not the case however, and I will have to settle with the feedback obtained from the second iteration to fully evaluate whether the framework and prototype fulfills the research goals.

The aspects I was able to present and demonstrate however, gave me a lot of valuable input. The project partners seemed to be content with my framework overall, and immediately added it to an App Outline document following the meeting (Scott, 2021), so my effort was not completely for granted.

That being said, I was not overwhelmed with satisfaction over how I performed this intermediate review. The main concepts of the framework were presented in a comprehensible way, and the functionality demonstrated to further illustrate it. What I am not happy with however, is how I handled the feedback session, as there was no real structure to it. By the end of the demonstration, I just initiated a back-and-forth conversation requesting any and all feedback from the partners, attempting to follow up

any question as best as I could. For the second iteration and the final evaluation, a structured evaluation that effectively rates the user's satisfaction, the app's usability factor, as well as the overall usefulness of the app will have to be performed.

6. Prototype Iteration 2

Following the first iteration of the prototype and the feedback provided by the project partners, this second iteration aims to add any missing functionality as well as address any previously mentioned issues. In this chapter, the second and final iteration will be presented. User feedback and evaluation is reserved for chapter 7 and 8.

6.1. Tasks

In contrast to the first iteration, this time around the app was tested by actual students. They were introduced to the project and given an overview of the framework, before given eight tasks to perform as part of the evaluation.

1. Log in using any of the presented methods
2. Find an overview of which skills you possess
3. Find a description of the skill "Adaptability"
4. Add a new skill named "App design" with a "Competent" skill level
5. Add an experience that helped you improve your "App design" and "Teamwork" skills which you obtained in university
6. Add an artifact containing a YouTube video that improved your "App design" and "Teamwork" skills
7. Add a reference that can vouch for your "App design" skill
8. Find a way to export your skills to a PDF

6.2. Design

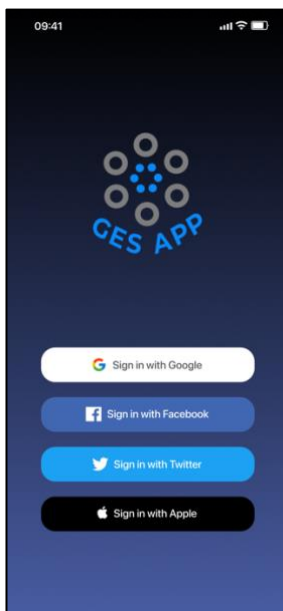


Figure 6-1 illustrates the intended sign in screen. This was technically no part of any requirement, but is a nice addition nonetheless, which makes the prototype feel more real. I have opted out from the traditional e-mail sign-in page in favor of letting users sign in with existing social accounts using the authorization protocol OAuth. Easier for students to sign in, and easier for developers to get started.

Figure 6-1: Sign in screen

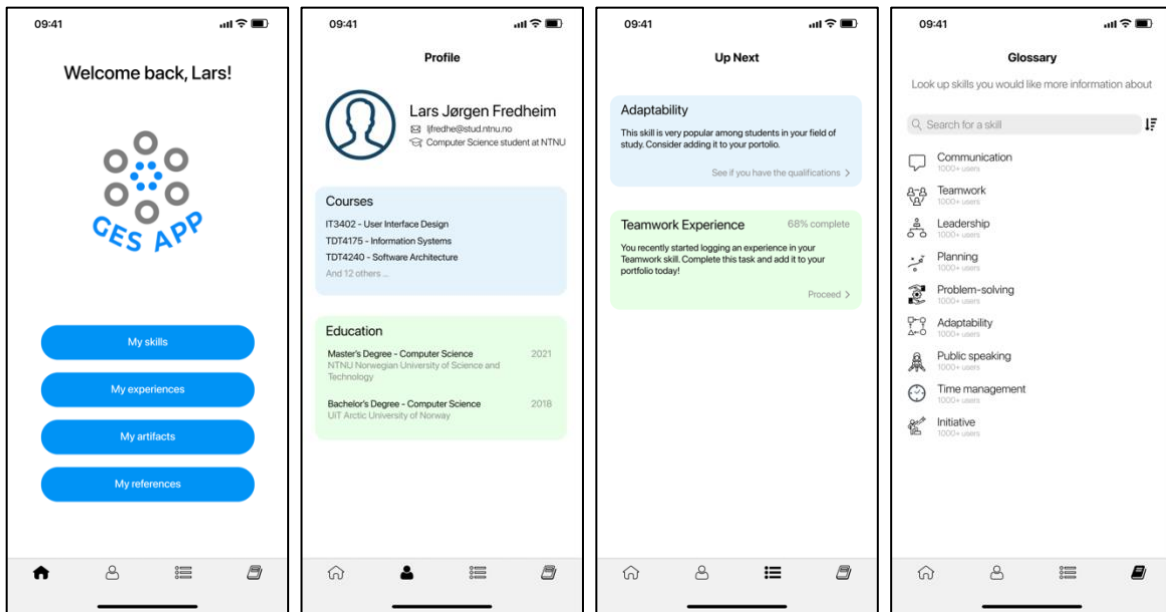


Figure 6-2: Main navigation screen

Figure 6-2 illustrates the different screens found by pressing each of the icons on the bottom tab bar. The home tab (1) is what the student will see whenever they open the app. It is designed to make the process of both adding and displaying skills or evidence rather quick by providing shortcuts to all of the main framework concepts. The profile tab (2) is where the student will find personal information about themselves and their education. Should there be a social aspect implemented to the app in the future, this page would be ideal for sharing with friends and potential employers, without revealing which skills you possess. The up next tap (3) is where the student will find tips for what to do next. As mentioned in the first iteration, if the student is unable to complete logging an experience, they can save it for later. This is where they would find it. In addition, the student will also receive tips on potential skills they should look into acquiring, powered by the crowdsourced repository of user data. The glossary tab (4) as a direct result of the feedback obtained from the first iteration. Here the students can look up a specific skill to see what it entails, and whether they have the qualifications.

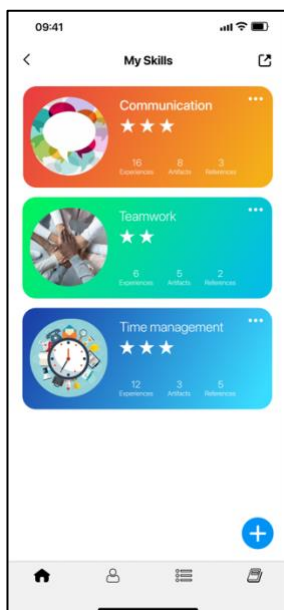


Figure 6-3: My skills

Figure 6-3 is what the student is presented with if they click on the “My skills” button on the home page. Similar to the skills overview from the first iteration but utilizing more vivid colors and an appropriate icon to further illustrate which skill is behind each of the cards. Colors and icons can be changed by clicking on the three dots in the top right corner of each card, should the student wish to tailor it to their personal preference. In the top right corner, there is a new “Share” button that allows the student to either export their skills to a PDF or send it via email.

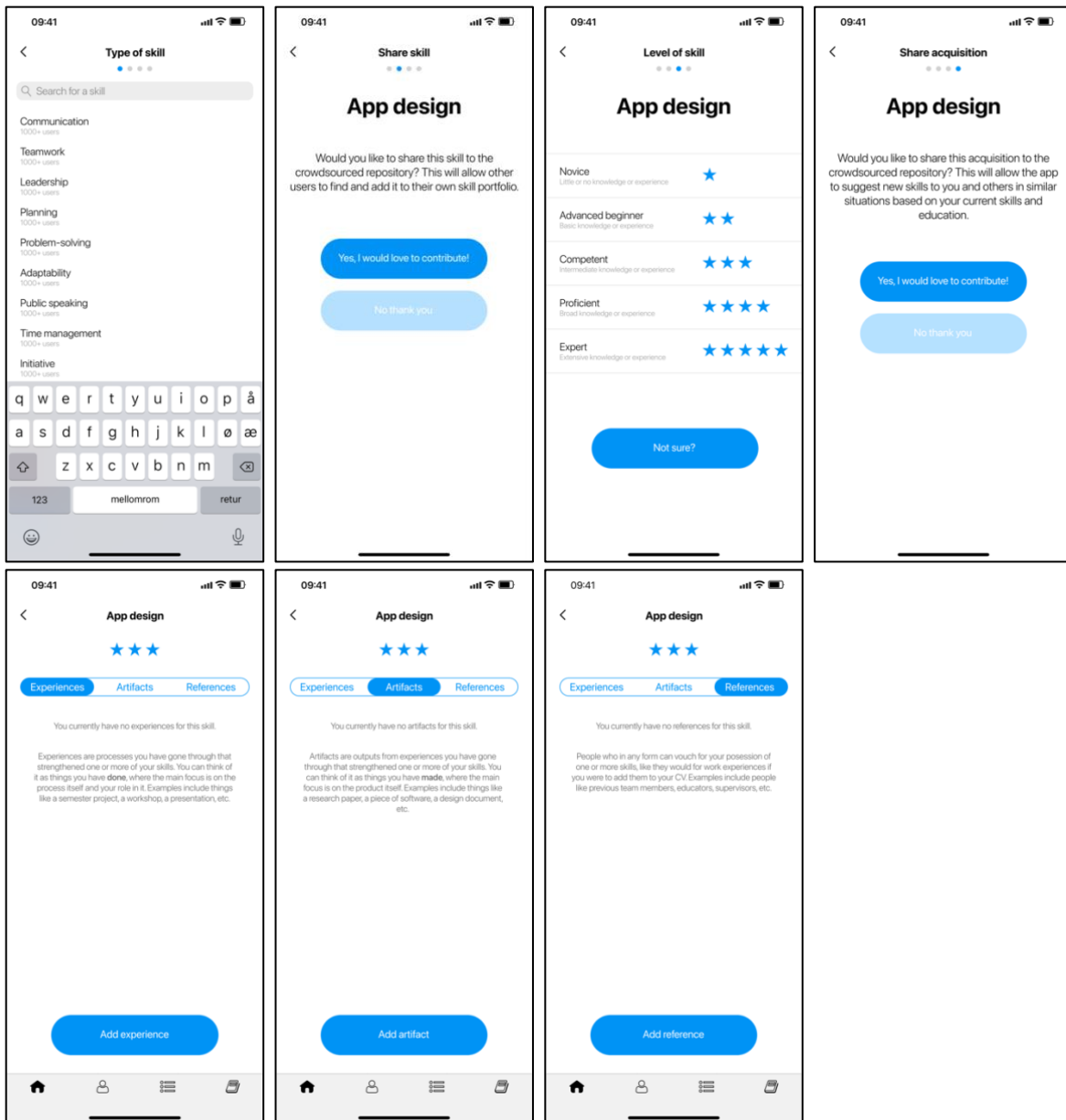


Figure 6-4: Adding a new skill

Figure 6-4 illustrates the process of adding a new skill. The process has been streamlined and the student is now always aware of which step they are on thanks to the progress indicator on the top of the screen. Keeping interaction sequences short, in addition to being transparent about it, should encourage students to finish logging. The first step includes finding a skill the student wants to add to their profile (1). If said skill does not exist in the repository of publicly available skills, the student will be encouraged to add it to the repository (2). Next the student is asked to rate their level of skill according to the Dreyfus scale, with the opportunity to get a more in-depth description of what each level entails by clicking the "Not sure?" button (3). The final step involves asking the student for permission to add their skill acquisition to the repository of user data (4). Unlike in the first iteration, where this was toggled by a slider, it has now been transformed to look exactly like the screen for sharing the skill. Upon adding the skill to their profile, the student is presented with the temporarily empty archive of evidence for that skill – experiences (5), artifacts (6), and references (7). While empty, each tab will display a short description of what the different types of evidence entails.

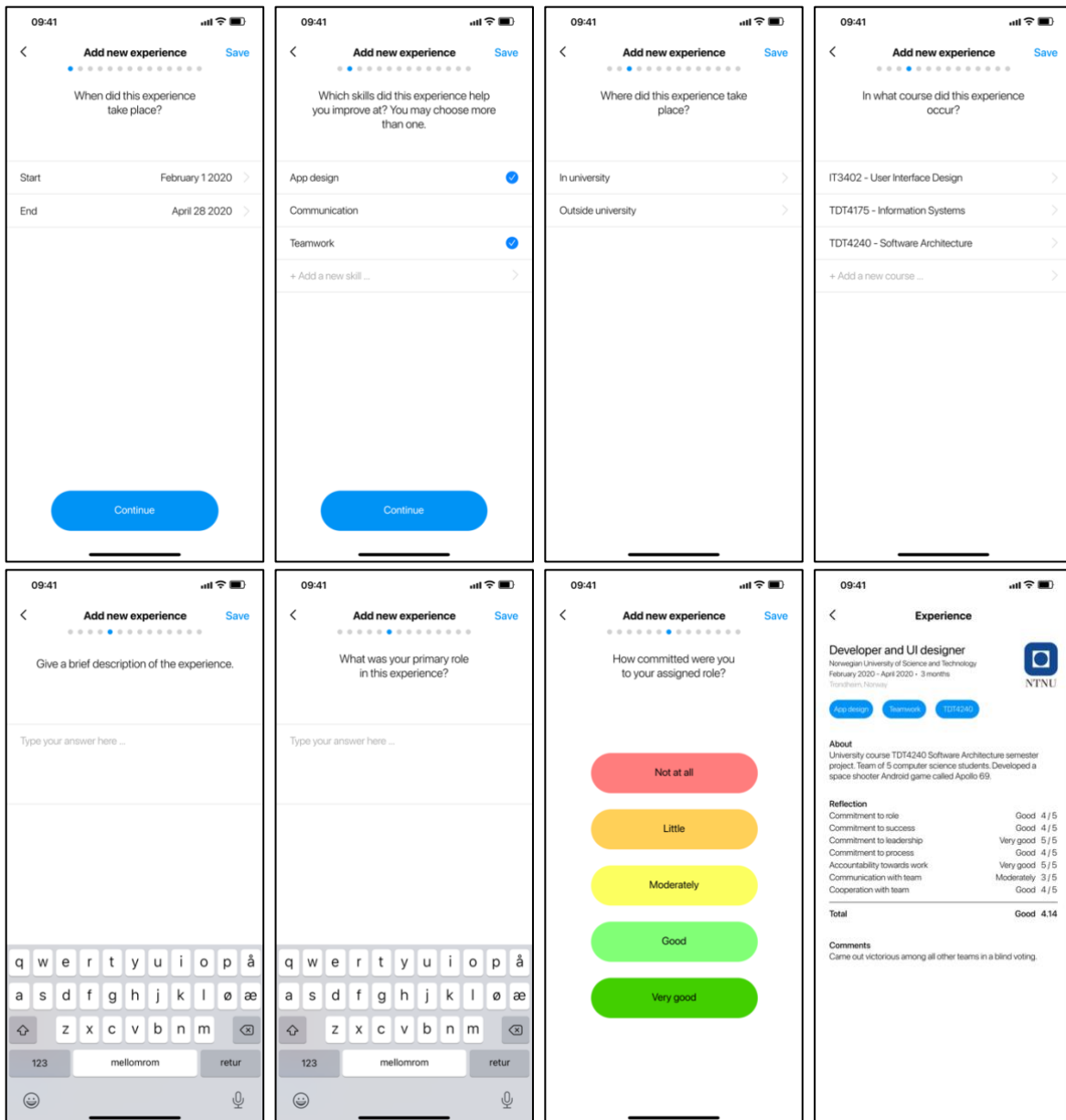


Figure 6-5: Adding a new experience

Figure 6-5 illustrates the process of adding a new experience. Like adding a new skill, this process also adopts the progress view at the very top of the page. This is particularly helpful in this activity, as there are quite a few steps. The first step includes entering the timeframe when this experience occurred (1). After that, the student is asked to select all skills the experience helped improve (2), and then whether said experience occurred within or outside of university (3). If it occurred in university, the next step is to select which course it occurred in (4), before giving a brief description of the experience (5) and what role the student had (6). To wrap it up, the student is then provided a series of reflective questions where they are asked to self-report their level of commitment towards their assigned role, team success, team leadership, and team process, as well as the overall communication, cooperation, and one's accountability towards their work (7), based on Abbas' (2021) reflective assessment log, put forward as part of the partner meeting discussed in chapter 5.1. The answers provided in these reflective questions are then enumerated in order to rate the overall experience, as opposed to the smiley face rating provided in the first iteration, giving a much more quantifiable point of reference.

The rating is then displayed along with the other provided information on an overview page (8).

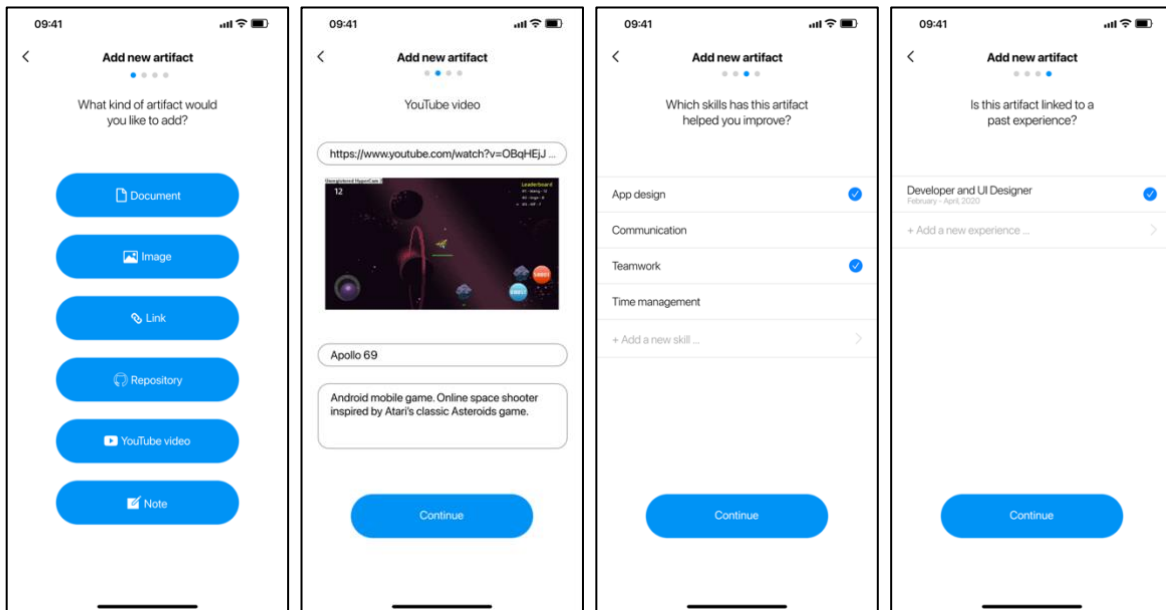


Figure 6-6: Adding a new artifact

Figure 6-6 illustrates the process of adding a new artifact. The first step is to select what kind of artifact is to be added (1). The types currently supported are documents, images, links, repositories, YouTube videos, and notes. Each type is illustrated with a corresponding icon to make it even easier to identify the correct one. When selecting to add a YouTube video, the next page will prompt the student to fill in the video URL, as well as relevant video information (2). To wrap it up, the student selects which skills this artifact helped to improve (3), as well as link it to potential experiences (4).

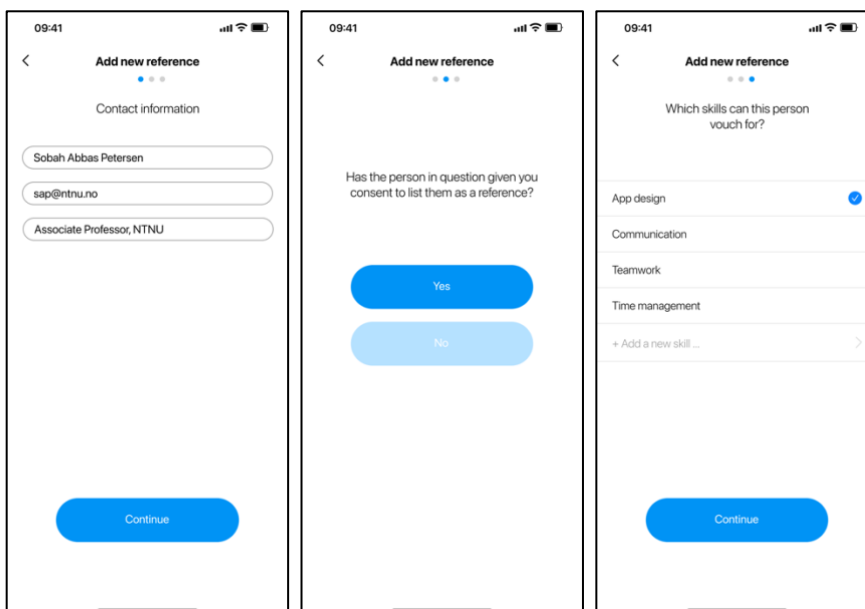


Figure 6-7: Adding a new reference

Figure 6-7 illustrates the process of adding a reference. The first step is to input relevant contact information (1). Once that is complete, the student is asked to verify that the person in question has given their consent to being listed on your profile (2). If the

answer is yes, the student is asked to select which skills the person can vouch for (3). If the answer is no, the student is told to ask for consent, and the activity is cancelled.

6.3. Test Prototype

If for any reason the reader is interested in having a closer look at the prototype, it has been made available online in two modes.

To test the interactive prototype, click on the following link:

<https://www.figma.com/proto/AwqOfF3JdI0vaMUtVb7gTQ/GES-2.0>

To view the prototype in its entirety, click on the following link:

<https://www.figma.com/file/AwqOfF3JdI0vaMUtVb7gTQ/GES-2.0>

7. Final Evaluation

In this chapter methods, data collection, data analysis, and final prototype will be evaluated.

7.1. Research Methods

The research methods presented in chapter 2 were that of a structured literature review, interview session, and case studies of existing solutions.

The literature review, while not very structured, worked out well. It did not follow the traditional way of analyzing large amounts of literature at once, but rather applied throughout the case studies. This to verify and argue for or against certain aspects of the solutions in question, as well as in the final sections of chapter 2, where similarities were compared to build an ideal framework.

The interview session also worked out alright, although a tremendous amount of unnecessary work followed. Due to a miscommunication, I was under the impression that the interviews were to be conducted individually, instead of as one large group session. Not only did that mean that I spent 5x the amount of time necessary to conduct them, but I also needed to spend another 5x amount of time processing and transcribing them, before gathering them into one unified document. A lot of good data was extracted from these sessions, but I am also left wondering how much potential knowledge and opinions were left unsaid because the participants were unable to spin off of each other's ideas.

The four platforms explored in the case studies were all based on output from the interview session, as well as a tip from my co-counselor. It was somewhat challenging to get a complete picture of all the platforms, as one was hidden behind a paywall to unlock all of its features. This meant I had to go off of their own descriptions of what the app could do, as well as literature on app in question. From the studies I was able to identify the core functionalities that made them successful and used that information to create the framework presented in chapter 4.

7.2. Data Collection and Analysis

Extra unnecessary work aside, the qualitative data collected from the interview sessions were of great value. Each session was recorded without video, so only the conversation, upon given consent from the participants. Zoom then automatically transcribed the entire conversation, so the only thing left for me to do was go over it and correct any sort of misheard conversation or spelling errors. From there I went over the transcripts one more time to identify key words and phrases that best summarized the answers and input them into an organized form provided by the project partners, which can be seen in its entirety in Appendix B.

Data collected from the feedback session of the first iteration of the prototype were rather unstructured in nature and limited to a finite set of bullet points. As such, there was no real need for an in-depth analysis. They were all tackled head-on as to whether

they were worth addressing in the next iteration or not. Some ended up directly impacting the interface in the final version, while others were deemed irrelevant for the time being.

Data collected from the evaluation of the final iteration was much more organized. After completing a set of tasks, the participants were asked to answer a set of questions that directly quantified their satisfaction with both the prototype, as well as their thoughts on an app like this existing at all. The participants were hand-picked from my immediate social circle. However, the data was all anonymously gathered using Google Forms without any personally identifiable characteristics.

7.3. Prototype

The evaluation of the final prototype will now be examined using two variants of usability measuring.

7.3.1. System Usability Scale

The final prototype was evaluated using the System Usability Scale (SUS), which is a quick 10-question questionnaire designed to be answered immediately after the testing has concluded (Smyk, 2020). Each question is answered on a scale from "Strongly disagree" to "Strongly agree" and is awarded points from 1 to 5 in ascending order. The responses can then be used to calculate an overall SUS acceptability score, which indicates how good the overall design of the app is. The result from the test gave a very clear idea of where the app is as of writing this thesis, and the data is presented in detail in chapter 8.

7.3.2. Additional Evaluation

In addition to the ten SUS questions, a set of additional questions were also asked to evaluate the app further, which are listed below.

1. Whether the tasks were easy to complete.
2. Their overall impression of how long the tasks to finish
3. Whether having data organized in an app like this would be of value to them in an employability setting.
4. Whether they at any point encountered any errors or were uncertain about how to proceed.
5. Which platform they would prefer using an app like this on.
6. Whether they use any third-party application to accomplish any of the tasks completed in the GES App.
7. Whether they found any of the features to be excessive.
8. Whether there were any features they were missing.

Questions 1 and 2 directly relate to the output from the interview session in chapter 3.2 that a mobile app should consist of simple navigational tasks that do not take long to

complete. Question 3 to see if they would consider using the app at all. As the prototype is functional, but not fool proof, question 4 was formulated to identify any errors or overlooked aspects of the prototype interactions. Question 5 was aimed towards verifying the consensus from the interview session that a hybrid solution was most desirable. Question 6 was formulated with the goal of identifying other third-party platforms not examined in chapter 3.3. Questions 7 and 8 were asked to, as their names suggest, identify excessive and unnecessary features, as well as missing ones.

7.3.3. Nielsen’s 10 Usability Heuristics

Nielsen’s 10 usability heuristics for user interface design are general principles used as a rule of thumb, rather than strict guidelines, in order to evaluate the overall design (Nielsen, 2020). The heuristics are listed in the table below, along with measures taken to abide by them.

Table 7-1: Nielsen's 10 Usability Heuristics

| | |
|--|--|
| 1. Visibility of system status | The system state is for the most part described within the header or the page visible to the user, i.e., what they’re looking at or what input is expected from them |
| 2. Match between system and real world | Icons in the navigation tabs are used to illustrate sections of the app as real-world objects |
| 3. User control and freedom | At any point while logging an experience, the user can return to the previous page or exit the activity altogether |
| 4. Consistency and standards | Home and Profile icon in the navigation tabs are universally accepted icons |
| 5. Error prevention | Heuristic not attended to, as prototype is intended to follow a specific set of predefined journeys |
| 6. Recognition rather than recall | User is provided help in context after adding a new skill by describing in detail what each of the evidence types are |
| 7. Flexibility and efficiency of use | Heuristic not attended to, as prototype is intended to follow a specific set of predefined journeys – shortcuts reserved for implementation phase |
| 8. Aesthetic and minimalist design | Simple card and tab layout with minimal use of distracting visual elements |
| 9. Help users recognize, diagnose, and recover from errors | Heuristic not attended to, as prototype is intended to follow a specific set of predefined journeys |
| 10. Help and documentation | Documentation and help are presented in context when a need for elaboration is encountered, like when adding evidence for the first time or when self-reporting level of skill |

Overall, most heuristics are met with one or more sets of functionalities. However, there is a lot of ground to cover if the app is to be made fool proof.

8. Results and Discussion

The final prototype was evaluated by external users through the means of informative reading, usability testing, and answering an evaluation form. Out of the 10 participants, 8 were students, and the majority were in their twenties. The results are listed below.

8.1. System Usability Scale

The SUS score is calculated using the following framework:

- For all odd numbered questions, sum them up, subtract 5, and you get (X).
- For all even numbered questions, sum them up, subtract the total from 25, and you get (Y).
- Add X and Y and multiply by 2.5.

Below are the results of the odd numbered questions.

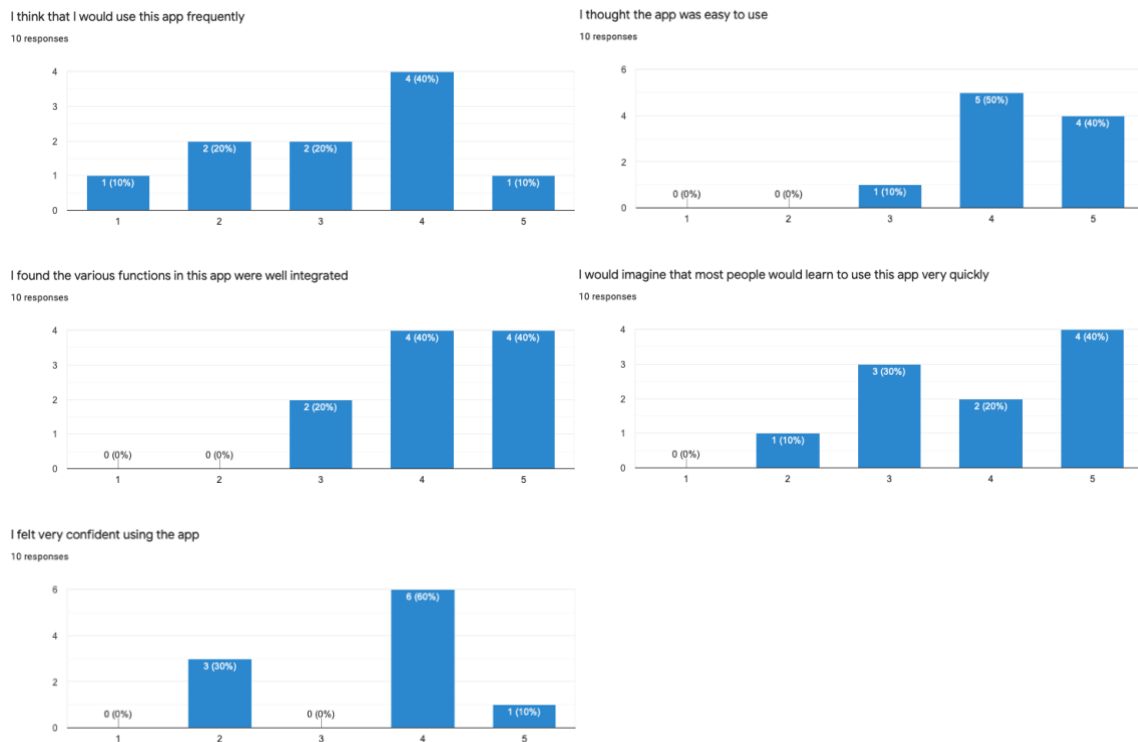


Figure 8-1: Odd numbered SUS questions

Following the formula, this yields an X with the average value of 19.1.

Below are the results of the even numbered questions.

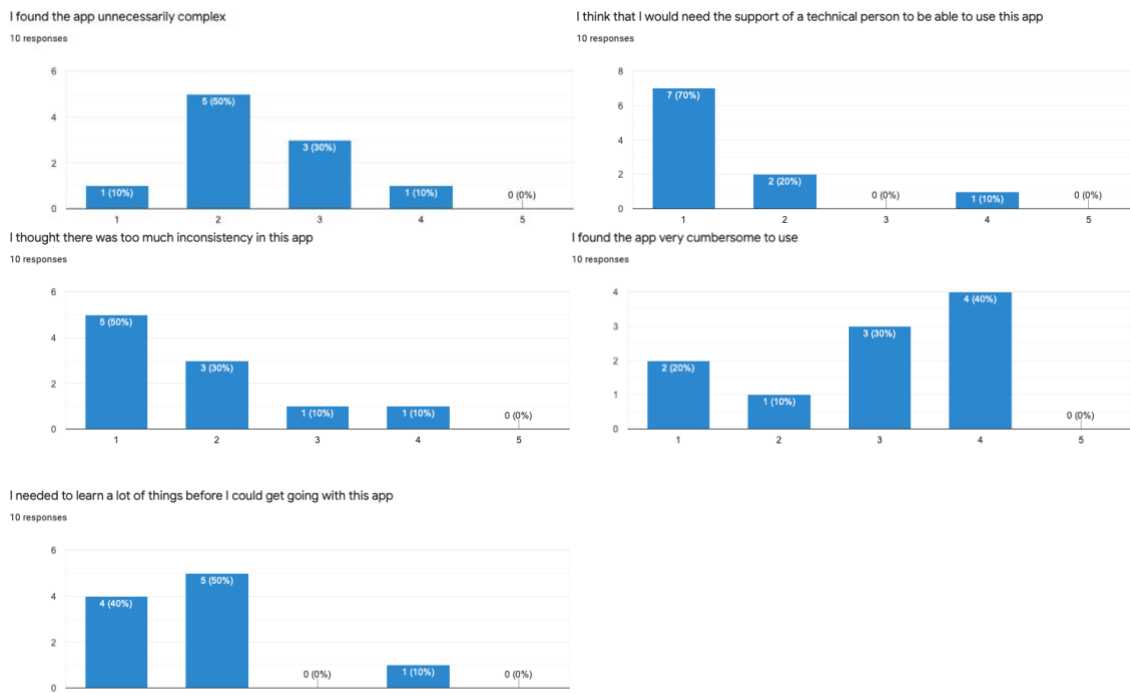


Figure 8-2: Even numbered SUS questions

Following the formula yields a Y with an average value of 10.4.

Thus, the average SUS score becomes: $(19.1 + 10.4) \times 2.5 = 50.6$.

According to the SUS acceptability score (Smyk, 2020), it positions the final prototype right on the edge between “Marginal” and “Not acceptable”. While certainly not where I would hope to end up, the numbers do not lie, and I will have to accept the truth. In the grand scheme of things, it certainly could have gone a lot worse, so an “ok” score is not the end of the world.



Figure 8-3: SUS Acceptability Score (Smyk, 2020)

8.2. Additional Evaluation

In regard to the additional questions that were asked following the SUS questionnaire, the answers are summarized below.

Perceived ease of use when performing tasks like adding skills, logging experiences, and adding artifacts received an average rating of 4.4/5. This means that the tasks themselves, once initiated, were certainly achievable for most users.

When asked about whether these aforementioned tasks took too long to complete, adding skills received a 2/5 average, logging experiences received a 2.4/5 average, and adding artifacts received a 2.1/5 average. Keeping in mind that less is good in this regard, as they are disagreeing to something taking too long, the results illustrate that for the most part, time to finish was within an acceptable timeframe, while still leaving room for improvement.

Going on to asking about having data organized in the app, the average responses were 4.5/5 for skills, 4.2/5 for experiences, and 3.7/5 for artifacts. Thus, the respondents would not mind having their skills organized, but when it comes to providing evidence, the interest dips ever so slightly.

One participant encountered an error while performing a task. While not completely certain as to what caused it, their main theory was a client-side software bug. Three participants were also at one point uncertain about how to proceed, and cited reasons like poorly worded tasks, missing functionality, unable to click buttons, and sequence of events did not match expectations. Some of these are a direct cause of missing links in the Figma prototype, while others, like poorly worded task, is an inexcusable error on my behalf.

In regard to which platform the participants would like to use the app on, 20% said desktop only, 40% said mobile only, and 40% said a combination of both. This is partially comparable to the feedback obtained from the interview session in chapter 3.2, where the consensus leaned towards a hybrid solution. People who would prefer a mobile only solution cited it being easier and a more available way of interacting with the app, but also having a lower threshold for not finishing tasks. People who would prefer a desktop only environment cited it as cumbersome to type long descriptions on mobile, with the downside of it not being available at all times. Lastly, people who would prefer a hybrid solution cited it being nice to be able to reserve more labor-intensive tasks for the desktop, while still having the ability to add things on the go.

For any of the tasks performed in the app, participants cited LinkedIn, CV Partner and GitHub as alternate platforms to achieve similar results.

Under excessive features, a couple of valid concerns were brought up. Firstly, the reflective self-evaluation part of adding an experience could very well incentivize rating oneself abnormally high in order to achieve a higher overall score. While the app is meant to aid in self-development, there will always be individuals ignoring all the rules in pursuit of glory. Second, the "Up next" section of the app could have been merged with the home page. This would be a rather easy fix, as the actual development has yet to commence. Experimenting with both variants could be reserved for future works to see what makes more sense for the user.

A suggested solution to the aforementioned self-reporting issue is peer evaluations, where people rate each other, rather than having people rate themselves. While this would require some form of social aspect be added to the app, it is certainly not a bad

idea. In similar fashion, another suggestion for missing features revolved around experiences and artifacts being autocompleted based on what others have already entered. A way of achieving this would be to tag other users in ones entries.

8.3. Research Goals

Approaching the end, it is appropriate to bring up the research goals once again from chapter 1. The goals were summarized in two research questions.

RQ1: What parts of students' skill acquisitions are most relevant in an employability setting?

By analyzing the output from the project partner's literature review, narrowing down to the skills themselves, and analyzing how existing solutions deal with skill acquisitions, I was able to develop a framework for both describing and evidencing skills that in an employability setting will not only allow the candidate to cite what they are able to do, but why they are able to as well.

RQ2: How can this be tailored to fit inside a mobile application?

By building the core of the app around this framework, and by extracting requirements from potential users about what kind of interactions are desirable in a mobile setting, I was able to develop a moderately appreciated proof-of-concept prototype of the Graduate Employability Skills mobile app.

As a project that is intended to be built on for years to come, there is certainly room for improvement, especially in the design realm. But from the standpoint of this being the very first iteration of the project, I am satisfied with the progress that has been made, and I hope future developers and users see the value of the framework developed to the same degree as myself.

9. Future Works

As stated in chapter 8.3, while this is the end of my thesis, it is only the beginning for the GES App project. So, while it might seem like a very bareboned app, a lot of work has been put into the skeleton. A skeleton that should be able to host a wide variety of functionalities future developers and users deem appropriate

One of the most cited functionalities, both in the interview section of chapter 3.2 as well as in the feedback of the final prototype, is the addition of social connections and sharing. Be that for the sake of connecting with friends, comparing skills, or getting in touch with recruiters or employers. Many of the platforms investigated in chapter 3.3 had existing frameworks for allowing employers and candidates to interact with one another, and there is no reason why this should not be possible within the GES App as well.

Another feature that could be worthwhile looking into, which was briefly introduced in chapter 3.6, is the idea of adding gamification features to the app. Part of the questionnaire for the interview session in chapter 3.2 even had explicit questions regarding the interviewees' attitude towards online minigames, which most of the ones I chatted with was. However, seen as the app will allow for anyone to add any skill, creating games around them might seem like an endless task, which is why it was never researched in more detail in this thesis. But that doesn't stop someone from finding a reasonable solution for it in the future.

The competency gap, discussed in chapter 3.1.3, was suggested by a project partner to be filled by allowing alumni to provide input once graduated and gotten a job, as they would have key information about which skills were needed to land the given position. While the proposed repository of user data for suggesting relevant skills for students, allowing alumni to provide this kind of input is certainly not a dumb idea.

As seen during the final evaluation phase, some participants were at one point or another uncertain of what to do in order to proceed. While parts of this could be blamed on the prototype not being fully optimized to allow any form of input from any screen, a good idea might be to put greater focus towards achieving success with Nielsen's heuristics number 6 and 10, which pertains to providing relevant help to the user in-context, rather than introducing them to it once and forcing them to remember it.

One could go on for days about potential add-ons to this app. However, it is important to not lose sight of what the app is actually intended to do, which is helping students plan and acquire skills that make them employable once graduated. I for one am about to graduate, with a new job just a few months away. But I am excited to see the potential value this app can add to future students, and hopefully I will be able to say that I played a small part in helping one lucky student achieve their dream job.

Bibliography

- Abbas, A. (2021). *E-Coach (Employability Coach) Helps Support Your Journey to WoW (World of Work)*.
- Badge Count 2020*. IMS Global Learning Consortium. (2020).
<http://content.imsglobal.org/badge-count-2020/badge-count-2020/>
- Baillie, S., Booth, N., Catterall, A., Coombes, N., Crowther, E., Dilly, M., Farrell, R., Langebæk, R., O'Reilly, M., & Read, E. (2016). *A Guide to Veterinary Clinical Skills Laboratories*.
- Benner, P. (2004). Using the Dreyfus Model of Skill Acquisition to Describe and Interpret Skill Acquisition and Clinical Judgment in Nursing Practice and Education. *Bulletin of Science, Technology & Society*, 24(3), 188–199.
<https://doi.org/10.1177/0270467604265061>
- Boyle, L., Jimoyiannis, A., Maciejewski, G., Olstad, H. A., Petersen, S. A., Scott, G. G., Simpson, A., Skimina, E., & Topolewska-Siedzik, E. (2020a). *Graduate employability skills (GES) App, Intellectual Output 1: Review of the GES literature*.
- Boyle, L., Jimoyiannis, A., Maciejewski, G., Olstad, H. A., Petersen, S. A., Scott, G. G., Simpson, A., Skimina, E., & Topolewska-Siedzik, E. (2020b). *Project. Graduate Skills Employment*. <https://ges-app.com/index.php/project/>.
- Creating a Digital Artifact*. University at Buffalo. (2021).
<https://research.lib.buffalo.edu/digitalartifacts>
- Date, E. J. S. (2017). *Essential Skills of Graduate Engineers: The Case of Namibia (Doctoral dissertation, University of Science and Technology)*.
- Dreyfus, S. E. (2004). The Five-Stage Model of Adult Skill Acquisition. *Bulletin of Science, Technology & Society*, 24(3), 177–181.
<https://doi.org/10.1177/0270467604264992>
- Gillett, J. (2014, October). Approaches to teaching and learning in the DP. *IB Africa, Europe & Middle East Regional Conference 2014*.
- Hammon, L., & Hippner, H. (2012). Crowdsourcing. *Business & Information Systems Engineering*, 4(3), 163–166. <https://doi.org/10.1007/s12599-012-0215-7>
- IMS Open Badges*. IMS Global Learning Consortium. (2020). <https://openbadges.org>
- Jonides, J., Lewis, R. L., Nee, D. E., Lustig, C. A., Berman, M. G., & Moore, K. S. (2008). The Mind and Brain of Short-Term Memory. *Annual Review of Psychology*, 59(1), 193–224. <https://doi.org/10.1146/annurev.psych.59.103006.093615>

- Kirkpatrick, K., & MacKinnon, R. J. (2012). Technology-enhanced learning in anaesthesia and educational theory. *Continuing Education in Anaesthesia Critical Care & Pain*, 12(5), 263–267. <https://doi.org/10.1093/bjaceaccp/mks027>
- Laker, D. R., & Powell, J. L. (2011). The differences between hard and soft skills and their relative impact on training transfer. *Human Resource Development Quarterly*, 22(1), 111–122. <https://doi.org/10.1002/hrdq.20063>
- Nielsen, J. (2020, November). *10 Usability Heuristics for User Interface Design*. Nielsen Norman Group. <https://www.nngroup.com/articles/ten-usability-heuristics/>
- O'Neill, A. (2021, March 31). *Unemployed persons worldwide until 2023*. Statista. <https://www.statista.com/statistics/266414/unemployed-persons-worldwide/>
- OECD. (2019). Attitudes and Values for 2030. *OECD Future of Education and Skills 2030 Concept Note*.
- Park, J. (2015). Proposal for a Modified Dreyfus and Miller Model with simplified competency level descriptions for performing self-rated surveys. *Journal of Educational Evaluation for Health Professions*, 12, 54–57. <https://doi.org/10.3352/jeehp.2015.12.54>
- Rapanta, C., & Cantoni, L. (2016). The LinkedIn Endorsement Game: Why and How Professionals Attribute Skills to Others. *Business and Professional Communication Quarterly*, 80(4), 443–459. <https://doi.org/10.1177/2329490616677044>
- Rolfe, A. (2019, March 18). *What is a CV?* Reed. <https://www.reed.co.uk/career-advice/what-is-a-cv/>
- Scott, G. G. (2021, April 29). *GES App Outline*.
- Smyk, A. (2020). *The System Usability Scale & How it's Used in UX*. Medium. <https://medium.com/thinking-design/the-system-usability-scale-how-its-used-in-ux-b823045270b7>
- Wu, Y., Dhakal, N., Xu, D., & Cho, J. H. (2018). Analysis and Prediction of Endorsement-Based Skill Assessment in LinkedIn. *2018 IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC)*, 1, 461–470. <https://doi.org/10.1109/compsac.2018.00071>
- Zagzebski, L. (2017). What is Knowledge? *The Blackwell Guide to Epistemology*, 92–116. <https://doi.org/10.1002/9781405164863.ch3>

Appendix A – NSD Approved Privacy Statement

Vil du delta i forskningsprosjektet «Mobile Application for Graduate Employability Skills»?

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å prototype en app som skal hjelpe studenter i løpet av og etter studietiden. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

Formålet med prosjektet er å produsere en interaktiv prototype av en *Graduate Employability Skills* mobilapplikasjon. Appen skal hjelpe studenter å dokumentere og reflektere over ferdigheter og kompetanser de opparbeider seg gjennom studietiden. Prosjektet ønsker å utforske hvilke virkemidler implementert i en slik app som best mulig vil motivere studentene til å bruke den over tid. Målet er å bevisstgjøre studentene på hva de faktisk kan, slik at de i en ansettelsesprosess kan redegjøre for hvilke ferdigheter og kompetanse de har ved hjelp av konkrete opplevelser, kunnskap og refleksjon. Prosjektet er en masteroppgave ved NTNU, og i tillegg en del av det europeiske Erasmus+ prosjektet med samme navn, som er et samarbeid mellom NTNU (Norge), University of West Scotland (Skottland), The Cardinal Wyszyński University in Warsaw (Polen), og The University of the Peloponnese (Hellas). Erasmus+ prosjektet har som formål å utvikle appen, evaluere verdien og effekten av den, samt å organisere støttemateriell og casestudier for beste praksis. For mer informasjon, se <https://ges-app.com/>. Resultatet fra denne masteroppgaven vil bli delt med de europeiske partnerne.

Hvem er ansvarlig for forskningsprosjektet?

NTNU er ansvarlig for prosjektet.

Hvorfor får du spørsmål om å delta?

Utvalget er trukket blant medstudenter på bakgrunn av samarbeid i tidligere prosjektoppgaver på NTNU.

Hva innebærer det for deg å delta?

Hvis du velger å delta i prosjektet, innebærer det at du deltar i et intervju. Dette intervjuet vil ta deg ca. 15-20 minutter. Undersøkelsen inneholder spørsmål om din kunnskap vedrørende teknologi, ansettelsesferdigheter, og app-funksjoner. Det vil bli gjort taleopptak under intervjuet, og opptaket vil bli transkribert.

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine personopplysninger vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

- Student og veileder vil ha tilgang til personopplysningene til de som velger å delta.
- Navn på deltaker i intervjuet vil bli erstattet med en vilkårlig tallkombinasjon i tittel ved lagring av lydopptaket og det transkriberte intervjuet vil lagres med en annen tallkombinasjon. Det vil med dette ikke være mulig å identifisere deltaker basert på det skriftlige dokumentet.
- Kun transkripsjonen vil bli gjengitt i den ferdige oppgaven, og deltaker vil dermed ikke kunne gjenkjennes.
- Det transkriberte intervjuet vil bli delt med partnerne i Erasmus+ GES App prosjektet.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Opplysningene anonymiseres når prosjektet avsluttes/oppgaven er godkjent, noe som etter planen er juni 2021. Ved prosjektslutt vil taleopptakene bli slettet permanent.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi av opplysningene,
- å få rettet personopplysninger om deg,
- å få slettet personopplysninger om deg, og
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra NTNU har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- NTNU ved:
 - Sobah Abbas Petersen (veileder) – sobah.a.petersen@ntnu.no
 - Lars Jørgen Fredheim (student) – ljjfredhe@stud.ntnu.no
- Vårt personvernombud:
 - Thomas Helgesen – thomas.helgesen@ntnu.no

Hvis du har spørsmål knyttet til NSD sin vurdering av prosjektet, kan du ta kontakt med:

- NSD – Norsk senter for forskningsdata AS på epost (personverntjenester@nsd.no) eller på telefon: 55 58 21 17.

Med vennlig hilsen

Sobah Abbas Petersen
(Veileder)

Lars Jørgen Fredheim
(Student)

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet «*Mobile Application for Graduate Employability Skills*», og har fått anledning til å stille spørsmål. Jeg samtykker til:

- å delta i spørreundersøkelse

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet

(Signert av prosjektdeltaker, dato)

Appendix B – Interview Session Transcript Summary

| Parent category | Questions | Key words in the answers | Core quotes | Comments | |
|--|---|---------------------------------------|---|---|---|
| Opening questions | 1. What type of apps or programs do you use and like the most? Do you use them on mobile devices or computers? Could you give an example of the app you like? | Type of used apps | <ul style="list-style-type: none"> - Facebook (*) - Messenger - Instagram - YouTube (*) - Google Drive - WhatsApp - Discord (*) - 9GAG - Chrome and Firefox (*) - Spotify - Steam - Email | <p><i>"Probably most social media on my phone"</i></p> <p><i>"I use my computer for games and programming"</i></p> <p><i>"Google Drive is one of my favorites because it works so flawlessly across all devices"</i></p> | |
| | 2. What features of this app/these apps make it/them appeal to you? | Features of existing apps | <ul style="list-style-type: none"> - Communication (*) - Entertainment (*) - Intuitive / easy to use - Access to information - Number of users (*) | <p><i>"The biggest is communication with friends"</i></p> <p><i>"Social media because everyone uses it"</i></p> <p><i>"Social media gives me value by letting me connect with other people"</i></p> <p><i>"A web browser would give me access to information and also helped me do my job"</i></p> | |
| (0) Students perspective on their plans and skills | | | | <i>"It's not necessarily about appealing part, but more about necessity part, especially regarding messenger because everyone is using that"</i> | |
| | 3. Have you ever used an application related to self-development? If so, what kind of app did you use? | Experience with self-development apps | <ul style="list-style-type: none"> - Meditation app - Time management app - Exercise app (*) - Language practicing app - Audiobook app | <p><i>"I listen to self-help audio books"</i></p> <p><i>"I have a sports watch with a connected app that uses gamification features to help me develop myself"</i></p> | |
| | 4. Have you ever used an application related to education? If so, what kind of app was it? How did you like using them? | Experience with educational apps | <ul style="list-style-type: none"> - Blackboard (*) - Microsoft Teams - Memorizing app - Chess coach app - Duolingo | <i>"(...) the problem with Blackboard mainly was like the UI was quite poor and the responsiveness of the application was also quite poor (...). It was also stigmatized by the fact that other users usually have the same experience as you, which kind of amplified your own experience"</i> | Blackboard is the primary LMS used at NTNU |
| (0) Students perspective on their plans and skills | 5. What are your plans in the field of work? If you don't have any, can you say why? | Plans in the field of work | <ul style="list-style-type: none"> - Software developer (*) - Consulting firm (*) - Already have a job (*) - Move up the corporate ladder | <p><i>"I'm hoping to get a job"</i></p> <p><i>"I will continue working at the software company where I work already"</i></p> <p><i>"I will try to work my way up a bit, maybe some half middle management or something"</i></p> <p><i>"I will probably stay in the consulting business for two to four years and then look for some other fields within software development"</i></p> | Several respondents noted already having a job ready after graduation – some already working there as of doing the interview, and one starting after graduation |
| | 6. Whether or not you have career ideas, what are the skills you think you will need to get a job in your | Skills necessary to | <ul style="list-style-type: none"> - Ability to learn - Technical (*) - Teamwork (*) | <i>"The primary skill is to be able to learn because there's always something you don't know, but you have to learn it yourself"</i> | Domain-specific technical skills and/or general computer skills |

| | | | | | |
|--------------------------|--|-------------------------------|---|---|-----------------------------------|
| | profession / in future work? / What do you think, are they the only skills you will need in future work? (answers will likely depend upon whether students have a target career area or not) | work in the profession | <ul style="list-style-type: none"> - Communication (*) - Social - Problem solving - Project management | <p><i>"Problem solving is probably the most important thing"</i></p> <p><i>"You need to have basic computer skills"</i></p> <p><i>"You cannot rule out what kind of skills you would need to possess in the future because you don't really know what happens in the future"</i></p> | was mentioned by every respondent |
| | 7. What is your idea of the kinds of skills you are developing as a result of your course of study? What skills are these? - How do you think, do you have the skills and knowledge you need to develop CVs, application forms, succeed at interviews and assessment centers, for example? If so, what skills do you have? - How do you think, do you have the skills and knowledge you need to develop CVs, application forms, succeed at interviews and assessment centers, for example? If so, what skills do you have? | Skills developed at classes | <ul style="list-style-type: none"> - Project management - Planning - Teamwork (*) - Technical (*) - Theories | <p><i>"Project management and planning and estimation, which is pretty much directly from my course mediation"</i></p> <p><i>"Teamwork and groupwork"</i></p> <p><i>"(the education program) doesn't necessarily give you sufficient skills in teamwork and communication, so you definitely need to learn more when you are in a new job"</i></p> <p><i>"(...) it's mostly like a theoretical approach on the field of study as it is right now"</i></p> | All CS students cited programming |
| (1) Knowledge of, and | 8. What do you think the situation on the labor market is nowadays? What | Situation on the labor market | <ul style="list-style-type: none"> - Personality | <i>"I think the job market has a lot of jobs, or at least I see a lot of jobs, I can apply to"</i> | |

| | | | | | |
|--------------------|--|-------------------------------|---|--|---|
| attitudes to, GESs | sort of skills do you think employers are looking for? | | | <p><i>"You have to be likeable by people to a certain degree, because emotions have a lot to say in regard to employability"</i></p> <p><i>"The easiest way to get a job is getting someone to like you"</i></p> | |
| | | Skills required by employers | <ul style="list-style-type: none"> - Communication - Teamwork - Social (*) - Ability to learn - Technical - Independence - Curiosity | <p><i>"How you will work with people"</i></p> <p><i>"You have to show that you are good at the job"</i></p> <p><i>"Communication skills might be one of the most important (ones). You need to be able to communicate your qualities"</i></p> <p><i>"Independence and being able to work on your own is important"</i></p> | |
| | 9. What do you consider as important in applying for a job? (What kind of differences are between the employers' and the applicants' perspectives?) | Features of job application | <ul style="list-style-type: none"> - Self-awareness - Good CV - Good application - Open minded - Display ability to learn - Be excited - Don't lie | <p><i>"Anything that shows that you have the energy to work and learn things on your own"</i></p> <p><i>"I think the interviewer would recognize if you really want to work there"</i></p> | |
| | 10. What are the skills you think you will need to maintain employment? (What kind of differences are from the employers' or the applicants' perspective?) | Skills for keeping employment | <ul style="list-style-type: none"> - Able to learn (*) - Able to adapt (*) - Teamwork - Flexibility - Sociable | <i>"Being able to update your skill set with the latest or most commonly used technology as it changes is important"</i> | A lot of responses were centered around very specific technical skills relevant for CS students |

| | | | | | |
|--|--|------------------------------------|---|--|--|
| | · Do you consider employability skills as important to find and keep a job? If so, which are important | | | <p><i>"For newly educated people, you will learn a lot after you start your first job, so the ability to learn fast and understand"</i></p> <p><i>"In Norway it's really hard to lose your employment by not having the right skills. (...) if I were unable to do the tasks that my position requires, I would probably lose that position"</i></p> <p><i>"It's about the flexibility and the mentality of being able to acquire new knowledge"</i></p> | It is not very common to get fired in Norway unless you have done something very serious |
| | 11. What do you think are the main barriers regarding applying for a job? | Barriers in job application | <ul style="list-style-type: none"> - Finding jobs - Self-doubt (*) - Mental load (*) - Anxiety - Customizing CV - Lack of experience - Be able to display skills | <p><i>"I think there are probably a good number of jobs that are kind of hidden because they're not announced, so you have to know someone in the industry"</i></p> <p><i>"I don't feel I am as good as a lot of other people applying for that job"</i></p> <p><i>"You're going into a process that requires a lot of mental capacity and it's tiring if you don't get a job"</i></p> <p><i>"Companies want people they don't have to train or people that can start being productive right away"</i></p> | |
| | 12. What do you think are the main barriers regarding maintaining employment? | Barriers in job maintenance | <ul style="list-style-type: none"> - Finding a balance in terms of workload - Adapting to workplace trends - Landing a job you actually want (+) | <p><i>"You are not used to the work life balance. You can go into the student mindset that 'yes, I can work 12 hours a day', then that could ruin the job for you"</i></p> <p><i>"Don't apply for something that sucks because then you would not be satisfied and working there would be a bad experience"</i></p> | <p>Transitioning from student life to work life can be a challenge</p> <p>Landing a job you actually want, and not</p> |

| | | | | | |
|--|---|-------------------------------------|--|---|--|
| | | | <ul style="list-style-type: none"> - Maintaining excitement over time (+) - Keeping up to date - Keep pushing every day | <p><i>"Make sure you push to stay ahead"</i></p> <p><i>"Showing up every day and giving it everything"</i></p> <p><i>"You have to stay up to date on whatever is new in order to be relevant and productive"</i></p> | accepting the first offer you get "just because" will help you stay motivated in the long run |
| (2) A form of employability skills storage and presentation | 13. How do you keep track of the skills you are learning/improving? | Skill tracking | <ul style="list-style-type: none"> - Try to remember - Update CV - LinkedIn - Publish previous projects and tag with relevant concepts - Use the (skills) often | <p><i>"The main thing is just trying to remember them"</i></p> <p><i>"Maybe rely too much on memory"</i></p> <p><i>"I don't keep track of them physically by writing a list"</i></p> <p><i>"Keep a mental idea of what you have been learning the last few years"</i></p> <p><i>"I think about it and try to evaluate it every time I update my CV"</i></p> <p><i>"The most efficient way to maintain them is to use them often and continuously"</i></p> | <p>None of the participants systematically keep track of their skills, and rely heavily on memory to remember</p> <p>LinkedIn and CV updates are the most common ways of "logging"</p> |
| | 14. What would be useful as a certificate of having employability skills after finishing education? | Skills certificates | <ul style="list-style-type: none"> - Grades (*) - References - Technical tests (*) - Certification process like LinkedIn or AWS - Not useful | <p><i>"Passed courses for example if I've got a good grade"</i></p> <p><i>"References to people that can verify that 'yes, this is true, this person is very skilled in this and that'"</i></p> <p><i>"It doesn't provide me any value unless an employer would look for these types of certificates"</i></p> <p><i>"I feel it's more useful for jobs that don't require a long university degree"</i></p> | Several mentioning LinkedIn's certification process as relevant |
| | 15. Do you think an app could help you do that? Why/why not? · How can an app collect | GES App as a GES certificate | <ul style="list-style-type: none"> - No other trustworthy substitute as of right now - If it's credible | <i>"Employers would need to be aware of and trust the app"</i> | People seem torn between LinkedIn's affirmation feature – |

| | | | | | |
|------------------|--|-------------------------|--|---|--|
| | <p>and store information on employability skills?</p> <ul style="list-style-type: none"> How do you think employability skills can be presented in a digital form? How do you think an app (in which one collects and stores information on employability skills) might be helpful in looking for a job? | | <ul style="list-style-type: none"> Official standard Make employers aware of it Store along other educational information Affirmation by others (like LinkedIn) Depends on the line of work Score or percentage Duration of projects Quantify skills Integrate with LinkedIn Direct contact from employers | <p>"If there is an official standard recognized by employers. LinkedIn certifications exist. I would not download another app for certification purposes, as it does not add any value for me. But for identifying flaws and developing skills, it could be interesting"</p> <p>"I don't trust (LinkedIn endorsements). It's not very reliable"</p> <p>"(Recruiters) need to have access to the certifications. They need to be able to see them and verify them"</p> <p>"If you're a hardcore artist, you should probably have some videos"</p> <p>"Grading based on like good-better-best (...) something that is easily comparable"</p> <p>"As long as the ones employing know of it"</p> <p>"It is really difficult to communicate your skills verbally, it's much easier with like a certificate or a proof"</p> | <p>some suggest taking inspiration from it, others don't trust it at all</p> |
| (3) App features | <p>16. Would you prefer to use such an app on a laptop, on a mobile device or both of them? Why/Why not?</p> | Computer vs. mobile app | <ul style="list-style-type: none"> Both (*) Long descriptions on a laptop (*) Easy navigation and interaction – mobile (*) | <p>"If I'm supposed to write a description about a project I've done or explain something about a skill I have, I think I would use a laptop"</p> <p>"If it's more just viewing and scrolling through my skills, I can use my mobile phone"</p> | <p>One participant said laptop only, the others agreed on a multiplatform solution</p> |

| | | | | | |
|--|--|--|---|--|---|
| | | | <ul style="list-style-type: none"> Browsing and showing – mobile (*) | <p>"If I have to write a lot in the app I don't like to write on my phone"</p> <p>"A list of information you might want to present to others it's useful to have it on your phone"</p> <p>"The computer is like the work area, and I'm not really looking for a job when I'm on my phone"</p> | <p>Heavier workload on laptop</p> <p>Easy and light navigational work on mobile</p> |
| | <p>17. Do you know about any app that might be helpful in storage and presenting employability skills?</p> | Existing similar apps | <ul style="list-style-type: none"> LinkedIn (*) CV Partner Code Academy WA.works "Tinder" for work | <p>"(Code Academy) is specific to the courses, so you can't add something that's not there"</p> <p>"(LinkedIn) doesn't help you improve your skills, it's more tracking what you know"</p> <p>"I know LinkedIn has this feature, but I personally don't use it myself"</p> | <p>Wide Assessment (WA) is a Norwegian based recruitment platform for tech people</p> |
| | <p>18. Do you see any problems with using apps to help young people in storage and presentation of employability skills?</p> | Potential problems with the usage of the app | <ul style="list-style-type: none"> Restrict access to data Store data securely Avoid a lot of "work" for the user Be a part of a bigger system Proprietary Might be forgotten | <p>"(The employer) might not be interested in downloading (the app)"</p> <p>"As long as it helps and does not create more work, I think it would be great"</p> <p>"Have a way of inputting data from the app to third party application forms, otherwise it is useless"</p> <p>"With (LinkedIn) we can connect the resume with it, and you don't have to write it again"</p> <p>"An app doesn't provide you value often enough, they will be forgotten and not used. So, I think an app like this needs to be part of a bigger system where it would be"</p> | <p>Answers seemed to be (partially at least) directed towards this app in particular, and not apps in general</p> |

| | | | | | |
|--|---|---|---|---|--|
| | | | | <p>the number one way for employers to certify candidate skills”</p> <p>“(…) it might just be one application that they have downloaded and set up, and then they just forget about it”</p> | |
| <p>19. What kinds of features do you think are important in such an app?</p> | <p>Required features of the GES App</p> | <ul style="list-style-type: none"> - Sharing (*) - Export as list or summary - Third party integration (*) - Link third party profiles - References - Previous work (*) - Suggest skills - Search for people - Communication - Good rating system - Encourage improvement - Personal profile - Comments - See how many recruiters viewed your profile or appreciate a skill you possess | <p>“Integration with third party systems (…) where you can get the skills into your CV from the app directly without having to copy and paste something”</p> <p>“The ability to maybe connect or transfer the knowledge from the application to (employer’s) own site”</p> <p>“The less the user has to do, the more the user will do”</p> <p>“Some kind of search feature (…) where they put the requirements they are looking for, and they find people who possess them, and they can contact them directly”</p> <p>“Like a coach that helps you identify what you lack in different types of skills and how you should improve them”</p> <p>“Previous projects you have been involved with would be a central feature”</p> <p>“Pictures could be very essential if you’re looking at someone that is studying design or architecture”</p> <p>“A personal profile section would be great for general information in addition to what kind of projects you have been involved in”</p> | | |

| | | | | |
|---|--|--|--|---|
| <p>20. What kinds of tasks do you think can be useful in such an app?</p> | <p>Useful tasks in the app</p> | <ul style="list-style-type: none"> - Add experiences - Questionnaire - Multiple choice test - A way to confirm skills - Ask questions during reflection phase | <p>“Entries, for example, university courses and grades”</p> <p>“Every skill has their own way of how they need to be confirmed, (…) so it’s probably most useful with a reflection”</p> <p>“It’s kind of hard to (identify your level of skill) when you don’t have a point of reference of what defines a good skill”</p> | |
| <p>21. How often should the activity in an app be required?</p> | <p>Frequency of activity in the app</p> | <ul style="list-style-type: none"> - Reminder (*) - Once a year - Couple times a year - Couple times a week - Retake certificates | <p>“Would be an advantage to have reminders from the app saying ‘hey, it’s been a while – have you done anything you want to fill in?’”</p> <p>“I don’t see myself wanting to fill in a lot all the time”</p> <p>“If you’re actually using it actively to develop your skills that might be helpful to have it remind you to track your activity and reflect on your skills”</p> <p>“It might get cumbersome and annoying if you have to do it really often, so maybe only once a year”</p> <p>“It depends on how the app is going to function, because if it’s just going to function like a portfolio, it wouldn’t necessarily need that much attention”</p> | <p>Consensus seems to be that frequent activity in the app depends on reminders and not forcing too much “work” on the user</p> |
| <p>22. How do you think, how the app should change by…</p> | <p>Different features of the app due to:</p> | | | |

| | | | | |
|---|-----------------------|---|---|---|
| 22a. Those new to the job market versus those with employment experience? | Job experience | <ul style="list-style-type: none"> - Grades - Projects - Internships - Experiences - Updates - Improve skills for unemployed people | <p>"I guess someone new would focus more on adding the initial things like grades and internships, while more experienced focus more on adding their jobs and projects"</p> <p>"Skills they've learned during school is important, but if you've been in a job for 10 years and you search for a new job, what you learned in school is not as important"</p> <p>"If you are not employed and struggling to find a job, you might not have realized that you need to improve your skills"</p> <p>"I believe that whenever you are recruiting someone, they are looking for someone with the specific skill set"</p> | 60% said yes, 40% said no |
| 22b. Whether users have any disabilities or special needs? | Accessibility | <ul style="list-style-type: none"> - Visual impairments - Text to speech | <p>"Would be advantageous if the app, from a user interface perspective, could adapt to or tie different settings for those with visual impairments"</p> <p>"Maybe there should be accessibility features so people with different needs can still use it, but I don't think the main purpose should change in any way"</p> | |
| 22c. Gender? | Gender | <ul style="list-style-type: none"> - Generally, no (*) - Avoid genderizing - Highlight skills sought after from a specific gender | <p>"I know some businesses appreciate more females, they try to hire more females, maybe it's an advantage if you are a female with leadership experience because then you want to highlight that"</p> | All participants were generally negative to this aspect |

| | | | | |
|---|--|--|--|--|
| 23. What features and content would make the app more appealing to you? | Desirable features of the GES App | <ul style="list-style-type: none"> - Gamification - Profile completeness - Level of skill - Social aspect – compare with others (*) - Employers give feedback - Sought after skills - Recommend jobs - Where to apply for jobs - Provide user with new information - Credibility feature - Display projects | <p>"Having a concept of profile completeness, for example, how much different skills are filled out with support if I'm missing skills normal from my education"</p> <p>"Compare yourself to close friends or skills at a business"</p> <p>"Employers can give you feedback on which skills they appreciate or like the most"</p> <p>"Analyze your profile and skill set and see if there's something missing"</p> <p>"What should I do to improve the different types of skills"</p> <p>"It should have some kind of credibility feature, like perhaps it was backed by a university or an educational service or company"</p> <p>"Compare feature to see how you place among your competitors"</p> | Big focus on comparing with others to see how your skills stack up with your competitors |
| 24. Would you find the app more attractive if it contains some gamification features (e.g., progress bar or achievements)? / Would you be interested in playing an online game related to the app? / Would you be interested in playing online if the app contains features gamification related? | The attractiveness of gamification elements | <ul style="list-style-type: none"> - If done correctly (*) - Grading user profiles - Motivational boost - Waste of time - Skill-based quiz-type of game (*) - Compete with strangers on same skill level | <p>"Avoid users hoarding skills"</p> <p>"Give me some kind of identification on where I am and how much I've done"</p> <p>"If you don't like achievements and you don't get any value it's mostly annoying to have it there"</p> <p>"I have this app for my electric toothbrush which gives me achievements for brushing my teeth three days in a row – it's not useful at all and doesn't provide any value"</p> | Overall positive to gamification features One negative to online game, one on the fence, three seemingly positive |

| | | | | |
|---|---------------------------|--|---|--|
| | | | <p>"If it's purely for entertainment, I don't see the benefit"</p> <p>"Quiz app that lets you compete with strangers on the same skill level"</p> <p>"If they can see that by improving in a skill can help them achieve a better score in a game, I think that's a good way of giving incentive"</p> | |
| Is there anything else you would like to say? | Additional remarks | <ul style="list-style-type: none"> - Hear from recruiters | <p>"Get a hold of some recruiters and see what they would see from that perspective because I'm not really sure if the students actually know what they are looking for"</p> | |

