Institutionen för teknik och naturvetenskap
Department of Science and Technology

Examensarbete

Digital Learning Designed for Entrepreneurial First-Time Smartphone Users

Examensarbete utfört i Medieteknik
vid Tekniska högskolan vid Linköpings universitet
av

Marcus Nygren

LiTH-ITN-EX--YY/NNNN--SE

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Linköpings universitet
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Todo list

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Design och utveckling av mobilinlärning för entreprenörskapscoacher i Uganda och Zambia
Digital Learning Designed for Entrepreneurial First-Time Smartphone Users

Författare
Author

Marcus Nygren

Sammanfattning
Abstract

If your thesis is written in English, the primary abstract would go here while the Swedish abstract would be optional.

Nyckelord
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problem, lösning

Sammanfattning

Svensk sammanfattning här.

Abstract

If your thesis is written in English, the primary abstract would go here while the Swedish abstract would be optional.

Acknowledgments

Due to a chain of lucky events, this master thesis took the approach of combining service design, thoughtful interaction design, technology, learning effectiveness research, and entrepreneurship.

For service design, I want to thank Peter Gahnström at LiU Innovation, who led me to Expedition Mondial, and I especially want to thank Susanna for being a great tutor.

Thoughtful interaction design was introduced thanks to a recommendation from Lena Tibell and Konrad Schönborn, to go to Jonas Löwgren's first test lecture about interaction design at Linköping University, which led me to looking deeper into his literature, and discovering the book Thoughtful Interaction Deisgn, which was a perfect fit into the world of interaction design for me, coming from an engineering perspective. It showed me what being a great designer really meant, and I was compelled.

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Thank you.

Linköping, Januari 2020
N N och M M

Contents

Notation

Några mängder

Notation	Betydelse
$\mathbb{N}$	Mängden av naturliga tal
$\mathbb{R}$	Mängden av reella tal
$\mathbb{C}$	Mängden av komplexa tal

Förkortningar

Förkortning	Betydelse
ARMA	Auto-regressive moving average
PID	Proportional, integral, differential (regulator)

1

Introduction

This chapter is the introduction to the master thesis report.

1.1 Purpose

In order for young ambitious entrepreneurs to build sustainable enterprises they need to have basic entrepreneurial skills. This is where a mobile learning platform comes into the picture.

1.1.1 Task

The entrepreneurship education YoungDrive is an initiative of Illiana Björling from YoungDrive, now collaboration with Plan International. Within the project A working future, they have educated, supported and inspired 12 000 Ugandan youth in the process of starting their own businesses. **?**

YoungDrive now requests two digital modules, to reach even better results and to be able to scale up the operations to more locations with confidence.

The overall aim of the master thesis is to do a Minimum Viable Product (MVP) of module 1, the Coach module.

The master thesis is about how to design an app for entrepreneurship education, including evaluating it's effectiveness towards the coaches.

The result is an app which the coaches use during and after the coach training.

1.1.2 Goal

By training coaches that can carry out the education in larger groups of entrepreneurs, the education reach many young people at the same time. The mobile learning platform will improve the effect even more.

The app has the following purposes:

- Validate the coaches' level of knowledge during their education
- Train the coaches on distance
- Certify all staff

Young Drive's experience goal for the app is "It should be easy to understand, pedagogical and enjoyable to use, and the coaches should think it is fun and meaningful to learn via the app".

1.2 Definitions

The following definitions of words will be used while reading:

Design situation

Entrepreneurship is the act of creating new businesses.

An *entrepreneur education* is when an entrepreneur goes trough training. (It can be defined according to Ruskovaara (2015) or Liñán, F. (2004) as well. The author talks about Intention-based models of entrepreneurship education. Piccolla Impresa/Small Business, 3(1), 11-35, contains a definition which may be useful as well.)

Training can be both physical and digital training, but always has the purpose to improve the skills or knowledge of the trained.

Effectiveness is about keeping the same quality with less means (economical, physical, time resources, etc).

Coaching is the activity in which a person is helped by being asked questions and support, often by a person.

Digital development

A *digital tool* is an electronic help for a person, designed to solve or assist a person in solving a task that otherwise would have been more cumbersome. A *digital education*, is an education which takes place on an electronic device, either partly or fully. An *app* or *application* is a kind of digital tool, and can often be downloaded from an app store, either on mobile or web.

Design process

Interaction design describes the creation of digital artefacts.

Learning

Formative assessment (given to you, for your own sake) instead of *summative assessment* (given to the employee, for the employee's sake). You have to secure that it's a process. You have to see that there is an effect! "Assessing for Learning" :) - much debated, has drawbacks. Feedback is one of the most effective ways for learning.

1.3 Theory

To understand how to reach the objectives of the project, this chapter presents background and relevant theories.

Part 1-2 deals with the design situation, part 3-4 gives introductions to relevant topics, and part 5 presents related work.

Part 1-2: Design situation

For design situation, the client context is described. This also includes a motivation for digital learning, and related work to the thesis.

The first section describes the opportunities for entrepreneurship in Uganda, followed by how Plan International and YoungDrive uses this to tackle child poverty by fostering and educating youth in starting their own businesses. This section concludes by how digital learning and digital tools becomes increasingly demanded, which is why this master thesis has emerged.

Part 3-4: Relevant topics

In this section, an introduction is given into entrepreneurship education, digital education, and hybrid app development.

Part 5: Related work

In this section, first examples within digital tools are named that have either considered a developing country context.

Secondly, two studies within digital learning are named, which have combined learning theory and a mobile or computer platform.

1.3.1 Social Innovation and Social Entrepreneurship in Uganda

This section will present background on working with mobile learning platforms, and understanding the society of entrepreneurs in Uganda.

Why Uganda is the world's most entrepreneurial country

Some facts about Uganda in terms of entrepreneurship are **?**:

- Uganda is the world's most entrepreneurial country. (28% av of the population are entrepreneurs)
- Uganda has the second youngest population in the world (77% of all Ugandans are below 30)
- Uganda has a very high unemployment rate (64 % of people between 18–30 are unemployed)

With a high unemployment rate and little or none social security, starting a business is for many young entrepreneurs simply a tool for survival.

But tough conditions can also lead to creativity, and there are as well many innovative entrepreneurs with great ideas and the aim to create positive social impact.

No matter the reason of starting a business, Uganda's many entrepreneurs are contributing to the national society by boosting the economy and creating new jobs.

Why mobile services is growing fast in Uganda

One of the reasons is that the country has invested heavily in communication networks, even connecting remote rural villages with fibre optic cables and thereby connecting them to a world of information.

As much as 65% of the adults in Uganda owns a cell phone, which has allowed many areas in the country to skip the landline stage of development and jump right to the digital age.

For those who hasn't electricity at home, there are plentiful of charging booths for mobiles all over the country.

Mobile services and social innovations

The wide use of mobile phones has lead the way for the development of several innovative mobile services and in many cases the mobile service are way ahead of us. In Sweden mobile banking services that allows us to transfer money through our mobile phones were made popular with Swish, introduced in 2012. In Kenya people have had similar services for the last 10 years.

1.3.2 The Client: YoungDrive

In this section, the project that the client YoungDrive is in is first described, and then how YoungDrive fit into the structure with its entrepreneurship education program. In the last part, future plans of YoungDrive and A working future is presented, giving relevancy to the field of digital education.

A working future

Plan International works towards eliminating child poverty, and their project A working future, supported by SIDA 2012-2016, tackles unemployment among youth in rural areas.

It runs for 12 000 youth in Kamuli and Tororo.

VSLA groups and CBT's

Because of high tuition fees, saving (financial literacy) and earning (practicing vocational skills) are central.

VSLA groups have existed for many years, where a group starts a village savings and loans group together. A democratic process makes the group independent of e.g. banks, which rates are in general high and which may not even borrow money, either because of long distances to the bank or of no previous financial history.

For Plan International, VSLA groups have been successful in several countries for a long time. However, while the groups were skilled with saving, they did not always spend the money in the most strategic way.

Plan's pilot with A working future, was to introduce trainings on top of the VSLA structure.

Where Community Based Trainers (CBTs) were previously only responsible for hosting the groups, not they were trained and tasked with carrying out different programs: like agriculture, financial literacy, and the most successful program to date, focusing on running own businessess, YoungDrive.

YoungDrive

YoungDrive is based on a Swedish concept, and had previously had a pilot in Botswana, when tasked with running the entrepreneurship module of A working future. The organization foster and educate young entrepreneurs in developing countries. They train the CBT's, provide training material, and support the CBT's via direction and direct support via co-project leaders and Youth Mentors (YMs).

YoungDrive moves an entrepreneur to location, becoming country manager. Then, she educates project leaders during four days, followed by educating CBT's, which then roll out the training to the youth groups during 10 sessions, 1 session per week in average. The CBT's also rolls out other trainings, often simultaneously.

Social entrepreneurship

The CBT's are often volunteers, receiving a small scholarship from Plan International. They are often business owners themselves.

Thus, the CBT's can be described as social entrepreneurs. As Mitchel says about entrepreneurship **?**, motivation does not need to be wealth accumulation anymore. The activity of entrepreneurship contributes to society, in a way that is not caputed by the commercial entrepreneurship literature.

Many of the YoungDrive participants are driven by that their business can have an impact on their community, as well as take them out of unemployment or increase their current livelihood.

Future plans

For the future of YoungDrive, they want to make the CBT's even better, and collect and take us of data (monitoring and evaluation). Another motivation is scaling and monetization, as Plan International wants to increase the project to more countries, with an increased digital focus, and YoungDrive wants to be independent of project funding (i.e. a social enterprise). This was a great time to introduce digital enablers, where there previously had been no technology-focus, especially towards CBT's and YM's.

1.3.3 Entrepreneurship education

According to Dickson **?**, there are few empirical studies available on entrepreneurship education.

Ruskovaara & Pihkala **?** concludes, that the teacher seems to be the main factor for entrepreneurship education, and that research agrees with them.

There seems to be no indication of difference between men and women, nor previous professional teaching experience.

Entrepreneurial activity seems to lead to better entrepreneurship education.

Recommendations for enhancing entrepreneurship education practices are mainly two things.

First, the playful side of teaching and learning is mentioned **?**.

Secondly, they encourage teacher training that develops the competences as a mentor, enabler or coach.

1.3.4 Digital Education

In recent time, e-learning has had a tremendous impact both outside and inside the classroom. With a growing teacher interest, research so far shows that digital education is hard, risky and possibly rewarding. Thus, digital education shows both great potential and great considerations.

Brining research into reality

Gates **?** has done a comprehensive study, which motivates why a digital tool or game is a good thing by showing a .33 standard deviations in intrapersonal learning outcomes, relative to non-game instructional conditions. They also conclude, that design rather than medium alone predicts learning outcomes.

Much of the research to date on digital games has focused on proof-of-concept studies and media comparisons. The study's comparison, is to focus on how theoretically-driven decisions influence learning outcomes: for the broad diversity of learners, within and beyond the classroom.

Caring for the context

Luckin **?** emphasises the need to care for the context. Stickdorn **?** exemplifies how the design process should be altered when the context is social innovation.

Service design in a social innovation context is called "social design", and is a new field. **?**. No longer is service design solely focused on creating and promoting consumer goods, but to offer services to society. The design process should be designed to tackle a social issue, or with the intent to improve human lives. The focus is on delivering positive impact.

E-assessment

There are numerous examples of developments in e-assessment using mobile environments, as well as immersive environments and social and collaborative environments.

Interest in formative e-assessment is increasing. A large amount of development has taken place on diagnostic testing environments, that allow teachers and learners to assess present performance against prior performance. **?**

Luckin says that further consideration should be given to how technology can be used to enable the assessment of knowledge and skills not usually distinguished within current curricula. **?** One such example would be entrepreneurship.

1.3.5 Hybrid App Development

The history of app and web development is rich and increasingly intertwined. First, websites were developed for desktop only, and when smartphones became popular, they were made responsive.

With today's possibilities of native mobile development or developing a native app using web technologies, there are numerous viable alternatives available if an app should work on several devices, depending on budget and preferences.

One of the main argument for developing an app in web technologies, is that the whole application, including the server, can be written in one programming language, JavaScript (full-stack).

Tools such as Apache Cordova can compile JavaScript applications into native apps. Thus, they can appear on Apple iOS and Android Play Store, as well as on the web, or installable offline on a smartphone from the computer.

JavaScript is developing rapidly as a language, as well as its ecosystem of frameworks and tools. Frameworks has emerged and matured, like Meteor.js, which makes building full-stack applications in JavaScript reliable and fast.

Previously, web hosting has been troublesome for JavaScript server applications. Today, tools as Meteor.js and Heroku have introduced free and paid hosting for such applications, with smart bindings to code platforms such as GitHub, which makes collaboration and version handling easy.

1.3.6 Related work

Caring for the context

One great example of a mobile banking service that is a true social innovation is Ledger Link, developed by Grameen Foundation in collaboration with Barclays Bank. This mobile banking service empowers saving groups in rural areas to save money. It is developed with human centered design methods and were lucky to meet up with Juliet, Julius and Joseph, three of the persons behind it, during our visit. **?**

One great example of an education service that is true social innovation is iSchool, developed by iSchool Zambia. Their app platform is designed to fit the Zambia school curriculum to the point, accessible as a home edition, pupil edition and teacher edition.

E-assessment / M-learning

Two studies within e-assessment have been done that this master thesis is inspired by. One uses deliberate practices on a mobile learning environement **?**. The other focused on and further validated the research of various experimental studies, that multiple-choice can be a viable auto-assessment method to improving student learning, especially for m-learning **?**.

1.4 Research questions

The overall aim of the study is to create and apply a design process of an application for entrepreneurial learning, to be implemented in a developing country context.

In response, the following specific research questions were raised:

1. How is the development affected by the technical possibilities?
   - Limitation

insert limitation here

2. How is the design affected by the contextual constraints, e.g. young entrepreneurs, entrepreneurship education, and culture?
   - The app will be a compliment to the physical YoungDrive training, not a replacement. This would be interesting continued work.
3. How can quiz questions be developed to support entrepreneurship learning?
   - Solely existing YoungDrive teaching material will tested using the app, not new material, or other entrepreneurship programs.
4. How can user's feedback be used to inform modifications of the app?
   - Limitation

insert limitation here

5. How does design affect usability and learning done via the app?

    - Ideally, the master thesis would include measuring how app usage affected their youth session quality, measured by the coach, the youth, and co-project leaders.

      If this would have been the case, there could have been three different control groups: A, using the app and the YoungDrive training, B, using only the YoungDrive training, and C, using only the app.

2

Methods and Implementation

This chapter presents the methodological framework, via presenting methods to design for learning and motivation.

Then, the setting and research context is described, together with a description of the participants.

Then, application implementation is described, followed by presenting the study design and data collection.

The final topic is data analysis theory.

2.1 Methodological framework

2.1.1 Methods to Design for Learning

The following sections, are about how to design for effective learning, by designing for the mind, cognitive psychology.

Cognitive psychology deals with how our brain works in regards to our memory.

The section presents strategies and techniques to design learning for the mind, and what needs to be considered.

Two aspects are especially relevant when it comes to education: how humans learn (the first four sections), and how humans forget (the two last sections).

In how humans learn, the purpose is to find the most powerful strategies and techniques to design effective learning (mapping educational objectives, how to build skills, pattern-matching techniques, and the power of reflection and assessing).

In how people forget, UCLA Bjork's Learning and Forgetting Lab **?** researches how people forget, and how to design so that people do not forget (retrieval practice and spaced practice).

Learning the Right Things: Mapping educational objectives with Bloom's Revised Taxonomy

What to teach should be determined by the learning objectives of the activity.

Depending on the objective, it fits differently into the Knowledge dimension and Cognitive Process dimension of Bloom's Revised Taxonomy. **?**

The taxonomy provides a framework for determining and clarifying learning objectives. See figure 2.1 from **?**. Each colored block is an example of a learning objective matching with the two dimensions. The image also explains the different concepts.

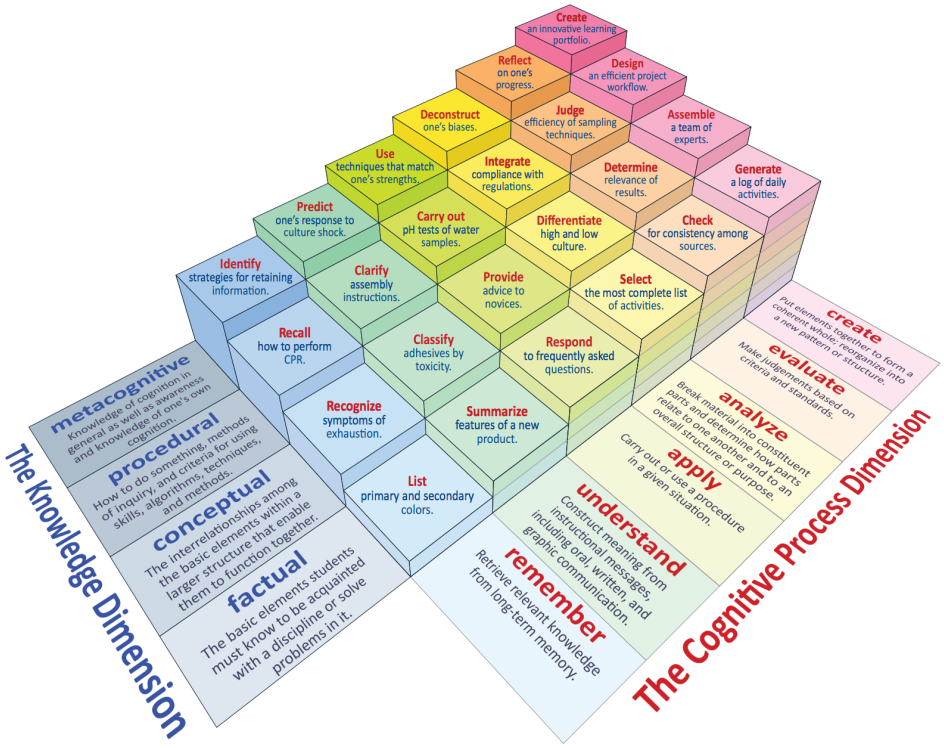

Figure 2.1: *Bloom's revised taxonomy visualised with examples of different learning objectives.*

Learning activities often involve both lower order and higher order thinking skills as well as a mix of concrete and abstract knowledge.

The taxonomy can provide usable insight into how to design, by the combination between lower or higher cognitive complexity, and concrete (factual or conceptual) or abstract knowledge (procedural or metacognitive). **?**

Building skills: by Spaced practice, Deliberate practice and Perceptual exposure

Spaced practice deals with spreading out learning, with the purpose of not forgetting. E.g. Gates **?** concludes that spaced learning versus massed learning did have a memory benefit in their study.

Designing for this, could mean making the user apparent on the person's meta-cognitive ability (personal insight into what you'll remember), and meta-memory (when you need to repeat information in order not to forget).

Moreover, dividing learning into 45-90-minute chunks, getting to 95% reliable within three sessions, has been proven highly effective. This is called deliberate practice. Gates **?** agrees, finding no evidence of consistent correlation between total duration and effects on learning outcomes in their study.

Sierra presents a number of strategies, most notably research within deliberate practice **? ?**. Deliberate practice has been proven to be an effective way to build skills. It has also been tested before for mobile learning environments. **?**

Sierra **?** suggests skills to be divided into three buckets: can't do (but need to do), can do with effort, and mastered (reliable/automatic). The goal then is to move skills from can't do into mastered, in the best way possible. See figure **??** from Sierra **?**.

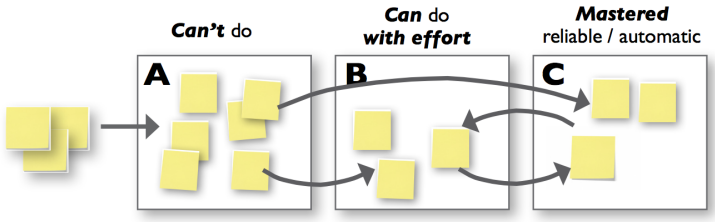

Figure 2.2: *Moving skills from A (Can't do) to B (Can do with effort) into C (Mastered) can move different ways, depending on how effective the learning is. Deliberate practices focuses on A-B-C, while perceptual expose enables A to C. Reflection allows knowledge to go backwards, to get better at the skill than previously possible.*

Desirable difficulties applies here, meaning that during deliberate practice, it may feel as if learning gets harder and harder, but in the long term the user is actually learning more. As a result, less people does true deliberate practice, but they do not get the same reward in return. This needs to be designed for, e.g. using social psychology.

A way to build skills quickly, is to utilize that the brain is brilliant at pattern-matching, by the method "perceptual exposure". **?**

By exposing users to very high-quality samples during a very limited time, experts can learn intuitively.

Learning from Assessment

Knowing what learners know, and don't know, is crucial to effective learning, Luckin **?** says.

Assessment can partly help to design for flow, matching challenge and ability **?**, which is effective for intrinsic motivation (see next chapter).

Moreover, it also has cognitive benefits. It can help to offer appropiate feedback, increase learners' awareness of their learning needs, and give accurate assessment and analysis, and allows learning to be tailored.

By recognizing differences of students, in their ability to understand what they know and how they can progress, it is possible to ensure that everyone achieves their full potential.

Effective assessment by a teacher or agent includes individual feedback (task-oriented and informal) and appropiate feed-forward advice.

Learning by Thinking: Reflection & Retrieval Practice

When reflecting, the student develops neccessary skills and self-awareness to refine their own learning activities. This surely applies to the teacher as well, Luckin says. **?**

Stefano **?** suggests that that reflection has been an overlooked area of research for a long time.

They found that individuals who are given time to reflect on a task, outperforms students who are given the same amount of time to practice with the same task.

His results suggests that reflection as an activity that can be more effective than additional learning.

Similar to deliberate practice, it is a desirable difficulty. Individuals in the test themselves, had a tendancy to allocate time to practice on the task rather than reflecting on it.

Bjork **?** shows that retrieval from memory is more effective than people who repeat reading the same thing to remember.

They also showed, that the more effective students, retrieves from memory.

E.g. "What was in that article?", instead of immediately reading the article, is an example of memory retrieval that is extremely effective for learning, their research shows.

One design method to encourage this, would be flip cards, where the question is on one side, the answer is on the other, versus giving the person a multiple-choice question.

2.1.2 Methods to Design for Motivation

Social psychology can guide the design, when there is a wish to make people behave differently. A big research area is motivational psychology.

With a compelling context, the users are already motivated. Their motivation, is to become better.

Sierra **?**, instead suggests the focus to be how to help users progress (see "Progress and payoffs"), and what pulls them off (see "Cognitive load theory").

Cognitive load theory

Sierra argues working on what stops people, matters more than working on what entices them. Thus, a focus needs to be identifying and removing blocks.

Sierra **?** describes how humans have scarce cognitive resources, and how to design for these.

Cognitive load theory research is divided into three areas: intrinsic CBT, extrinsic CBT, and germane CBT. Below, to design for these are described.

Intrinsic CBT, needs to be dealt with if the effort is too high. Sierra **?**describes two strategies. She first says that according to deliberate practice, if you can not get to 95% reliability within three 45-90 minute sessions, split skills that can be done with effort into sub-skills. The purpose is to reduce time spent practising being mediocre.

Extrinsic CBT, the way presented to a learner, should be handled via designing to support cognitive resources, Sierra says **?**.

Scaffolding is a technique to step by step remove the support wheels for the user, e.g. present information in different ways. Gates' **?** report shows that in their research, each category of scaffolding demonstrated significant effects on learning.

Also, reduce cognitive leaks by e.g. don't make them memorise, and make the thing you want the user to do, the most likely thing to do (affordances). Everything that takes willpower, reduces cognitive leaks.

Germane CBT, is the work put into creating a permanent store of knowledge. To support cognitive resources, escape the brain's spam filter by making the information essential. Either by designing for the compelling context, or desining for just-in-time learning versus just-in-case, Sierra says. **?**

Progress and payoffs

Sierra aruges that to pull users forward, to stay motivated, progress and payoffs are essential. Both of these, are investigated in terms of motivational psychology.

The feeling of progress can be emphasised by a path with guidelines to help the user know where they are at each step, e.g. for a training.

The best payoff, is a intrinsically rewarding experiences, according to Sierra **?**.

It is superb to gamification, says Sierra **?**. This is in-line with self-determination theory, where e.g. Pink **?** says that the surprising truth about what motivates us is that drive is fostered by autonomy, mastery and purpose. The most efficient way is therefore to design for having intrinsically rewarding experiences.

Caring for the compelling context, why the user wants to learn the skill, are helpful strategies. Other strategies are flow, mentioned before, or to give high pay-off tips, helping the user progress in a fair way.

Gates **?** says that simple gamification as well as more sophisticated game mechanics can prove effective. However, they add that it should be investigated if

"simple gamification" (e.g. contingent point and badges connected to learning activities) more frequently focus on lower-order learning outcomes, compared to studies with more sophisticated game mechanics.

2.2 Setting and research context

Uganda (Kampala, Tororo) and Zambia (Kabwe).

2.3 Subjects (Participants) & Stakeholders

Lorum ipsum.

2.4 Study Design & Data Collection

2.4.1 Interdisciplinary Design Process

Interaction design talks about the creation of digital artefacts specifically. When it comes to the design process, it is influenced by related areas such as human-computer science, and more recently human-centered design.

However, various disciplines suggests different design processes. For example, agile development suggest how do develop software efficiently.

Whenever a project is multi-disciplinary, various design processes may need to be combined. Whenever this happens, design thinking becomes a skill essential to thoughtfully design the process.

Löwgren **?** writes about design thinking and useful techniques in general, from his interaction design perspective.

Service design thinking connects various fields of activity **?**, and it's methodology relies on being close to the users.

While interaction design talks about the creation of digital artefacts specifically, service design talks about the creation of services.

As some digital artefacts are used within a service, or can be thought of as both a product and service simultaneously, the combination of the two are very useful.

Each discipline holds efficient methods and tools, that can be modified to suit the specific situation even better. From the field of graphic design, mental models are usable. From interaction design, desirability, utility, usability and pleasurability are useful principles. While not naturally a part of service design, these have been useful in service design projects previously. **?**

In difficult situations, this places demands on the designer. This is where design thinking becomes relevant.

Here, relevant methods and tools are briefly described, and what it means to be a good designer.

A good designer

The result of a method can not be better than the people engaging in carrying out the process **?**.

With its user-centered and T-shaped focus **?**, service design can be said to equip the designer with tools both for reasoning and design ethnography.

This is neccesary, as a good designer can deal with the complexities of design: a satisfactory (and surprising) solution or design can be achieved while working in a highly restricted situation.

How to deal with relationships and roles

According to Löwgren, "real" design is about finding ways to design a project within the existing preconditions and limitations **?**.

While a researcher is interested in reality, a designer is interested in what reality could become. **?** Being thoughtful means conceptual clarity from the designer, caring for the vision, and being equipped with appropriate tools of reasoning.

There are three roles as interaction designer in particular can take: the computer expert, the socio-technical expert, and the political agent. The trend is increasingly towards socio-technical experts **?**, the middle ground.

This seems to be a perfect fit with service design, where interaction design is both technical skills and design, and service design can be both design and ethnography. Even more importantly, service design suggests making the whole process co-creative, involving all stakeholders. **?**

Thinking of a product as a service

Service design thinking is described as a process of designing, rather than to its outcome.

A service's intent is to meet customer needs. If it does, it will be used frequently, and recommended. **?**

As this is often not the case, service design can be applicable to fields including social design, product design, graphic design and interaction design.

The result can be a product service hybrid. When designed and considered well, service design shapes the value proposition and desirability of the product for the better.

Service design methodology

Below, brief descriptions of the five principles of service design is described, together with how the work is divided into iterations, and examples of tools that can be applied.

Service design principles

Stickdorn **?** describes five principles that constitute service design thinking, and how to follow these.

The book describes how to follow these principles, by making the process user-centered (e.g. via design ethnography), co-creative (involve all stakeholders) and holistic (keep the big picture). Sequencing (visualize the service, and make iterations) evidencing (make the service tangible) are the two last important principles.

1. Sequencing: The iterative process

While literature and practice refer to various frameworks, with different number of steps, every service design project includes: exploration, creation, reflection and implementation **?**.

Nissar **?** suggests a model where one iteration consists of insights, ideation, trigger material, and interactions. See figure 2.3.

Figure 2.3: *In Nissar's model, a iteration consists of Interactions, Insights, Ideation and Trigger material.*

1. Interactions, where you are listening, the *Explorative phase*.
2. Insights, which is where you use the Interactions in order to try to understand, the *Understanding phase*.

3. Ideation, where you find possible ideas and when creation of new version of the app is done, the *Design phase*.

4. Trigger material, where material is developed to test the outcome of our evaluation in the next round, the *Trigger development*.

The iterations should come closer and closer to a desired outcome. It is not always obvious what this outcome is. For each iteration, the process takes the project closer, from Why? to What? to How?, often with overlaps **?**. See figure 2.4.

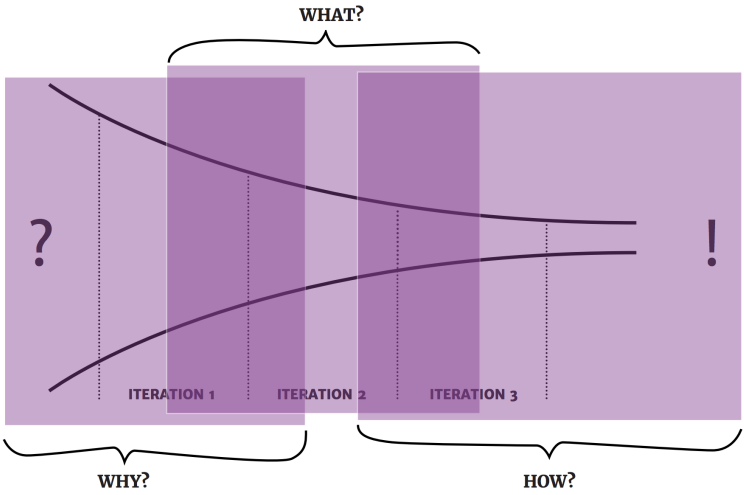

Figure 2.4: *The iteration process consists of a number of iterations with different focus, starting with broad strokes, and narrowing down into a concrete product. Between iterations, the overlap between "Why?" and "How?", "How?" and "What?", signals that there is a learning process which means conclusions may need to be quickly questioned as new insights emerge. This is especially important in projects where you work with an unfamiliar target group and there are several uncertainties and constraints.*

Service design tools

There are a number of popular service design tools that follows the five principles, e.g. how to make it user-centered.

Explorative tools are e.g. Shadowing, Customer Journey Map, Contextual Interviews, The 5 Why's (same as "Why-why-why" within interaction design **?**), Cultural Probes, Mobile Ethnography and Personas.

Tools to create and reflect can be done via a certain work methodology, e.g. agile development, and structuring and inspiring brainstorms, e.g. via "What if...?" and Co-Creation, inviting stakeholders in the creation process.

2.4.2 Data Collection

In this chapter, each step of the visualization pipeline is presented, allowing analyzing the data. Then, conclusions are presented.

The Visualization Pipeline describes the process of generating an image from the data: **?**

1. Data acquisition (→ data are given)
2. Data enhancement (→ data are processed)
3. Visualization mapping (→ data are mapped to for example a geometry)
4. Rendering (3D->2D) (→ images generated)

Data acquisition presents how data was acquired.

Data Acquisition from Server

The app pushes data to server when online (it saves quiz start, and quiz finish).

The server receives JSON data, stored in a MongoDB database.

Each data point is saved in a database called Results, with the signed in user (from the Users database).

It was desired to store the data in Google Sheets, thus it was necessary to convert the JSON format into a Google Sheets-readable format, like CSV.

Multiple approaches were tried, and the Google Chrome extension called Magic Json by agaze_dev_team (last updated October 29, 2015) was the one that worked without problems. **?**.

Data Acquisition from Pre-Study

The Pre-study data was done by manually recording the paper-submitted pre-study evaluation form from the coaches, into Google Sheets.

2.4.3 Data Enhancement of Server Results

This section presents how data from the server was processed, to enable visualization mapping.

To make the data easier to work with, the columns were reordered, and made sortable and filterable.

Some columns were given conditional formatting, so it would be easier to spot irregularities.

Lägg till bild "results-colored.png" (finns på skrivbordet)

After this, some observations could be made. For example, there was a surprisingly low number of answers where the user answered the question without confidence. Also, more users had started a quiz without finishing it than anticipated. Finally, a lot of users had done quizes that were not Topic quiz 3 and Coach quiz 9, which might indicate high interest (if they did more than 2 quizes) or confusion (if they did not do 3 or 9, but they did do other quizes) during the

app evaluation. This meant that on some aspects, there were less data than anticipated, (which was troublesome, as there were already few data points), and some aspects where there was more data than anticipated (that were overlooked)

Summarizing the Server Results

To be able to compare the test results with the pre-test results, it was clear that it would not be viable to test every dimension against every dimension.

Instead, since goals of the app evaluation had been predefined in the following way, the quiz results were summarized so that the following could be derived:

- % correct 1st try
- number of tries until 100%
- number of tries until 100% in 1 try

These could be calculated by having columns for:

- Quiz 3
  - Start time training
  - % correct 1st try
  - number of tries until 100% in 1 try
  - Time difference start to end time certification
- Quiz 9
  - Start time training
  - % correct 1st try
  - Time difference start to end 1st try
  - Time difference start to passed training
  - Time difference 1st try to certified

Then, to see trends, I again added color scales. With ordinal values, a sequential color scheme is used (e.g. fastest time, from green to red), and with nominal values (like if they are female or male) where there is no right value, a qualitative color scheme is used. Now, it was easier to spot outliers and trends.

Date Enhancement of Pre-study Results

To see differences in answers more clearly, the data from the pre-study was made sortable and filterable. Then, the data was resampeled for each column that hade numerable (sortable) data in text instead of numbers, so e.g. "The day before" was changed to -1 and "The same day" to 0. In a similar way, school level was divided into four different groups, from 0 to 3, where 0 meant secondary, year unknown, 1 meant lower secondary, 2 meant upper secondary, and 3 meant tertiary.

After this, each column was given conditional formats using a color scale, using Google Sheets built-in functionality. This gave a visual way to quickly get a overview of the pre-test data.

Observations from the data was that a surprising number of cells were left blank. One user had not done the pre-test, where some had left questions unanswered (most commonly "Do you own a company?" (should have used the word "business"), plus "Hours of preperation" and "Occations for a youth session" (there is a tendency this might be because they were not proud of their answers, because of correlations with low quiz results).

Missing cells was not as obvious with the app results, were users could not progress in a quiz without answering both the question and the confidence. However, none of the passed quiz 9 certification answers had been submitted. Thus, it was needed to add these from the manual recordings, which had been used as a backup in case anything like this would happen.

Comparing the pre-test and results summary sheets

I joined the summary sheet and the pre-quiz sheet, meaning I had created a multiple-variate data set (serveral dimensions that I needed to compare with several dimensions).

I met with my university supervisors, so they could further support me in how to properly analyze the data.

It was clear that analysis in Google Sheets could only go so far. It was greatly helpful to sort by multiple columns (e.g. first by Manual?, then by School level, then by Quiz 3). However, it took a long time to filter the data on multiple parameters, and the work became tedious. It was not viable to discover the data using this approach.

Meeting with the supervisors, they started by comparing the means on the pre-quiz results with the two control groups. Since they showed similar results, the two control groups were comparable.

Then, we calculated the means from the other columns based on e.g. "Manual?", gender, school category, high app quiz result, etc.

A multivariate analyzation software or a visualization was suggested to discover the data in less time.

It was hard for us to determine a suitable multivariate analysis software suitable when having so few data points. Principle Component Analysis or Cohen's kappa would not be suitable, or to do Linear correlation on all dimensions.

After discussion with other Master thesis students working with large amounts of data (one from KTS and one from MT), parallel coordinates was suggested. It would allow me to very quickly filter the data, find correlations, and distinguish outliers and common characteristics.

To learn how to analyse the data, Une-terre (2012) was consulted. He writes "||-coords are a data visualisation which allow you to "read out" the relationships and trends between your dimensions. Positive relationship (correlation), negative relationship (invert), or no relationship (random)."

Add that I also did regression

2.4.4 Visualization mapping

The goal with visualization mapping is to generate renderable data.

Thus, I added a new spreadsheet, specific for visualizing the data.

I deleted columns that would serve no visual purpose (e.g. timestamps), gave all cells data values (even N/A when undefined), deleting users that did not have data, and shortened the column names so they would fit on the screen.

The data was then exported from the Google Sheet into CSV.

2.4.5 Rendering

For rendering, the JavaScript library D3.js was chosen. It supports data-driven documents for visualizing data with HTML, SVG and CSS. It supports both JSON and CSV data.

A visual framework for multidimensional detectives for D3.js was found, called "Parcoords.js", written by Chang Kai (2012).

The example code from "Linking with a Data Table" provided the basis for the rendering. It would be a great benefit to bee able to see both a parallel coordinates visualization, and to see the same values present in the Google Sheet.

I replaced the example CSV file with the exported Google Sheets data in CSV.

Eventually, I also changed the colors, and added to the example the toolkit's functionality to drag the axes titles around to reorder the dimensions, since the goal was to quickly compare and find correlations.

Lägg till bild på parallella koordina visualise

2.4.6 Preparations in Sweden

The insights before going to Uganda were addressed in the initial work plan, see Appendix A.

Add appendix with Work plan

2.4.7 Iteration 1

2.4.8 Iteration 2

2.4.9 Iteration 3

2.4.10 Iteration 4

2.5 Application implementation

In this section, the prerequisites for the app is described, from the perspective of the user, stakeholders, and the developer.

2.5.1 User needs

The technical constraints for the project, would need to affect the technologies used, if the project would be user-centered.

On the client side, the app would need to be mobile and web based, consider non-access to internet, and not use a lot of battery, to work for the coaches of YoungDrive.

2.5.2 Stakeholder needs

As the project was only three months, and the first month would be without digital development, time constraints were massive. However, to be able to answer research question #2, evaluation needed to be done via data collection.

If no evaluation, there would be no need to write code, instead working with a lo-fi prototype using pure design tools. Now, a data-driven approach was needed to measure, and therefore an app needed to be developed.

On the server side, a database and API would be needed, to pull data from the database and push data from the client. Since internet was not always available, the client must be smart in its usage of pushing and pulling data. This would need to be investigated further into the project.

2.5.3 Implementation of Learning Methods

Considerations for Entrepreneurship Education

The scope of the app is to examine and strengthen the entrepreneurship the student already has. One important goal is to give good feedback.

The YoungDrive's entrepreneurship education methodology goes hand in hand with the presented theory. It's mottos are: "Dream big, start small", "Learning by doing" and "We have fun!" **?**.

Both in regards to designing for the users and for the above reason, the app should be a complement to YoundDrive's existing training material and the structure of the program.

A challenging part of the work is that YoungDrive consists of both the practical skills of the entrepreneur, theoretical material of running a business, and an entrepreneurial mindset. Therefore, both how to assess knowledge, and build habits, needs to be examined.

Learning from Assessment

Lorum ipsum

2.5.4 Implementation of Motivation Methods

Lorum ipsum

2.5.5 Iteration #1

Here, the work and result from iteration #1 is presented.

App/Web Development

Early in the project, it was thought that existing tools could be used, instead of building the app from scratch. E.g. using existing tools like Knowly or Typeform[1] during the first iterations for understanding users, and during development e.g. the Typeform API (http://typeform.io/). The Typeform API allows developers to create surveys from within their own applications or systems.

Insights

Week 6-7 Learn about the YoungDrive organization

Start-up meeting with partners

On February 10th, a first stakeholder meeting was held between me and the country managers for YoungDrive (Iliana Björling) and Plan International (Shifteh Malithano).

Plan: Learn from previous work Led to visits and interviews with Designers without Borders and Grameen Foundation (carried out on February 26th).

Skype interview with Gerald, Plan, Tororo is used instead of both Kamuli and Tororo Entebbe, literature review & research Write on the report

Ideation

Week 6 Outbox workshop with Mango Tree Create Workshop #1 and Workshop #2 with Expedition Mondial

Week 8 Create questionairre guide with Expedition Mondial and YoungDrive Designers without Borders Grameen Foundation

Trigger material

Preperation Quizical Duolingo

Interactions

Week 7: February 23rd: Number of interactions for iteration #1 cut down Interactions canceled for week 7, the day before Wednesday-Friday, because of local elections.

"Det var tråkigt att höra att det inte blev lika många interaktioner som planerat. MEN jag tänker: Det här är verkligen en del av lärdomarna att jobba med tjänstedesign i andra kulturer (som jag även tar med mig från vårt projekt i Kenya). Det går bara att planera till en viss grad, och det blir aldrig riktigt som man tänkt sig :) Man får vara beredd på att ändra planen i sista sekund, mycket mer än vad man behöver i sin egen kultur. Bra lärdom!

[1] examples include https://showroom.typeform.com/to/ggBJPd and https://showroom.typeform.com/report/njdbt5/dIzi

Så utifrån dina fåtal interaktioner i början på nästa vecka kommer du iallafall ha en hypotes, även om den kanske är lite vagare än vad vi tänkt från början. Jag kan skicka dig nästa kapitel i Coaching Handbook som handlar om Analys senare i veckan så kan du börja fundera på hur du bäst gör analysen utifrån det material du har. " - Susanna, Expedition Mondial

Week 7, Thursday, February 25th I realize what I'm actually doing is "Designing and Developing Mobile Learning for Entrepreneurship Coaches in Uganda". The master thesis title is changed to this.

Week 7: Friday, February 26th Ringer Gerald 26 fredag februari, som meddelar att nya tidschemat jag hade är omöjligt. Han har bara bokat alla inblandade kl. 8-17, då Plan inte tillåter field trips p.g.a. local elections

Krismöte med Josefina, som föreslår att gå bakom kulisserna och engagera Christine och Patrick, utan Plans inblandning. Kanske till och med kan besöka coachgrupp Sammanfattning: interaktionerna har gått från 3 dagar, till 2 dagar, till 1 dag

Varje gång har jag behövt anpassa mig, och hitta ett nytt koncept Nu kanske det blir 1 dag i Plans regi, och jag ändå är i Tororo måndag-onsdag.

Week 8, Sunday-Wednesday in Tororo Sunday, travel to Tororo 4 (not 3 or 8) face-to-face-interviews 1 meeting with Plan, 1 with local partners Workshop #1: Customer Journey Map: A day as a coach Workshop #2: Quizical and Duolingo 2 field visits Stay over with Patrick

Week 8, Thursday & Friday Thursday: Expert meeting with Expedition Mondial and LiU Innovation Friday: Partner meeting with Linköping University and YoungDrive

Implementation

Choosing cross-platform framework

After choosing Meteor.js

2.5.6 Iteration #2

Here, the work and result from iteration #2 is presented.

The interactions for this iteration were planned to be in Tororo. However, during a meeting during the first week with YoungDrive project leader Josefina, I was invited to participate in the coach training in Zambia. A new work plan was created, so that I could travel to Zambia and develop the app and participate in the YoungDrive coach training together with the coaches.

Insights

There were two main insights from iteration #1.

1. The aim is for the coach to feel self-confidence for its youth session 2. The skill to be trained is having a youth session

During the evaluation meeting with Linköping University and YoungDrive, it was the determined that Iteration #1, is answering the research question #1, #1a, and #1b.

The iteration has provided a good basis for answering research question #2.

It was concluded during the partner meeting, that iteration #2 should:

1. Allow me to test the validity of my insights from iteration #1. 2. Be carried out in a way that I can compare usability and learning done via the app, between iteration #2 and #3.

Ideation

This was the start of the quiz app. The focus was on assessment. For example, it was decided with Iliana, that no facts would be presented before the quiz.

It was discussed, how the correct information about YoungDrive would be presented. Thus, for this iteration, questions were created by the YoungDrive team, and I developed the app.

The ideation started with me creating a quide how to write questions according to Bloom's revised taxonomy, which was shared to Iliana and Josefina.

The initial plan was that the team would only produce questions for two sessions, not all 10.

Iliana did questions initially for the two sessions, mapping each question to the Bloom taxonomy.

Then, when it was decided that the app would be developed and used during an actual coach training in Zambia, it was decided that questions would be created for all sessions.

Trigger material

Project leader Josefina in Zambia refined the first question sets, prepared for my visit in Zambia. Josefina created question sets with Bloom at the back of her head, also taking into account the structure and the order of the coach manuals, what it means being a coach within the topic, and lastly scenarios.

On the week before the trip, and on the airplane, I did a working prototype, a very basic quiz app, keeping it as simple as possible. I brought with be devices (tablets and smartphones).

When I arrived at the evening before the coach training started, I added the questions to the app, and installed the app to all of the devices. This process was repeated for all the days, Sunday-Friday.

Interactions

Design workshop #1

The coach training started with me having a design workshop with the coaches, not showing them the app that I had created.

Since the knowledge about smartphones and apps were low, I started by introducing these topics.

All were familiar with Facebook, so thus I showed the Facebook app. Me wanting to know what the app would look like if the coaches would have designed the app, I first needed to train them how to design an app via drawing wireframes.

Using postits, they started with during limited time drawing the start view from the Facebook app.

Then, they were asked to draw what they thought happened on the friend icon click, drawing the view on another postit.

Then, the mission of the YoungDrive app was described. They were then divided into two teams, having limited time to draw the best imaginable YoungDrive coach quiz app they could. First, they designed the app from the top of their heads. They then pitched their results to each other.

On the next iteration, they were to suggest and design improvements how the app should be designed to improve learning, not only assessment. They then again pitched their results to each other.

The result was fantastic, in the sense that it gave me an unbiased look at what the coaches expected from the app, what functionality wasn't important, and into their technical preferences.

The designs and insights gained were used throughout the week to further improve the app I had actually started creating, and gave great insights to who the coaches were and their thinking.

Assessment via quiz

At the end of each day, the app was used to test the coaches' knowledge. Each coach got either a smartphone, tablet or computer. The coach first took the quiz for the most recent session, and could then choose what to do next.

As there were no back-end developed, Josefina by hand documented the scores of each coach, writing the name of the coach, the session, number of correct answers, and what questions had been answered wrong.

Josefina then, when planning the next day, looked at the statistics, looking for trends that would inform the sessions for the following day.

She also evaluated the quality of the questions, before creating the new question sets for the next day.

Experimenting with quiz before or after the session

Since the coaches appreciated the app so much, we felt tempted to try what would happen with fun and learning if we tried using the app *before* a session instead of only after. During the rest of the week, we continued, finally finding preferences and tendencies from the coaches, via observation, interviews, and survey.

Experimenting with design of questions

Number of questions Multiple-choice questions Framing of questions Challenge level of questions Determining what made a question hard

Testing the app outside the YoungDrive context

Test with refugee innovators was surprisingly successful, Humanitarian Innovation Jam Test with university student from Makarere University scored 100%

correct

Result

Using the quiz before the session increases learning, slightly decreases fun of the session

The app works for assessment!

Results from the coaches:

Trends from the coaches:

Analysis

Bugs Simpler design than I thought (KISS)

Discussion

If I would have created myself, would have assumed more functionality was necessary and requested

Conclusion

- Short iterations are very effective, however not perfect
- Field hackathon, designing and developing together with the users, is fantastic
- I would never have come this far without the short iterations
- The app works for assessment!
- Fun and encouraging and good for learning for the coaches
- A good indicator for Josefina
- A great way to scale the YoungDrive training in the future, both for online coach-training and the physical training

Staging environment using Heroku

Needed when the Meteor free tier was removed. Connected to deploy from GitHub branches automatically. Could have benefitted from CI, passing tests before ready for production. Solved this by having a stage environment (since April 19th) where stage is YoungDrive-beta (branch Iteration 4), and YoungDrive is master.

2.5.7 Iteration #3

Insights

Findings:

- Josefina does not want to be replaced
- The app would be great and could actually work outside the physical coach training - with revision, be stand-alone, even being able to distribute online
- Refugee innovators has a great need for such an app
- Test with university student scored 100% correct, means that common sense can go a long way, and that the results can't be 100% trustworthy, and that multiple-choice questions has serious issues - this, we already knew during and before the coach training - but it needs to be taken care of

Check with findings iteration #1:

- The app is only working on assessment now, not for learning
- The need for a field app still feels relevant (especially for sessions long since the coach training)
- The potential for YoungDrive having online coach training is huge

Determine:

- Focus for the next iteration: design quiz app for learning, focus on field app (CI, CS, TM, FA), or design app that works stand-alone from the YD coach training.

After-talk with Josefina, on Skype in Uganda, 2016-04-02: Nu har vi praktiska bevis för vad jag upptäckte under Iteration 1:

* Utbildningen ska faktiskt träna dem i förbereda quiz-session * Därför borde även quiz testa detta * Vad det inenbär vara bra coach, är hålla bra ungdomssessioner * Det finns vissa coacher, Josefina hade velat stoppa från att hålla ungdomssession, om de inte har 90-100% correct information * Men hon kan inte asessa detta * Här, är quiz en väldigt bra möjlighet * Quiz-app under utbildning och ute i fält går därmed ihop

Ideation

Josefina: "Jag kan ju inte kontrollera dem på något sätt hur de förberett sig"

Förbereda session: Antingen inför du börjar, sedan har du ett hum vad du behöver träna mest Eller (bättre/säkrare iom quiz inte täcker allt), så bättre förebereder sig, och sedan gör quiz när de tycker de är färdiga

Har du fått 9/10 rätt, då är du förberedd! (9-10 rätt) Det de har fel på, det kommer de ju lära ut ungdomarna fel på.

Om du har 8 eller under, då ligger du i röd zon Om du har fel på t.ex. “Vad är en entreprenör?”, då kan du ju inte förklara det för ungdomarna!

Därför borde de ha alla rätt.

Där kan man ju också jobba mycket mer med feedback via appen, och skapa en annan typ av quiz för förberedande

Därför får jag Josefina att ta fram en ny quiz, som är "Förebered session X"

Syftet är att komma högre upp på Bloom’s revised taxonomy

Dessutom, pratade vi om utvärderings-appen: varför behöver den vara en app? Det är extremt tydligt att det fysiska ändå måste finnas. Den behövs för att ge coachen smart själv-utvärdering.

Lärdom: det passar faktiskt inom ramen för quiz-appen Frågor blir automatiskt meta-cognitive Passar jättebra med Learning by Reflection

Monitoring & Evaluation app can converge with Quiz App

När någon är där och ger dem feedback, så blir det extremt svart på vitt, att de inte är så himla förberedda som de tror

Och: “Vad händer om du ger fel information här?” Vad händer om du säger cost är X?

Varför behövs det en app för M&E? För coacherna, ska få insikt på hur de håller en session De är inte ärliga med sig själva egentligen

Appen skulle kunna ge självutvärderings-frågor?

Redan nu, så skulle man ju kunna fråga: “Vad hade hänt om du svarat X på Y?” “Varför är det viktigt du svarar rätt på detta?”

Appens fråge-struktur

För att förbättra multiple-choice och komma högre på Bloom’s taxonomy

Fyra idéer: 1. Coachernas idé från Zambia: "Gör om"-knapp (ger dig nytt quiz med bara de frågor du hade fel 2. Första idén för att lösa: håll in knapp för att spela in svar "Vad är en entreprenör?". När du klickar "Nästa", så syns multiple-choice och du väljer det alternativ som var närmast vad du svarat. Feedback experter: utmaningar med användarvänlighet (liknar Snapchat, ingen vana), du kan fortfarande välja det mest sannolika alternativet (coachen gör en självbedömning, kanske tycker A var närmast när B var närmast, och coachen kan ljuga). Fördel: YoungDrive kan använda de inspelade svaren på bra sätt. Nackdel för mig: tar tid att implementera.

3. Från Lena: gör som i NTA Digital, du får medalj guld, silver, brons baserat på hur många gånger du försökt få 100% rätt

4. Henrik Marklund kom med följande förslag istället, inspirerat av lärare han kände: "Är du säker?" efter varje fråga 4a) Först var idén: gör som läraren, Ta fram ett gemensamt betyg, MVG, VG, G, genom att vikta Korrekthet med Empowerment 4b) Fick feedback från Josefina: ha två separata staplar Korrekthet och Empowerment. Coacherna kan 1) vilja gamea systemet, och 2) undra hur de fick sin score. Kan då bli svårt att förklara.

Fanns extremt många fördelar med denna, och kom bara fram till ännu fler efter diskussioner med människor och Lena Tibell, framför allt hur denna kan

förbättra utbildningen och 1-on-1 coachning, och bli väldigt bra självreflektion för coachen.

Sammanfattning, de 4 idéerna

App för lärande, inte bara utvärdering. 4 vägar att gå vad gäller hur frågor ska ställas: 1. Fältmetod: Efter du har fått slutresultatet så kan du trycka på improve för att få alla felaktiga svar. Klassiskt inom körkortsproven i Sverige.

2. LiUmetod: För varje försök sänks resultaten från guld, silver och brons. Motiverar till att studera innan = gamification.

3. Pedagogikmetod: Teknologi och förenkla livet. Efter varje fråga lades till ”hur säker är du på ditt svar?”. Kräver studenten att reflektera över sitt svar, metakognitivt tänkande.

Två staplar: Så här mycket rätt har du / Så här empowered är du!

4. Innan du får svarsalternativen så får du spela in dina svar, sen välja ett alternativ som de tycker är närmast. Det är bra för de som utbildar coacherna.

Beslut av approach

Idé för interaktioner blev först att A/B-testa Idé 1+3 vs. idé 4 under en workshop, och sedan testa Idé 2 ute i fält för att mäta användbarhet, i.o.m. den metoden gav mycket kvalitativ data, och var bra feedback till utbildarna.

Feedback kom först från Expedition Mondial (som hälsade på under veckan) att under min workshop med coacherna kommer säkert idé 1+3 och 4 blandas ihop.

Inför mitt möte med Grameen, pratade jag med innovationsrådgivare Peter Gahnström om hans analys av de 4 alternativen. Han gillade alternativ 4 mest, och gav följande nya insikt till mig: "Det här kan motverka traditioner och ”så här vi alltid gjort det” genom att tvinga en att reflektera över varför inte ens rätta svar korrelerar med hur empowered du känner dig. Bryter normer, sätter sig emot lathet och agerar proaktivt för en skarpare utveckling tillsammans."

Jag träffade Juliet och en utvecklare på Grameen Foundation (som gjort Ledger-Link), och gick igenom de 4 alternativen. Svaret gavs att idé 2 definitivt är för okänd för användarna. När indikationer kom från även Grameen Foundation att 1+3 och 4 säkert skulle blandas, och var grymma alternativ, fråga jag "Hur?".

Svaret blev en diskussion med att i ett resultat efter ett quiz få två scores Korrekthet och Empowerment. Sedan på Improve, så får du medaljer/score baserat på Antal försök. (Grameen trodde ej det skulle bli problem med gamification på idé 3.) Du ska nå t.ex. 90% rätt på båda staplarna.

Hon (Juliet) föreslog också att du kanske inte måste ha chans på guldstjärna bara på första försöket. T.ex. att om du gör quizet gång 1, så måste du få 90% för guld, men på ditt andra försök måste du få 95% för guld. Detta då vi ju vill att coacherna ska ha läst på innan.

Lena Tibell menade vid förslaget att "Belöna inte hur snabbt en elev går från att kunna till att inte kunna, för olika människor lär sig olika snabbt". "Vad vi ville åstadkomma med Antal försök var endast att undvika gissningarna".

Lena frågades också om vilken skala jag ska ha på 5, 4 eller vad jag inte tänkt på, 2-gradig skala. 5 eller 4 är vilket som enligt literatur, det finns två olika skolor. 2-gradiga skalan bedömde jag vara bäst, p.g.a. * användarvänlighet, tydligt för coacherna * behöver inte vara krångligare än så till en början, en bra test * blir

enkelt att mäta empowerment, rätt svar + säker = pluspoäng, rätt svar + osäker = du gissade men hade rätt, gör om och var säker -> empowerment, fel svar + säker = måste ge feedback (väldigt intressant för Josefina), och fel svar + osäker = du ahde rätt, det var ett annat alternativ, gör om -> empowerment + korrekt information.

Appens datainsamling

Denna gång behövde appen samla in data av sig själv, istället för att Josefina manuellt skrev ner resultat-tavlan efter varje quiz.

Kravet kom dels från Josefina (det kommer inte gå om det är mer än 10 coacher, vi har oftast 20-30), dels från att jag i mina interaktioner i Tororo skulle testa på 2 olika kontrollgrupper med 10 personer vardera, och jag visste baserad på Interactions 1 att jag inte skulle ha tid att både skriva ner resultat och observera hur de beter sig med appen.

Inloggning Att samla in data för användare, skulle kräva inloggning. Men det är ett användbarhets-problem för de flesta. Om de skapar en användare med lösenord, hur ska de 1) tycka det är intutivt och 2) komma ihåg sina användarnamn och lösenord till Interactions 4 om 2 veckor?

Jag pratade med flera om detta, Expedition Mondial och Grameen. Från EM lärde jag mig att de trodde min idé med en färdiggjort lista med coachernas namn (vi vet ju vilka som är i Tororo) skulle fungera, och från Grameen fick jag höra om dera erfarenhet att de validerat använda samma approach, med en PIN (längre än 4 siffror dock), men att de inte nailat konceptet ännu, och att de också itererar på sin approach för nästa uppdatering av LedgerLink.

Tyvärr har också Meteor begränsningar med deras auto-login-modul. Den tvingar både användarnamn och lösenord, och har automatiskt registrering. Går det att stänga av? Jag kan skapa användare och lösenord åt alla, och funderade på hur jag skulle generera lösenord. Ett förslag blev att bara registrera deras förnamn, och sedan skapa lösenordet baserat på T9 med de 6 första bokstäverna utan att berätta det för dem. Sedan tänkte jag på det kulturella, att det kan vara oartigt med förnamn, och bestämde mig för efternamn istället. Hela namnet skulle bli för långt och krångligt.

Helst skulle jag behöva gå runt Meteors standard-inloggning, och istället ha en enkel login-rullista som den ovan beskrivet, istället för att använda deras standard-lösning.

Meteor Collections En annan problematik var att om data ska skickas till en server, måste det finnas en server med Collections. I version 1 av appen sparades inga resultat i huvud taget.

Jag gjorde en exempel-app med Meteor Collections under veckan, och det är ganska coolt med DDP, och appen kändes snabb oavsett ej internet-connection. Det var däremot svårt simulera samma internet-problem som ute i fält. Det är en risk jag tar, att appen kanske inte kommer skicka in rätt resultat.

Därför ville jag även ha offline-databas, och då fanns det en plugin som hette GroundDB.

Detta var tidsödande, och vi får se om det fungerar bra på måndag.

Ett annat problem är, hur ska detta visualiseras pedagogiskt för Josefina och de andra utbildarna?

Educator Dashboard

Detta hanns inte med i Iteration 3 även om det var ett mål. Istället gjordes triggermaterial och workshop-upplägg till Tororo, då Expedition Mondial ifrågasatte "Visst är väl även Christine och Patrick?" målgrupp för detta? Och vad har de för utrustning? Christine har mobil, Patrick ingen. Så detta talade för att Educator Dashboard skulle behöva fungera på mobil, och inte bara dator som jag tänkt, iom att Josefina har dator.

Då bestämdes med Expedition Mondial att jag skulle ha workshop med dem på onsdag. Med samtal med Josefina, sade hon att de garanterat borde utrustas med tablets då de samlar in data digitalt, så jag kan tänka mig att de får en tablet framöver. Skönt! Detta stämmer även med vad Stefan FalkBoman hade tänkt sig, och de iPads han köpt in till mig. Så då kunde jag ha dessa som tanke att utforma educator-app-dashboarden ifrån.

Tekniskt

HighCharts var påtänkt som verktyg för att visualisera datan. Tanken var att den vanliga appen skulle kunna ha super-användare som är admins, och kommer till ett särskilt gränssnitt där de ser data om användarna. Detta kunde göras direkt i Meteor.

Stefan frågade vad jag tänkt om detta, och frågade om jag funderat över integration med deras verktyg Podio, och om det var möjligt. Det sade jag att det var framöver. Podio har ett API som bl.a. stödjer JSON, vilket jag använder. Då frågade jag om Podio har bra visual dash-board -verktyg, vilket han skulle kolla upp. Inom exjobbet behöver jag än så länge inte bry mig om detta. Problemet är att Stefan ser ett värde i att lagra datan i Podio, men de har inte i sig själv bra visualiseringsverktyg.

9 april hade jag då ett möte med SolarSisters COO Dave, som är en social enterprise med 1 huvudansvarig (Dave), 70 field staff och 2000 entreprenörer, så ganska likt YoungDrive i Uganda när Josefina var där.

Dave byggde 2013 upp deras backend i SalesForce för databas, och sedan TaroWorks för datainsamling. TaroWorks är en plugin till SalesForce, med offline-app anpassad för fält. De har sedan utrustat alla field staff med tablets, då det var för dyrt att ge till alla 2 000 entreprenörer. Field staff träffar entreprenörer varje dag, och hjälper entreprenörerna att knappa in t.ex. kvitton, utvärderingar och undersökningar (t.ex. från finansiärer) via appen.

Det tog 3 veckor att bara sätta upp systemet, och det var snabbt. För Dave har det varit en 100%-tjänst i början, och fortfarande 20%. Men fördelarna är att de nu är 100% datadrivna, och de kan följa exakt hur det går för field staff och entreprenörerna - detta guidar även vilka som får promotions och vilka som blir avskedade.

Det mest intressanta är kanske att SolarSister inte bara avnänder datan för internt bruk, utan även för dess partners. De gör undersökningar via TaroWorks som inte är direkt kopplade till SolarSister, för att få in pengar. Men framför allt,

sticker de ut gentemot andra social enterprises, då de enkelt kan ge partners all data de önskar, och det gör dem väldigt framgångsrika med grants. De är sannerligen en datadriven organisation. Datan, ger SolarSisters story ett trovärdigt narrativ, vilket Dave beskriver som en extrem framgångsfaktor.

Idag står 2/3 av finaniseringen från grants (fördel med socail entrepriser, du kan få pengar både från finansiärer och kunder), 1/3 från entreprenörerna. De vill bli mer self-sustainable för varje år som går, och detta är storyn som datan måste berätta - vilket är varför de t.ex. avskedar människor som inte presenterar. Datan måste stämma med storyn de vill berätta, för den storyn är vad som avgör att de får in pengar.

Detta gav mig insikter på hur mycket min datainsamling från coacherna kan spela roll för organisationen. Det var något jag inte tänkt på innan, och som jag vill vara medveten kring. För om det är något jag lärt mig denna iteration, är det hur "kunskap är makt", och hur mycket vettig kunskap jag, coacherna och Josefina och YoungDrive kan få ut av att helt enkelt lägga till frågan "Är du säker?" till varje quiz-fråga.

Teknisk utveckling: från Meteor 1.2 till 1.3

Branchade ut projektet och uppdaterade till Meteor 1.3 från 1.2, vilket gav bättre utvecklarupplevelse och många sådana fördelar (till exempel kan använda NPM), men fanns inte längre bakåtkompatibilitet till mobilerna som coacherna använder, samt att buildpack för Meteor till Heroku inte hade uppdaterats, så vid en push (även om det fungerade på localhost) så krashade hemsidan youngdrive.herokuapp.com, vilket fick feedback från handledare Lena som behövt accessa sidan.

Detta är ett bra exempel på hur tekniska begränsningar påverkar projektet. I slutändan, tog det ganska mycket tid under veckan "i onödan", och jag fick ta igen tiden genom att jobba fredag kväll och lördag inför mina interaktioner.

Trigger material

Vad som guidade trigger material #3, litteratur: In particular, we theorize that, once a person has accumulated a certain amount of experience with a task, the benefit of additional practice is inferior to the benefit of reflecting upon the accumulated experience. In other words, the intentional attempt to synthesize, abstract, and articulate the key lessons learned from experience generates higher learning outcomes as compared to those generated by the accumulation of additional experience.

Interactions

2.5.8 Iteration #4

Efter prat med Henrik: https://memorize.com/

Growht mindset vs Performance mindset Goal-mastery-mindset vill vi få dem hamna i

Flashcards vid Improve

Self-motitoring, vad du vill åstadkomma

Questions Used to Prompt Self-Monitoring and Self-Evaluation Self-Monitoring 1. Am I concentrating on learning the training material? 2. Do I have thoughts unrelated to training that interfere with my ability to focus on training? 3. Are the study tactics I have been using effective for learning the training material? 4. Am I setting learning goals to help me perform better on the final exam? 5. Am I setting learning goals to ensure that I will be ready to take the post test? 6. Have I developed a strategy for increasing my knowledge of the training material? 7. Am I setting learning goals to ensure I have a thorough understanding of the training material? 8. Are the study strategies I'm using helping me learn the training material? 9. Am I distracted during training? 10. Am I focusing my mental effort on the training material? Self-Evaluation 1. Do I know more about the training material than when training began? 2. Would I do better on the final exam if I studied more? 3. Do I know enough about the training material to answer at least 80correct on the post test? 4. Have I forgotten some of the terms introduced in previous training material? 5. Are there areas of training I am going to have a difficult time remembering for the final exam? 6. Do I understand all of the key points of the training material? 7. Have I spent enough time reviewing to remember the information for the final exam? 8. Have I reviewed the training material as much as necessary to perform the skills on the final exam? 9. Do I need to continue to review before taking the final exam? 10. Am I making progress towards answering at least 80post test?

INTERAKTIONSDESIGN FÖR LÄRANDE

Här gås hur jag utformat appen för lärande i iteration 2 och 3 igenom, med förslag till iteration 4.

ITERATION 2

Quiz-flödet 1.0: standard multiple-choice, designat för assessment, men ej för learning Besvara multiple-choice-frågor Få resultat-tavla med Question 1: 0, Question 2: 1, samt "Total score: X/X" Gå tillbaka till startskärm

ITERATION 3 Quiz-flöde 2.0: designat för learning och självreflektion, men ej för effektivitet vid varje fråga besvarar du det alternativ du tror är rätt samt "Are you sure?" Yes/No vid färdigt quiz, få en resultattavla med personliserad feedback läsa igenom dina felaktiga svar och hur säker du varit på dem observerat de korrekta svaren klicka "Improve" för att bara få dina felaktiga svar igen upprepa tills inga felaktiga svar var kvar (det står "quiz try: 3", om det är försök 3) vid 100innan dess, uppmuntrades du läsa igenom coach/deltagar-manualen om du då fick något fel, fick du gå tillbaka till träning igen om alla rätt på, blev du Certified coach. Om du klarade det på första försöket, fick du även en guldstjärna (andra försöket = silver, tredje försöket = brons) sedan kunde du ta ett annat quiz Kommentar, fördelar med feedback-läge: Genom att på varje fråga besvara "Are you sure?": Yes/No, så stärker vi inte bara coachens meta-kognitiva förmåga, utan vi kan vi även ge personliserad feedback i resultattavlan, istället för att bara visa Question 1: 1 point. Question 2: 0 points, som i Iteration 2.

Detta gör att coachen kan reflektera över sitt lärande på t.ex. följande sätt: - få en självförtroende-boost (via feedback "You were correct, and you were sure") - gå från gissning till självsäkerhet (via feedback "You guessed, but you were correct") - ändra uppfattning snabbare (via feedback "You were incorrect, but you were sure") - uppmuntra coachen att läsa i manualen (via feedback "You were incorrect, and you were not sure")

Fördelar med tränings-läge, och certifikations-läge: Jag gillar idén att när coachen har kunnat svara rätt på alla frågor, kunna befästa kunskapen med hjälp av certifikations-läget, då coachen ska kunna få 100

FÖRSLAG ITERATION 4: designat för learning och självreflektion, och effektivitet Problemet nu, var att de tog certifikations-läget och inte fick 100

Tränings-läget behöver alltså förbättras, och vara säker på att coachen verkligen är redo för Certification.

Ett problem är att "Improve" endast upprepade frågor som varit inkorrekta, och inte upprepade gissningar som varit rätt. Det gjorde att en coach kunde få fel på Certification quiz, för att kunskapen inte var befäst. Så vill vi inte ha det. Därför föreslår jag följande förbättringar i Träningsläge:

Förbättringar Träningsläge: ta ett quiz, med "Are you sure?". Baserat på svar, låt frågor hamna i tre olika lådor: "Can't do", "Can do with effort" och "Can do effortlessly".

Låt coachen välja vilken typ av frågor de vill upprepa.

Frågor i "Can't do", är frågor som coachen ej vet svar på ännu (t.ex. om svarat fel). Frågor i "Can do with effort", har coachen ett hum om (gissat rätt, eller gått från fel till rätt). Frågor i "Can do effortlessly", har coachen rätt och den vet att den har rätt

Genom att ta en hög med frågor igen, flyttas de om till andra högar. Om du har fel på en "Can do effortlessly"-fråga, flyttas den tilllbaka till "Can't do" eller "Can do with effort". Om coachen igen har rätt på en "Can do effortlessly", blir coachen certified i just den frågan.

Frågor i "Certified", är frågor som coachen befäst genom att upprepat korrekt från "Can do effortlessly". De behöver inte upprepas. Coachen kan bli Certified i ett helt quiz, när den tar alla frågor som ligger i Certified. Då är den klar, och 100

Målet är alltså att i coachens egna tempo, flytta över frågor från "Can't do" till "Can do effortlessly" till "Certified". Så planerar jag bygga expertis som YoungDrive-coach.

Förbättringar Certifikationsläge: om coachen klarar det, ska coachen bli enormt glad. Guld, silver och brons-medaljer ska vara tydliga, och ljud kan förstärka storheten i att ha klarat det. Det ska synas på startskärmen, att du har fått stjärnor och blivit certifierad i ett topic.

Service design-insikter

SERVICE DESIGN Detta kapitel visar vilka insikter som har guidat mitt arbete med iteration 1, 2, 3 och 4.

ITERATION 1 & 3: What's it like being a coach? I iteration 1 fanns ingen digital ansats alls. Jag var i Tororo för att besvara "What's it like being a coach?". Upptäckte att vad det innebär att vara en bra YoungDrive-coach, är att kunna ha bra ungdoms-sessioner. För att ha bra ungdoms-sessioner, är din självkänsla och självförtroende enormt viktigt. Och det är inte alla coacher som har detta, och därför skiljer sig kvaliteten mycket, vilket Josefina upplever som en utmaning.

Jag började leta efter hur och var en coach-app kan underlätta. En aktivitet som alla coacher har gemensamt för lärande och avgörande för coachens framgång, är (1) coach-träningen (som jag redan visste var viktig), men framför allt (2) förberedelserna av en ungdomssession. Jag övertygade Josefina att vi skulle ha ett mycket fokus på (2) än hon tänkt. Medan Josefina kan vara inblandad i (1), kan en app vara extremt viktig i (2), upptäckte jag under mina fält-besök på ungdomssessioner och intervjuer med coacher och projektledare.

I Tororo iteration 1 kunde jag observera ungdomsbesöken, i Zambia iteration 2 kunde jag observera coach-träningen, och i iteration 3 i Tororo kunde jag observera förberedande av ungdoms-sessioner.

Därför fick app-utvecklingen för dessa iterationer ha dessa fokus. I iteration 1 fanns ingen digital ansats, men apparna Quizical och Duolingo testades för att få koll på coachernas tekniska förutsättningar. Resultatet blev att min app kan placera sig någonstans emellan i svårighetsgrad.

Iteration 2 gjordes en coach assessment quiz app, och iteration 3 utvecklades den till en coach learning quiz app. Dessa insikter guidade:

Iteration 1: Självförtroende = empowerment Enligt iteration 1 kom självförtroende ifrån att under ungdomstillfället kunna ha: Correct Information, Correct Structure, Time Management, och Fun Atmosphere. Det är alltså detta appen borde testa och träna.

Lösning: en coach-träningss-app hade störst behov av att fokusera på Correct Information, i andra hand Correct Structure och Time Management. Till iteration 2 kunde Josefina assessa Correct Information (lyckat), och till iteration 3 kunde coacherna lära sig CI (lyckat, men behöver göras mer effektivt). Till iteration 3 hade hon via ett "Are you ready?"-quiz även försökt använda multiple-choice-strukturen till att även assessa och träna Correct Structure och Time Management (ej särskilt effektivt sätt, testar Factual Remember, men ej högre Bloom).

Det finns en medvetenhet kring att CS, TM och Fun Atmosphere är lämpligast att testa efter en ungdomssession, men att vissa förberedelser kan göras i appen innan en session. Dessa är därför sekundära.

Iteration 2 och 3: Självkänsla = kunskap om dig själv, meta-kognition Under Iteration 2 i Zambia, passade jag på att fråga vad som byggde självkänsla. Följande kluster fanns: "I believe in myself" (3 personer), "I believe in God" (2 personer), men också "I am well prepared" (4 personer) och "I am certified" (1 person).

Till iteration 2, hade jag fokuserat på att assessa "I am well prepared" och då stärka självförtroende, med hänsyn till Correct Information.

I iteration 3 i Tororo, hade jag fokuserat på att bli "I am well prepared", och även byggt in "I am certified.". Det visar sig att de flesta inte bryr sig om "I am certified" (vilket ju undersökningen redan visade), men de bryr sig om lärande-

resultaten.

Under iteration 3, lärde jag mig att det tog för lång tid för coacher att nå 100

Iteration 4: Effektivitet = en förutsättning för att coacherna ska ha nytta av appen Anledningen till misslyckandet i iteration 3: dels för att CS och TM tydligen inte lämpar sig för multiple-choice (gör sådana övningar drag-and-drop-istället), men framför allt för att feedback-systemet och tränings-läget behöver vara mer medvetet i när en coach verkligen kan sitt ämne och är redo för sin ungdomssession. Du vill inte testa 100

2.6 Data Analysis Theory

2.6.1 General

How to measure effectiveness

Answering research question #2 was a matter of choosing how to measure effectiveness. After choosing what should be evaluated, there needs to be a careful balance between what should be understood via interviews with the target group, and data collection via the app. There are three main aspects that are interesting:

These ways of measuring the questions are subject to change.

- **How do users interact with the app?** (Usability) Do they want to use it more on a voluntary basis? *(Measure)* and determine why *(Interview and Measurement)*. "Did you feel you needed any support? Did the app help? Did you need to search for support elsewhere?"

- **What usability aspects are associated with using the app?** (Usability) Do they like it? Ask: Are they stimulated? If not, why? What didn't they like? *(Interview)* When can they use the app, and when are they not able to?

- **What learning outcomes are associated with using the app for the coaches?** (Learning of Entrepreneurial Knowledge)) How good are they at answering the questions? 1. *(Measure)* What percentage of the answers were correct/inorrect? 2. *(Interview)* Were the answers were correct/incorrect because of lack of knowledge or wrong formulated?

  Ask the teacher/country manager/project leader if they got valuable information. Ask: did it help them become a better teacher? Were the results trustworthy? *(Interview)*

  Do they want to improve their knowledge via the app? This can be measured via how many times they repeat a test, what material they are studying for (e.g. measuring active time spent reading each section).

Insert Josefina's quote here

2.6.2 Iteration #1

2.6.3 Iteration #2

2.6.4 Iteration #3

2.6.5 Iteration #4

Quantative data collection

This was the first time that the server could collect data. See previous section for how the data collection was done and processed.

Qualitative data collection

Every coach was divided into one or three groups, on random. In these groups, they were asked:

1. Why do you think you were correct or incorrect?
2. Do they like the app?
3. Are you stimulated by the app?
4. What did you like?
5. What did you not like?
6. When do you want to use the app?
7. When are you not able to use the app?

3

Result

In this chapter, the results are presented, so that in the next chapter, these results are analysed.

3.1 Developed Application

Here the results from the app for iteration 2, 3 and 4 are shown. Iteration 1 is missing, as the app development had not started.

3.1.1 Iteration #2

3.1.2 Iteration #3

3.1.3 Iteration #4

Show images of final app - on mobile, tablet and desktop?

3.2 Qualitative Data

Here the results from the qualitative data for iteration 1, 2, 3 and 4 are shown.

3.2.1 Iteration #1

3.2.2 Iteration #2

3.2.3 Iteration #3

3.2.4 Iteration #4

3.3 Quantitative Data

Here the results from the quantitative data for iteration 1, 2, 3 and 4 are shown.

3.3.1 Iteration #1

3.3.2 Iteration #2

3.3.3 Iteration #3

3.3.4 Iteration #4

3.4 Findings in Multi-Variable Data

In this section, the conclusions from the different group characteristics are presented.

First-hand observations (before the parallell coordinates) were that there was a strong corrolation between pre-quiz results and quiz 9 try 1 (slightly visible also in quiz 3 try 1, but with more outliers). Also, with manuals there was a higher probability to finishing quiz 9 training + certification.

3.4.1 Correlations

Youth mentor (brun), 6 st vs. CBT (blå), 14 st * Youth mentors has higher school level than CBT's * 1/6 Youth mentors had brought manual, compared with 8/14 CBT's * Only 1 CBT has above 2 (1 st 3) on School, while YM have (2st 0, 1 2st, 2 2st) * Inverse correlation: CBT old, YM young * There are no female Youth Mentors (i.e. 100% male Youth Mentors) * All of the YM's run their own businesses, compared with 5/10 for CBT's * Only CBT's said they didn't feel comfortable with smartphone (2 st) - because of age? * Seemingly no difference CBT vs. YM in when prepares for session * All YM prepares 2 times for session, while CBT can train also 3 or 1 time) * 13/14 CBT's gjorde quiz 3 try 1, 6/6 YM's * YM's och CBT's presterar lika på quiz 3 try 1 * CBT 6/14 st certifierade, YM 4/6 st

Quiz 9 (rött=CBT: * 6 CBT's gör ej Q9 try 1, 2 YM gör ej * YM är top performers på Q9 try 1 jämfört med CBT's * endast 1 YM klarade däremot träningen, medan

* YM's är bättre på quiz 9 try 1 än CBT's * Det är endast 1/7 som klarade quiz 9 training som är Youth Mentor * Antal försök man gjorde är likvärdigt, förutom en YM som hade 12 försök (och klarade quiz) * Det var endast 2 st som klarade certifieringen, och båda dessa var YM och kvinnliga

3.4.2 Women

It is clear from the data that women: * Have lower education level than the men * Spread results on the pre-test (probably because of school level) * Half of them are around 25 years old, half spread out (up until 45 years old) * 2/6 har eget företag * Det är bara 1 som ej preppar alls * 1 st som endast preppar 1 gång, alla andra preppar 2 gånger (3 st) eller 3 gånger (2 st) * Alla hade max 1 fel på quiz 3 på första försöket! * De som ej hade rätt, tog det bara 2:a (1 person) eller 3:e försöket (1 person)

* 3/6 gjorde certifieringen - kolla upp: började de?

* Alla förutom 1 tjej gjorde svåraste quizet. De hade minst 42%! Varav 2 st hade 67%, 1 hade 50, 1 hade 42, och 1 hade 83

* Quiz 9 tjejerna hade mycket högre lägstanivå () än killarna (, och mycket högre högstanivå än killarna () - tiden är jämförbar, med svag tendens snabbare tjejer * Av de som hade 50% på 1:a försöket, gick det betydligt snabbare för tjejerna än killarna att jobba igenom quizet - tyder på att tjejerna är säkrare på materialet än tjejerna - dessutom är det bara 2 killar som fick över 50% på första försöket * Om du kollar tvärtom, så är det bara 1 tjej som fick under 50% på första försöket, medan det var 8 killar * Quiz 3 syns ej lika tydlig skillnad (OBS: kolla vilken fråga de flesta hade fel på, och kolla om det skiljer sig mellan killar och tjejer) * Skolnivå verkar oberende på hur quizen blir, om man kollar quiz 9 * Tjejer, antal försök quiz 9 hade de 2 (2 st), 5 (2st, 12 (1st) försök innan de klarade - bland killarna var det 5 (1st) och 7 (1st). Men sedan så var det 0 av killarna som blev certified, men 2 tjejer (de som gjorde på 12 försök och 2 försäk). Att antal försök skiljde sig mellan 2 och 12, men ändå klarar det, berättar att antal försök kanske ej korrelerar. Den på 12 försök hade 70% på försök, och jobbade igen de 12 försöken väldigt snabbt. * Den andra tjejen som klarade certifikation quiz 9 klarade 83% försök 1, (hade tillgång till hjälp), klarade träningen sedan på 2 försök.

Slutsats: * Anställ bara tjejer. De har högre kunskap och förbereder sig mer, trots lägre skolutbildning.

3.4.3 Use of participant and coach manuals

Användande av appen: * Vi hittade ingen korrelation quiz-resultat 9 första försöket om man fick hjälp eller inte, antagligen pga att man ej använder manualen före

3.4.4 Certified quiz 9

Only two people were fast enough to get certified on the final quiz before the app evaluation ended.

Characteristics were: * Both of them used the manual * Both of them were CBT's, not youth mentors * Both were women * They were 24 or 26 years old * They had a good pre-test score (57% or 71%) * They had top scores (1st place and 2nd place (shared with one other)) on quiz 9 try 1 * They had high scores on quiz 3 try 1 (100% and 92% * They prepared many times per youth session (2 or 3 times)

What didn't seem to matter: * Number of tries quiz 9 (12 vs 2 on Q9) * Time to pass training quiz 9 (35.5, slowest vs 12 minutes, below average) * When day trained (1 trained same day, 1 trained the day before) * One had a business, one didn't * School level (1 S?, one S lower)

Other: * They were medium skilled on using a smartphone

4

Discussion

4.1 Discussion of method

4.1.1 Consequences of involving end users and stakeholders throughout the whole process

Product Benefit from involving users and stakeholders

Design thinking, human-centered design and service design, has been proven to be crucial for the success of this project. Service design thinking and methods, gave a framework to have all of these perspectives in balance and consideration, always with the end user as the most important person.

Support Benefit from inolving users and stakeholders

The fact that the end users and stakeholders has been involved from the start, made them feel ownership of the product. This has many benefits, among others that they *everyone* involved is satisfied with the *final* app, since they think that their opinions and expertise has been taken into consideration and implemented. This further increases trust, and the the likelihood of them supporting future work. Even more so, the end users are more likely to use the app, as they have been co-creators of the product.

Complications

I was not a designer. I was a computer expert with social skills, now needing to design and develop an app for a cultural and socio-economic context very different from my own.

In this regard, the technical aspect was but one. I *did* need to learn how to develop hybrid apps in JavaScript that worked offline, and had an online back-end. Those was the technical demands.

But more so, I needed to quickly become a good designer. Not mainly from a perspective of graphic design or interaction design, but *how* to explore, design, and implements what the user needs from the requirements "fun, user friendly, and good for learning". The approach to learn design from these perspective was to read extensive literature, consult a diverse set of experts, and be very humble and curious in interactions with the end-users and stakeholders.

This took me a long way, to the point where research, experiments, and constant improvements could lead to increasingly well-informed decisions.

I now have new-found skills in:

- etnologicy (getting to know and learn from people in a different culture)
- human-centered design
- design thinking
- service design thinking
- interaction design
- digital learning
- data analysis

It has placed high psychological pressure and leadership demands on me as a new designer, to:

- always be in charge of balancing all the different perspectives, with the end user's best in mind
- be able to change the planned process when new learnings or opportunities emerge (leading an agile design process)
- always implement new functionality from customer needs instead of designer or engineer bias
- continually design and run workshops and tests suitable for the target groups

The reason why this has been especially hard, is that simultaneously to learning design and technological skills, I have been in a different cultural setting than the designer is used to. This has also been extremely rewarding, at the same time exhausting.

4.2 Discussion of result

In three months time, an app was developed with precision to the needs and context of the end users. The design has been heavily influenced by the end users, from day 1 of the project, in conjunction with relevant research, and in balance to stakeholder goals and considerations, and supervisor advice.

The results shows that the ideal coach, according to the quiz app, would be a woman, since she has better knowledge in spite of having less formal education. She prepares more, is more aware of her own knowledge and has a better study technique, respecting the app feedback for meta-cognition and meta-memory. This can be seen by higher quiz results, faster learning, and more honesty in "Are you sure?".

It could be that first-time smartphone users have a disadvantage with the app, since they will not learn as fast as experienced users. The interactions shows however, that at the second session, almost all of the coaches felt intermediate instead of beginners, using the smartphone and the YoungDrive app. The quiz data verifies this, with no direct correlation between technical skills and quiz results.

The final version of the app shows users can get 100% on quiz results much faster that the previous version, where the score board had been improved. Since the target group in Zambia and Uganda was different, it is hard to say if it went faster getting 100% with the possibility of repeating only the wrong questions, asking "Are you sure?", and providing individual feedback. The qualitative study does show however, that 100% thought the feedback was good for learning, and that they appreciate the app.

5

Conclusion

In response to the research questions questions, the master thesis has:

Contributed to the domain entrepreneurship education

Lorum ipsum

Demonstrated how certain technical constraints and design constraints can be overcome in a developing world context

Lorum ipsum

Provided methods of investigating usability and learnings with a digital training tool in the real-world training context

Lorum ipsum

Created new methods in service design, when co-designing digital artefacts in a developing country context

Lorum ipsum

Appendix

A

Appendix 1

Detta är ett appendix-kapitel. Jämför med appendixet i kapitel 3.

A.1 Original Time Plan

A.1.1 Before Uganda

Week	Focus
2	Workshop with Lena Tibell and Konrad Schönborn on Research questions & Proposal of method.
3	Start writing "Planeringsrapport". Study interaction design via guest lecture Jonas Löwgren, and reading the book "Thoughtful Interaction Design".
4	Interview with Take Aanstoot, Social entrepreneur in Kenya. Submission "Planeringsrapport". Education day in Service design in Stockholm (by Expedition Mondial). Meet Joachim Svärdh about Entrepreneurship research.
5	Approval "Planeringsrapport" with Camilla Forsell. Meeting with Lena Tibell and Konrad Schönborn (2016-02-02). Travel to Uganda.

A.1.2 In Uganda

Times specified are in local time to where I am. Uganda time (EAT - Eastern Africa Time) is 2 hours forward of Swedish time (CET - Central European Time). Meetings with Swedish partners are generally done via Skype, where Uganda meetings are preferrably done in person.

Note that during all of this time, writing the master thesis will progress. After the time in Uganda, the report will be a 100% focus.

1 day per week will be spent on report writing, including Analysis work for the meetings.

Week	Focus
6	**Cultural adaption**. Land, set up wifi, set up my apartment, learn about the YoungDrive organization, meet people. Be prepared for stomach disease. Get familiar with the transportation system in Kampala. Get familiar with the city. **Iteration 1**. Prepare Iteration 1 with Iliana. Start-up meeting with partners. Start report writing: analyze, collect material, sort, structure and plan.
7	**Iteration 1**. Prepare Interactions. Analyze Start-up meeting with partners. Write on report. in order to create *Questionairee guide*. Understand technical tools, without working on an app solution - the goal is to get familiar with the tools.
8	**Iteration 1**. Travel for Interactions. Do 8 face-to-face interviews, with no digital focus, hypotethical situations. Do minimum 2 field visits to understand the coach's situation, ideally living in Kamuli or Tororo a couple of days. This is a good opportunity to learn coaches how the tables and smartphones work.
9	**Iteration 1**. Analysis & Compilation. Thursday: Expert meeting (March 3rd, 6-7 PM). Friday: Partner meeting (March 4th, 11-12 AM). **Iteration 2**. Determine Needs. Ideation. Create low-fi Trigger material (pen and paper) and determine what the hi-fi (digital app) material should be.
10	**Iteration 2**. Design and Develop the hi-fi trigger material. *Half-time check-up with examinator.*
11	**Iteration 2**. Interactions, control group #1 & #2.
12	**Iteration 2**. Interactions, control group #1 & #2.
13	**Vacation** with fiancee.
14	**Iteration 2**. *Analysis #2* (What choices needs to be made? What path should be taken? Start formulate Customer path. If needed, document how people see apps, document limitations, document experience needs, document risks.) & Compilation. Thursday: Expert meeting (April 7th, 4 PM). Friday: Partner meeting (April 8th, 11-12 AM). Continued Development Creative Brief. Determine what actions needs to be taken outside of the development of the app. Create Behovsgrupper.
15	**Iteration 3**. Develop and Modifications phase.
16	**Iteration 3**. Develop and Modifications phase. Interactions: App Tests with Interviews & Measurements (with time allocated for late arrivals and missing participants).
17	**Iteration 3**. Interactions: App Tests with Interviews & Measurements. Analysis & Compilation. Friday: Partner meeting (April 29th, 11 AM) & Expert meeting (April 29th, 4 PM).
18	**Final analysis**. Finalize the app. Travel back to Sweden.

A.1.3 After Uganda

Week	Focus
19	Write on Master thesis report. Attend Auscultations.
20	Write on Master thesis report. Attend Auscultations.
21	Write on Master thesis report. Attend Auscultations. Find opponent for Master thesis.
22	Submission of report to examinator, after approval by supervisor. Examinator decides on date and time for presentation. Send report to opponent, and get the opponent's report.

A.1.4 After Semester

Week	Focus
35	Presentation of my Master thesis, with supervisor, examinator and opponent. Hand over publication approval to the administrator.
36	Opposition of another person's Master thesis.
37	Do changes to report if requested. Upload report to X-sys for approval (within 10 days). Write Reflections document and submit on X-sys within the 10 days. Publish master thesis in X-sys.

A.2 Half-Time Evaluation Time Plan

Bibliography

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