Breaking the Innovational Standstill in Dutch Primary Education

Motivating teachers to learn and apply new educational methods

STIJN SMOOK

faqta • TU Delft

Supervised by Jacky Bourgeois Catelijne van Middelkoop

Abstract

Dutch primary school teachers are strapped for time currently, and this is impeding the adoption of innovation. This is also a problem for Faqta, who are trying to sell their innovative teaching method. To convince teachers to learn, several theories and strategies are explored in this report, and how they can be applied on a digital video learning platform, the Faqta Academy, to answer the question "How can primary school teachers be inspired & motivated to learn & apply new educational methods with the Faqta Academy?".

The three most effective strategies to convince and captivate teachers are Microlearning, Self-determination Theory and Gamification. Microlearning lowers the bar of entry, while gamification keeps the attention over a longer period of time. Application of self-determination theory makes sure that teachers can actually internalize the motivation to apply the learnt material, by promoting Autonomy, Competence and Relatedness.

This report explores how to apply these to Faqta's Academy by introducing several design strategies in a framework for motivation, and applies them to the Academy through a workflow. The highlights of this workflow are shown in Figure 1.

Keywords: *microlearning, e-learning, motivation, education, gamification, innovation adoption, autonomy, competence, relatedness, self-determination*

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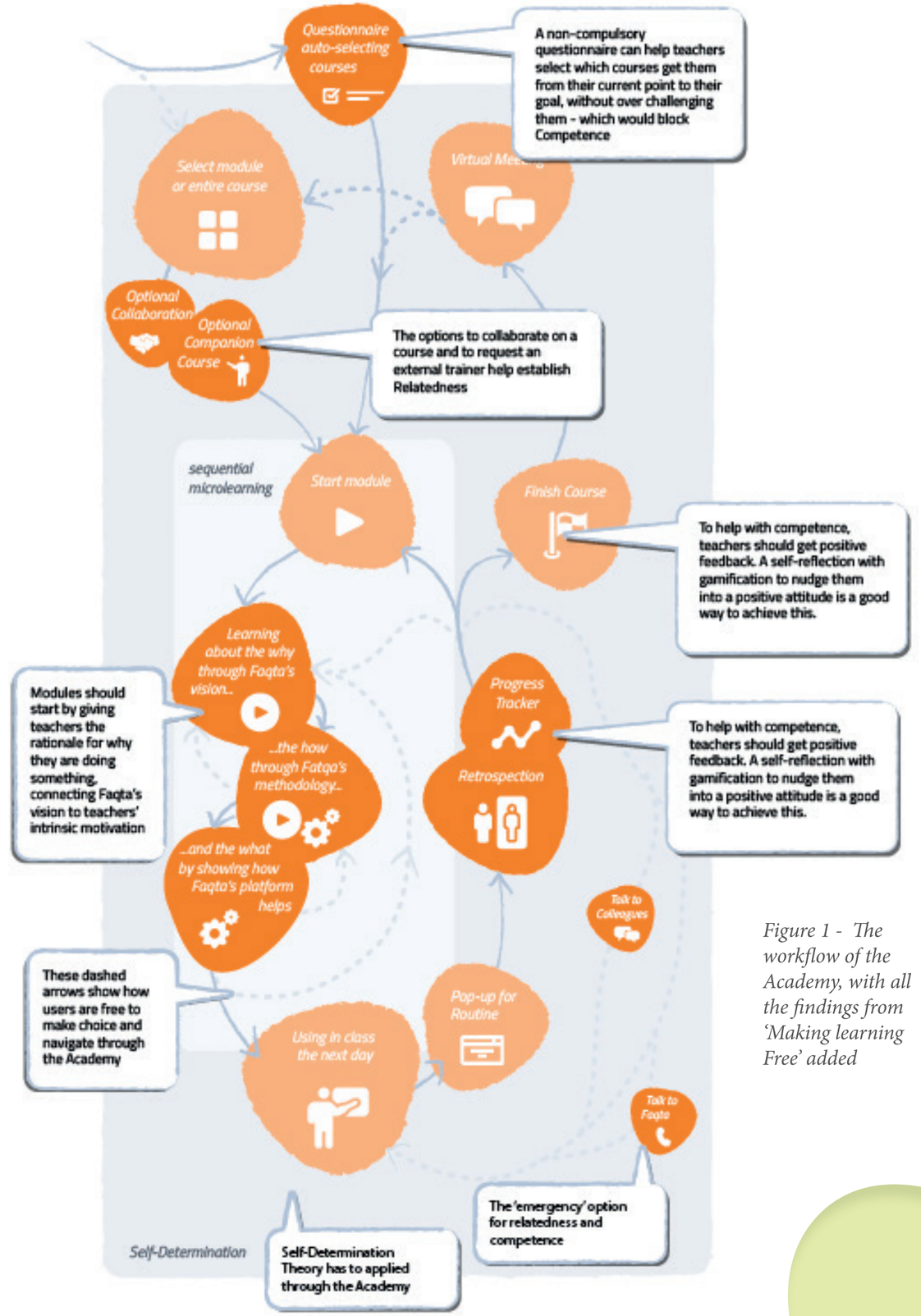


Figure 1 - The workflow of the Academy, with all the findings from 'Making learning Free' added

CONTENT

In this report you will first find the problem teachers and Faqta are facing, how the Academy might address those problems and what this project will try to achieve. In chapter 2, this project goal is addressed with three design strategies, and what findings lead to those strategies. This is then summarized and connected back to the project goal in chapter 3.

CHAPTER 1
THE PROBLEM

A description of the problem, the context of the problem, and the goal of this project

CHAPTER 2
A FRAMEWORK FOR MOTIVATION

The main content of the project: design strategies in context and what lead to those findings

CHAPTER 3
CONNECTING THE DOTS

The design summarized, connected together and connected back to the research goal

APPENDIX

CHAPTER 1
The Problem

An exploration of the problem and the context

Chapter 1.1

Introduction

Primary Education in the Netherlands is currently facing some serious problems. A combination of low salaries and high workload has made the career as primary school teacher unattractive to many. The secondary tasks are especially a burden, mostly in the form of administrative tasks. (Van der Linden, 2017).

This has several bad effects on teachers, schools, children and more, most importantly a negative impact on the quality of the education. (PO-Raad, 2019). But one of the effects that doesn't seem to be often discussed is the effect on innovation within the field of education. Because of the high workload, teachers simply don't have the time to educate themselves on the newest innovations. It might even be the number one barrier to adoption of innovation within education (Heick, 2012). In education, innovation already moves slowly. But the fact that teachers are overworked is not helping, if that means they don't have time to learn and improve their teaching.

Innovation is important. Innovations that could make a difference in a child's life could now get stuck on the drawing board. To give an extreme example: instead of an award winning medical research, this child could now become disillusioned with learning, all because their 5th grade teachers did not have the time or motivation to learn the newest teaching method.

This is also a problem for Faqta. Faqta is a small company developing an innovative education method for primary schools. This method is designed to be more fun and effective than traditional teaching, and is supported by an online platform that is designed specifically for this method.

With Faqta's method, the core information transfer is automated, mostly in the form of audiovisual media, with teachers taking on a more supportive role by coaching and creating enthusiasm for a subject. However, many teachers struggle to adapt to this new role, and fail to get the most out of Faqta's platform. This is especially a problem as Faqta has been moving past the early adopters into the early majority. Where the early adoption was a group of teachers willing to go above and beyond to use Faqta as effectively as possible, even learning in their free time, the later adopters are not as keen on learning (Roger, 2003).

Faqta has solved this by making it possible to use Faqta's platform in a more traditional manner. Teachers now have to invest less time in learning the platform as they can simply stick to their old ways of working. But of course, this is less than ideal.

In order to reach the maximum potential of Faqta's platform, teachers need to be educated on how to use Faqta's platform and method. But the high workload poses a big barrier here, as many teachers simply don't have enough time to educate themselves, or have a high apathy for training courses. For this reason, Faqta is developing an online training platform, the *Faqta Academy*. But now teachers need to be convinced to actually use this platform, despite of their already high workload. That is where this project comes in.

Chapter 1.2

Faqta & Project Context

To start off, let's take a look at the company that hosts this project, which will provide some critical context for this project itself, as well as the context in which the Faqta Academy needs to fit in, and even some design principles that ideally should be present in the Academy.

1.2.1 Core Beliefs & Brief History

At the core of Faqta lies its vision for the future for education. At Faqta's time of founding, in 2016, this vision was radically innovative. They have since adapted their vision to not only look at the needs of the children, but also at the actual consumer of the product, the teacher, but Faqta is still at the forefront of innovation in the market.

In Faqta's vision, teachers no longer need to spend most of their time working to transfer information, instead automating the information transfer using digital media. Most important of these media is video, which has a high potential to transfer knowledge based on various studies, (e.g. Kaltura, 2019, Mayer, 2005).

Teachers instead spent their time in two ways: as a Coach, and as what Faqta politely calls an Activator. Coaching means supporting students in their learning, where the automation fails to do so, such as providing clarification or more advanced knowledge. Being an Activator means that the teacher should stimulate enthusiasm, making the pupils excited to learn.

These beliefs should be translated into the Academy, but for a more mature audience. Implementing means of coaching and activation in the Academy will be an interesting challenge, as there is no clear teacher role in self-study, but using video for information transfer is easily done.

Summary

In Faqta's teaching method, teachers do not have to focus on knowledge transfer, which is done by video, but instead they can focus on 'activating' - creating enthusiasm, and 'coaching' - e.g. giving additional help to those that need it. Faqta translated these principles and more into a workflow called the Faqta Circle.

These are important to take into account and translate into a learning style fit for adults when designing the Faqta Academy.

1.2.2 The Faqta Circle

Of course, a company vision is nothing if not developed into an actual product. Faqta translated these principles into a workflow they call the Faqta Circle, accompanied by a symbiotic digital platform. In the Faqta Circle workflow, teachers go through a large theme over several weeks, with principles such as Activation & Coaching, as well as many other didactics integrated.

Analysing this workflow (as seen in Figure 2) is important, because part of this project is looking at how these principles can be transformed to fit the target audience, to help with recreating the enthusiasm that Faqta's method already awakes in children. So, in essence, this Faqta Circle is to be taken into account for the design of the Academy.

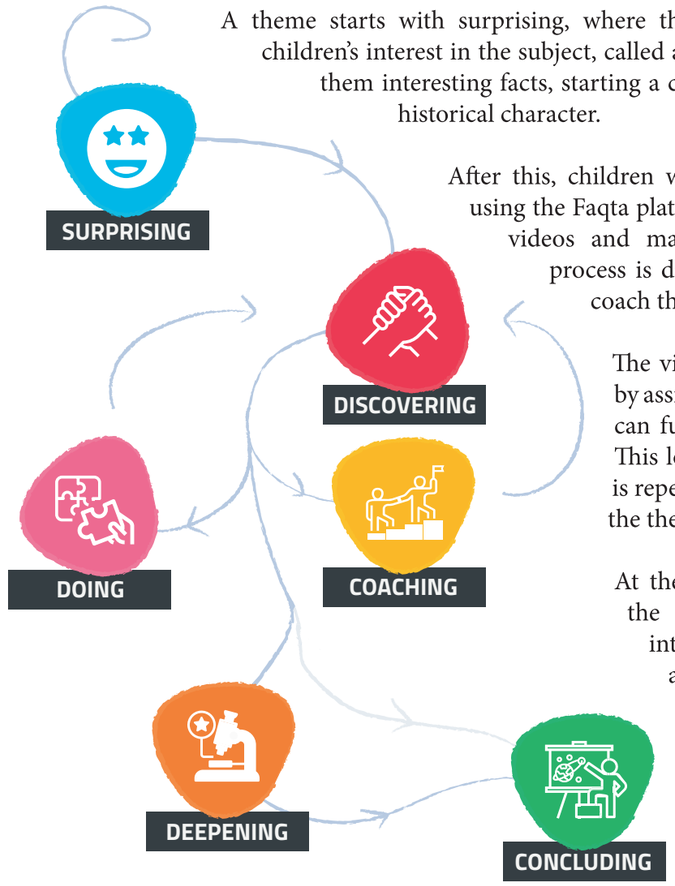


Figure 2 - The Faqta Circle, modified into a flowchart

A theme starts with surprising, where the teacher is tasked with peeking the children's interest in the subject, called a theme by Faqta, for example by giving them interesting facts, starting a class discussion, or by dressing up as an historical character.

After this, children will start learning through exploration, using the Faqta platform, where they can learn by watching videos and making small assignments. Ideally, this process is done in small groups while the teachers coach the students that need coaching.

The videos on the platform are accompanied by assignments in the do-book, where children can further digest the information by doing. This loop of discovering, coaching and doing is repeated over several weeks, until the end of the theme.

At the end of the theme, teachers may give the children the option to further dive into a topic, either by exploring a related advanced theme, on Faqta's platform called Faqta Talent, or by doing their own research.

In Faqta's vision, a theme is then concluded. If the children did their own research, they are asked to present their findings to the others, or the teacher can have a discussion with the whole class or anything else the teacher finds fitting to conclude with.

Figure 3 - An example from the do-book assignments (top), where children are tasked with creating a compas., and an example from the worksheets (bottom), where children need to answer a simple question.

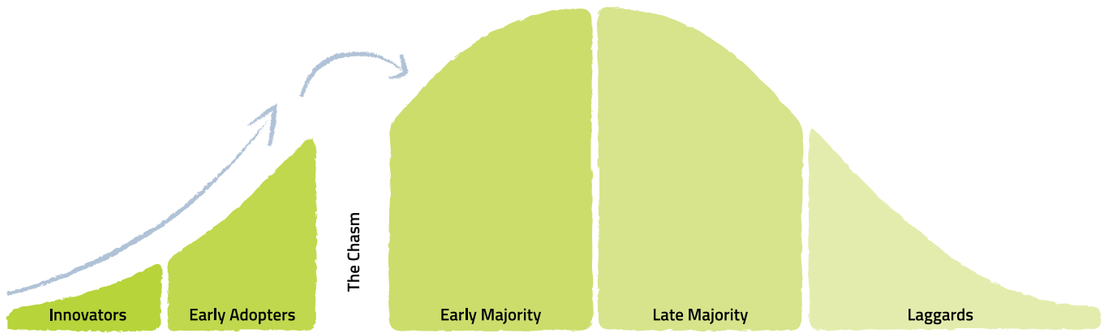


Figure 4 - Faqta has reached the Early Majority by reducing the innovativeness, jumping the so-called "Chasm"

1.2.3 The Circle in Practise

The Faqta Circle is how the platform was intended to be used, but many teachers also use the platform more like traditional education methods, with more whole-class teaching. Especially as Faqta has reached a broader audience, Faqta has noticed an increasing number of teachers using Faqta without applying Faqta's vision behind it's method. The early adopters, according to Roger's diffusion of innovation (2003), are willing to put more time into a product and look past its limitations. The early majority that Faqta now reached doesn't really want to take such time and effort to learn the ins and outs of Faqta's method, and a large portion of this group is instead using Faqta's platform like they always worked, without applying all the innovative and more effective vision and corresponding teaching methods.

Faqta has actually been developing its platform in recent years with this in mind, adding additional features specifically for teachers that want to use Faqta in a more old-fashioned way. For example, in Faqta's original vision there are assignments for children to further process the information they learnt. These 'do-book assignments' (Figure 3) are often fun, practical assignments, such as designing a house while keeping everything you just learned in mind. But for the more traditional teachers, these assignments are hard to assess, and too different from traditional assignments. This can be seen as incompatibility with previously adapted innovations, which indeed limits adoption of innovation (Roger, 2003). So for these teachers, Faqta designed a simpler alternative; worksheets with simple questions (Figure 3), to test how much knowledge the children retained.

There are a lot of other interesting details and examples that could be highlighted, but in reality most of it is of little relevance for the Faqta Academy. It mostly shows how the Faqta Academy can make a positive impact in communicating the vision and intentions of Faqta, and helping teachers learn and master the ideals of Faqta, so Faqta as an innovation can truly be adopted. Faqta's teaching methods are thoroughly thought out to be as effective as possible, with lots of the latest education innovations integrated into its vision. And when teachers share and apply Faqta's vision, children have a significantly higher learning efficiency, especially with competency-based assessment (Vreeswijk, 2020). The Academy can therefore really make an impact if it can convince teachers to believe and apply Faqta's vision and complementary vision.

It is also a cautionary tale: no matter how well you design the workflow, with the best intentions in mind, there will be people who want to use it in a different way and you could either punish them, or accommodate them. Later on in this report it will become clear that the latter is the best solution if I want to motivate teachers to use the Academy (see: *2.4.1 - "Imposed & Implied Control"*)

Summary

The real-world applicability of the Faqta Circle highlights the role the Academy could play

Figure 5 - The old and new Faqta interface design. In the new interface, there is a separate design for teachers, and a more intuitive workflow. The pastel cool blue base has been confirmed by teachers to be the ideal colour for the Academy, calming and clear.

1.2.4 Interface Design

By coincidence, Faqta is currently working on deploying a brand new interface, developed in cooperation with Studio Tast, located on the campus in TU Eindhoven. The old interface was a direct descendant from the original design from Faqta's inception, and had become bloated, and was poorly adapted to the needs of the teacher as was completely designed for the pupils. As an example of the aesthetics, the overview menu in the old and new interface can be seen in Figure 5.

The workflow and aesthetics of the new interface have been well thought out and thoroughly tested with teachers. The workflow of this new interface can be adapted to the Academy, to lower the learning curve. The aesthetics can be used as a basis for the visual design, as it has already been tested and validated with teachers. However, a clear distinction between the Academy and the regular platform can be considered too.

Summary

- Applying the newly designed interface can reduce the learning curve for users.
- The aesthetics are well grounded and validated, although a clear distinction can be considered too

Chapter 1.3

STAKEHOLDERS

Faqta as a company is the immediate context in which the project takes place, but the context is of course much broader than this. To get a feel of the entirety of the context, Figure 6 shows the stakeholders mapped out in accordance to their importance to the project, with a short description of how they could have a stake in the project.

Parents, children and society at large have an indirect stake in the project, as they are invested in the quality of education of the children. This project does not address that directly, but can help by boosting adoption of effective innovations, and if a possibility shows up to communicate this Faqta can consider doing so. On the other side, other companies also have an indirect stake in the project, such as external employees of Faqta, who are worried for their jobs.

Two stakeholders have a direct stake in the project: Faqta and Dutch primary school teachers. In Figure 6 these are split up into subcategories based on my research. Faqta is split up into its departments, while teachers are split into categories according to Roger's model for innovation adoption (2003). As for why I split teachers this way: I already described how the Academy might address adoption of innovation, but I will elaborate on this further in *1.5.2 - "Academy Goal"*.

Faqta has been sufficiently explored in the previous subchapter, so let us now take a look at the teachers.

Figure 6 - Expected stakeholders interests in the Academy

Chapter 1.4

USER RESEARCH

To design something for teachers, I first needed to know more about this target audience. To that end, several interviews were conducted. The aim of the user research was to find out what a typical workday for primary school teachers in the Netherlands looks like, what motivates them in their work, how they deal with change and what the enablers and barriers to participate in training courses are for them.

The timing of the user research was slightly unfortunate. Due to the Covid-19 pandemic, research was limited mostly to online communication. While this limited the options for research methods, interviews also proved to be quite effective at gauging the inner motivations of teachers. Teachers seemingly were knowledgeable on their own motivations and were open to share them.

1.4.1 The Typical Workday

First, to provide context into why teachers have such a high workload and to help explain why teachers might struggle to find time to learn, here is a description of how a day of a Dutch primary school teacher might look like.

Teachers start the day by preparing the day's activities. Materials need to be ready to use, teachers need to run through lesson preparation made the previous day again, teachers need to think which kids will need additional instructions, care, attention, guidance and/or intellectual challenge. Teachers need to discuss with the teacher assistant what they are going to do today, and they might need to discuss with an intern.

Once the kids arrive, "klassenmanagement" - class management - has to be in order, as during the school day, their entire attention is to be focussed on the children. Unlike higher education, children need consistent attention and guidance, so there is definitely no time to learn during the school day itself. In the breaks, teachers need to go through the next lessons again, and discuss with colleagues, teachers assistants and perhaps the intern.

After the school has ended, more meetings are in order, with parents and children to discuss the children's progress and behaviour, with colleagues to discuss school and class policy, with the other teacher running their class to discuss the handover… Teachers need to grade and assess assignments and tests. Then administration: they need to write down how each child is progressing, what worries them in this progress, if they need more attention or special care or more challenges, whether they got that, how that went. The grades need to be collected… are there any weird outliers in the grades? Why might that outlier be there? It all needs to be documented.

It is also time to prepare the lessons for the next day. Teachers need to go through all the subjects, what they need to say and teach in those lessons, they might need to collect art & craft materials, prepare assignments, print worksheets… Of course, depending on the teaching method used, this might differ slightly, as with Faqta the transfer of knowledge is automated. But still there is a lot to prepare.

By the time the day has ended, teachers are completely out of energy. And the next day it starts again. Seeing this shows why teachers might have too little time to educate themselves, and how this project could make a difference.

Figure 7 - Teacher Motivation in work and personal development

Summary

The most important finding in this subchapter is the list of enablers and blockers for motivation in teachers in Figure 7, which is essential to be taken into account in the design for the Academy.

Additionally, the viability of the Academy could be reached by tapping into the funds schools have for training purposes, or by providing more benefits to the existing subscription the deter schools from switching.

1.4.2 Motivations

To find teachers' motivations, I asked several teachers about what motivates them in their work, what originally inspired them to start a career in primary education and what inspires them to do self-improvement and/or training courses.

As seen in Figure 7, the most important motivation for primary school teachers is working with children, and helping develop into functioning and kind adults. All interviewees mentioned that they are in some way motivated in their work because it allows them to help children. E.g. by helping them become happier, kinder, more successful, more knowledgeable…

In self-development, lack of time is an important barrier to committing time and effort, with several teachers stating they never do training courses, as they indicated they simply have no time for it in their full time employment. Furthermore, teachers indicated that small and easily applicable changes in their way of working were often more viable to apply than sweeping changes. The reverse is also true: training coaches trying to get teachers to change their way of working completely in one go will get many teachers to disconnect from the course.

1.4.3 Dealing with Change

To see how teachers deal with change, I asked about changes they noticed in their work and how they feel about those, and how switching education methods impacts them and the children. The aim of this was to see how the Academy can help facilitate change optimally, and what troubles can be avoided. In the end this did not lead to any major insights into the effects of change for teachers, but it did provide me with some clues to add viability to the design of the Academy

Primary schools' finances are made out of several small pools of money designated for different purposes. Dutch Primary schools have a small, very rigid budget that has been split into several pools of money for very specific purposes. There is some money available to pay for teaching methods, which in Faqta's case is in the form of a subscription service. In comparison, traditionally, every 10 years the books are replaced. However, with a digital method this is no longer entirely necessary. The Academy might help provide incentive for schools to stick with Faqta. There is also money available for training purposes, which can be used as a source of revenue for the Academy.

Chapter 1.5

the FAQTA ACADEMY

This brings us to the actual Faqta Academy. Again, the Faqta Academy was envisioned to help users understand and apply more advanced topics, such as the theory behind Faqta, ideally by using the ideals and theories of Faqta but translated for the target audience. It is almost comically self-aware: using the Faqta ideals, teach teachers the Faqta ideals.

1.5.1 Academy Design

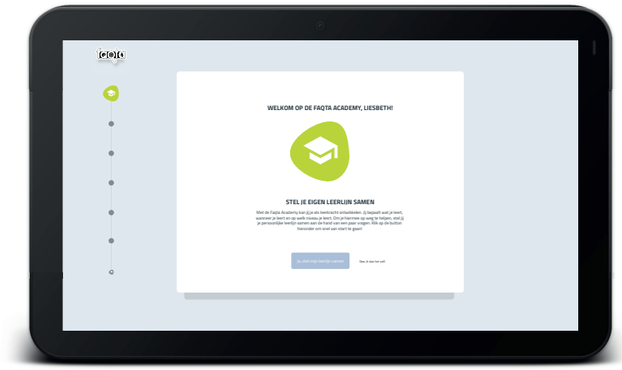
Faqta has only recently begun seriously working on the Academy, taking it from an idea to a design. Another student, van Gessel, has been working on setting up the basic interface for the Academy. This interface is only the bare-bones design, where users will be able to navigate the content of the Academy and select courses to put in a queue.

As of yet, the education material for the Academy has yet to be designed. This will make testing of prototypes with users more difficult, as real examples cannot be used in the Academy. However, it is also a big opportunity, as this gives more design freedom in determining the make-up of the content.

As for van Gessel's design for the Academy, it can be carefully used in this project. Using it as a basis will make it possible to focus much more on the actual goal of the project, creating enthusiasm within teachers, without focusing too much on the design of the context. Using it as a basis also has the potential to speed up prototyping. It can also lower testing requirements because van Gessel is already working on validating the intuitiveness and interface design. Lastly, creating a design that is compatible with van Gessel's design will create additional value for Faqta, as with incompatible projects they would have to choose. However, relying solely on van Gessel's design will limit the solution space severely, so I will attempt but not stricktly limit myself to remain compitable with van Gessel's design.

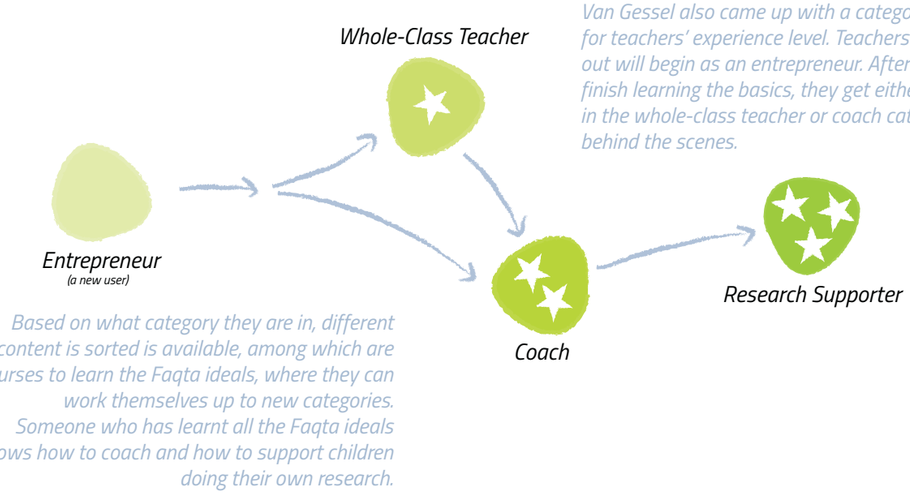
Summary

Another student is working on a framework for the interface, which can be considered in this project to increase value for Faqta, and additionally can carefully be used as a basis to speed up prototyping.



In van Gessel's design, first time users opening the Academy will have to answer a short questionaire. In her research, she found that users need different training depending on a few factors, such as the grade they teach and their experience level.

Based on the questionaire, courses will be automatically put in the queue for them



Van Gessel also came up with a categorization for teachers' experience level. Teachers starting out will begin as an entrepreneur. After they finish learning the basics, they get either sorted in the whole-class teacher or coach category behind the scenes.

Based on what category they are in, different content is sorted is available, among which are courses to learn the Faqta ideals, where they can work themselves up to new categories. Someone who has learnt all the Faqta ideals knows how to coach and how to support children doing their own research.

After the questionaire, teachers unlock the basics interface. Using the menu on the left, they can navigate to the queue, the entire catalogue of courses and something called the community.

Van Gessel is still working on the details of this part of the interface, which will be filled during the 20 week timespan of this project.

Figure 8 - Van Gessel's design for the Academy

1.5.2 Academy Goal

What's most apparent when looking at the Academy is how little there is beyond a concept in its infancy. There are several ideas floating around for what the Academy could be, and there are several reasons why Faqta is looking to develop the Academy. Firstly, as mentioned in *1.2.3 - "The Circle in Practise"*, one of the main reasons Faqta started working on the Academy is to help communicate its vision & intent to a growing group of customers who are not working with Faqta as envisioned & intended. Yet Faqta has been working to make it possible for this group of users to keep using Faqta, somewhat circumventing this problem. Still, it is not the ideal solution as using Faqta's vision to teach is more effective than more traditional whole-class teaching (Vreeswijk, 2020). Yes, Faqta's platform does already deliver several innovations, such as the use of video in lessons and the automation of assessment. But the methodology that the platform was designed with also incorporates much more innovations, which according to Vreeswijk's study is at least part of the reason why Faqta reaches a higher learning efficiency than traditional methods of teaching.

On the other hand, it is important to note that Faqta itself is not entirely certain anymore whether it is really necessary to tell and sell its vision, as the circumvention of the problem seems to work. I would argue that, yes it is critical to sell the vision better. Looking at Sinek's theory on the golden circle (2011), the most successful companies don't sell the what, they sell the why. Of course this is not black and white, and companies should also communicate the what depending on the time and situation, according to Teunissen (2018). The Academy is a perfect opportunity to communicate the why (the vision) and the how (the methodology), instead of selling the what (the platform). Faqta could also let go of its vision, but seeing how the vision helped Faqta reach its current position, that's seems like a poor decision.

But there is another reason Faqta contrived the academy, which now might even be the main reason. This second reason to build the Academy is to expand upon the on-boarding process. The on-boarding is the process schools go through when starting with Faqta, starting when they are weighing the options, and ending after the school has closed the deal and has completed all the requested training procedures. This process is intended to help teachers in the transfer process from the old teaching method to Faqta.

1.5.3 The On-Boarding Process

In general, when a school is considering replacing one of their school methods, they set up a small committee that thoroughly researched the options, after which an option is picked, often by the whole team. If they pick Faqta, Faqta often organizes an afternoon training session to help prepare the team for how Faqta works.

The problem is that for most teachers, this afternoon is the primary source of all knowledge on Faqta. One of the trainers of these so-called implementation courses explained that the majority of this afternoon is not even spent explaining how Faqta methodology works, but mostly calming down teachers that are afraid of change. The problem is even worse for teachers that miss the implementation training, as they have to rely on digital resources, as seen in Figure 9. The problem with the digital on-boarding is that it is boring, and only 2% of users even look at them, according to Faqta.

I noticed the sub par on-boarding process is also likely related to the growing group of teachers using Faqta's platform without applying Faqta's methodology. Because the on-boarding process is lacking, many teachers don't have the possibility to learn more about Faqta's vision, resulting in a growing group of teachers that want to use Faqta in their own, slightly old-fashioned way.

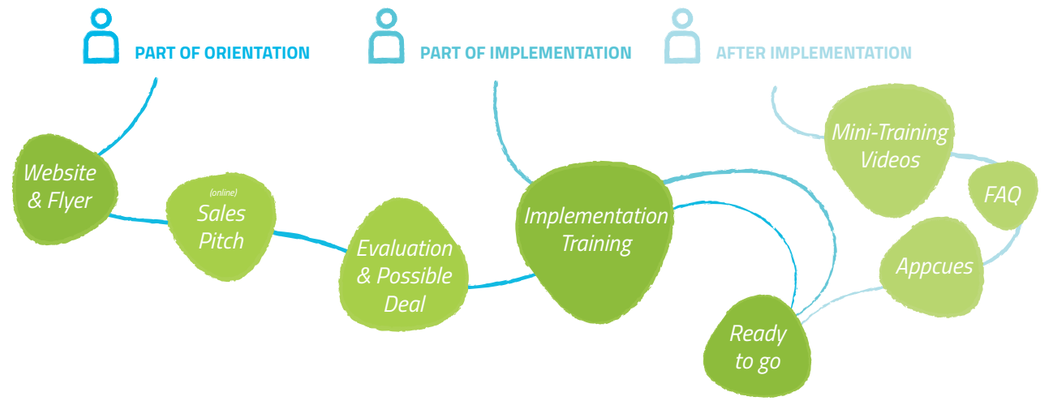


Figure 9 - The current on-boarding process, from the perspective of users in different stages

Based on some of my interviews with school administrators it appears that, whereas the innovators and early adopters choose Faqta because it aligns with their clear innovative vision, Faqta's newer customers consist of schools that have a less defined vision. According to Roger (2003), this early majority want to follow in the footsteps of the early majority, but are not willing to put in as much effort. So where innovators and early adopters were willing to put their own work into implementing Faqta, the early majority Faqta now reached is not willing to go above and beyond to implement the vision. And it becomes even clearer how hard it is for Faqta to convince their newest customers when looking at the makeup of schools.

Schools are not individuals, but organizations. In Rogers Diffusion of Innovation, Roger explains that while it is hard to determine what influences innovation adoption in organizations, there are a few key pointers that can help explain why some organizations are more innovative than others. The one that seems to play a

key role in Dutch primary school's innovation adoption is interconnectedness. Faqta organizes their customers in several categories. When speaking with teachers from the so-called innovative schools, often Faqta's oldest customers, I got the idea that the teams in these schools are often closely connected, whereas the newer customers were often less interconnected. In the early majority, the school leaders might have a clear vision, but this vision is often not as clearly defined and not shared among all teachers in these schools.

The teams of innovative schools seem to make a collective innovation-decision, deciding as a team to adopt Faqta. Whereas newer customers more often make optional innovation-decisions, where every teacher of the school decides for themselves whether to truly embrace Faqta as an innovation, or to reject it. The Academy could be a way to help reach these individual members to convince them to embrace Faqta, by explaining how Faqta's vision works, how Faqta's methodology works and ultimately convince these individual teachers to embrace Faqta as an innovation.

In Roger's model, the Academy would then fit within the 'clarifying' stage of innovation adoption. The current on-boarding process seems to help schools with the earlier steps in adoption within organizations. First, Faqta helps with the agenda-setting process - when schools go looking for options, they come across the website which already explains what Faqta does and how it helps schools. Then, the matching process starts when the committee in charge of researching the various new methods they can purchase contacts Faqta. Faqta hosts several meetings with the committee where they help analyse how Faqta can fit in with the problems and goals of the schools. Presuming that the school makes a decision, the three stages of implementation start.

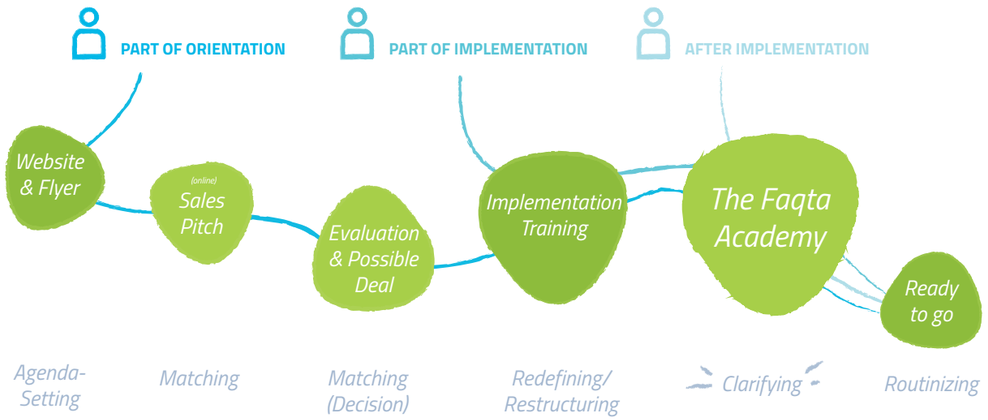


Figure 11 - Matching the on-boarding process to stages of adoption for institutions in Roger's model

Faqta helps with this process only with the implementation course, the one afternoon session mentioned before. This falls within the short phase of 'redefining/restructuring', which according to Roger "occurs when the innovation is re-invented to accommodate the organization needs and structure and when the organization's structure is modified to fit with the innovation" (2003).

It is only natural to look at the next phase in Roger's model for inspiration for how the Academy can fit within this process. This stage is 'clarifying', which "occurs as the innovation is put into more widespread use in an organization, so that the new idea gradually becomes clearer to the organization's members." (Roger, 2003). In other words, this is exactly what the current on-boarding process seems to be lacking: a tool which schools can use to help explain Faqta to all teachers, to help convince teachers of the importance of Faqta's innovative vision and methodology.

Roger does have some things to say on how the clarifying phase should go, and some pitfalls to avoid, which are of course important to take into account if the Academy is to help with the clarifying stage. The most important pitfall to avoid is that the clarifying stage should not be rushed. In the example Roger gives, a rushed implementation led to large numbers of individuals rejecting the innovation and ultimately the innovation had to be abandoned, despite the actual numbers indicating a massive success. In the clarifying stage, all members of schools should slowly be introduced to Faqta's method, how it works, how it affects them and how it affects the school. These are the questions to answer, and the Academy can be there to help answer them.

1.5.4 Academy Vision

So, to summarize the reason the Academy exists, the Academy was contrived by Faqta for two main reasons. To expand on the on-boarding process, and to help communicate its vision to new customers. But, as I explained, these are clearly connected. When I put them together, it becomes clear that the Academy is there to expand on the on-boarding process, to help deliver Faqta's vision and methodology to a growing group of teachers who are not willing to research this themselves, and to help schools in the process of implementing Faqta as an innovation.

This is what the Academy should be for Faqta, a tool to help teachers truly adopt the whole of Faqta as an innovation and not just its platform as a tool. Yes, the platform does already have several innovations incorporated, as Faqta might argue, but there is more innovation within Faqta and to make sure the entirety of Faqta's innovative vision and methodology reaches the teachers the Academy should be there to communicate this.

Summary

As Faqta is moving beyond the early adopters, they reach the early majority who are no longer willing to put their time and effort into researching Faqta's vision and methodology for themselves. In the vision for the Academy I described, the Faqta Academy should expand upon Faqta's on-boarding process, the process all starting customers go through, to help deliver Faqta's vision and methodology to these customers.

Chapter 1.6

DESIGN GOAL

At this point, both the problem and the context should be sufficiently clear. And now that the previous subchapter established something resembling a goal/vision for the Academy, it is time to explain what this project will add to the table.

The establishment of some sort of vision for the Academy is already a good first step, and this vision should already be valuable to Faqta. But notice how there is clearly an obstacle in the way that needs to be addressed in order for the Academy to actually work, and that obstacle lies within the target audience. As mentioned in the previous chapter, Faqta is clearly moving into the early adopters when looking at Roger's model for adoption of innovations (2003). And something that defines this step is that this group is not willing to look past the flaws of the innovation. Furthermore, this group's "innovation-decision period is relatively longer than that of the innovators and early adopters" (Roger, 2003). They are more risk-averse, and therefore less willing to put time and effort into adoption of innovation that may ultimately fail. This problem will be even worse for future customers, as the late adopters and laggards are even more risk-averse and hesitant to commit time and resources into adoption.

As mentioned, Faqta circumvented this problem for their platform by lowering the effort costs. They made it possible for new users to use Faqta without changing their way of teaching, without truly adopting Faqta as an innovation. But if the Academy is going to change that, and help teachers to actually learn the ins and outs of Faqta's vision and methodology, how is the Academy going to convince these people to take time and effort to use the Academy? That lead to the main question of this project:

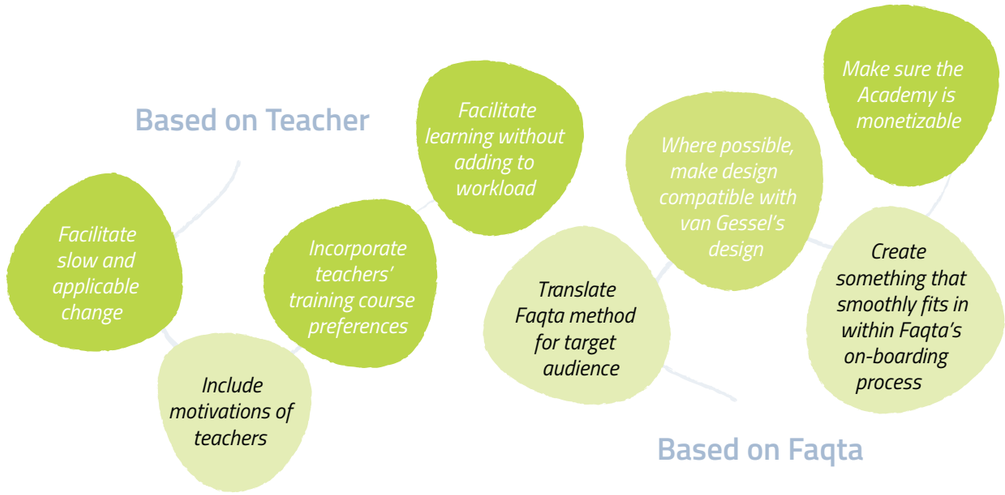


Figure 12 - Design scope, goals, solution space and considerations.

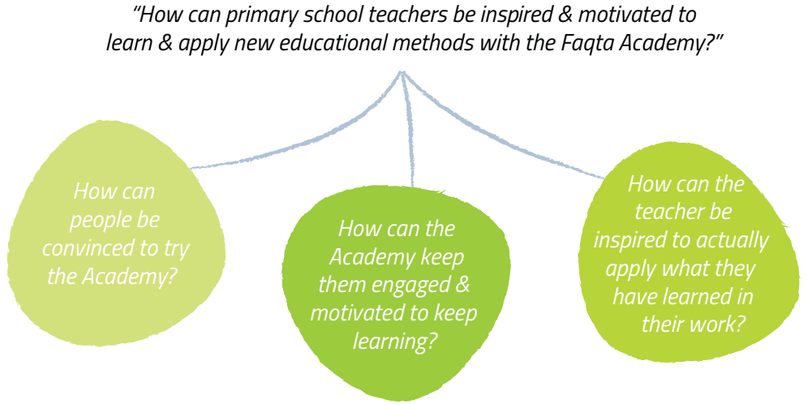


Figure 13 - Main research question and three subquestions.

"How can primary school teachers be inspired & motivated to learn & apply new educational methods with the Faqta Academy?"

While the actual facilitation of education is being explored by van Gessel's efforts to design an interface, I research how the Academy would convince people to try it, to use it, and to apply what they've learned, with actual facilitation becoming more a boundary condition. These three angles to the main question are actually the driving force of this report, as seen in Figure 13. How can people be convinced to try the Academy? How can the Academy keep them engaged & motivated to keep learning? And how can the teacher be inspired to actually apply what they have learned in their work?

You might notice that these are ambitious and very broad research goals. But this was necessary for two reasons. Firstly, the vision as described in the previous subchapter was not at all defined when I started working on this project, and the broadness of the main research question is what allowed me to explore what the Academy *could* be, to help narrow down what the Academy *should* be. A second reason for the broadness of the scope of the research question is that the Academy is still in its infancy. There is nothing but the basis for an interface as van Gessel designed, and some problems the Academy could address. The main question addresses a lot of problems that need to be solved for the Academy to be a success, and while that does not allow me to thoroughly explore in depth, it does allow me to set up a framework for how the Academy should be designed, what needs to be there and what needs to be researched & detailed more in the future.

Still, to help narrow down the scope, I crafted the contextual insights together with the subquestions. These together formed some broad design goals and considerations that were used in the coming chapter as a guide for approaching this broad topic, as seen in Figure 12. These were not used as strict limitations, but more as guidelines during research and ideation, to help guide the research along the wishes and requirements of the various stakeholders.

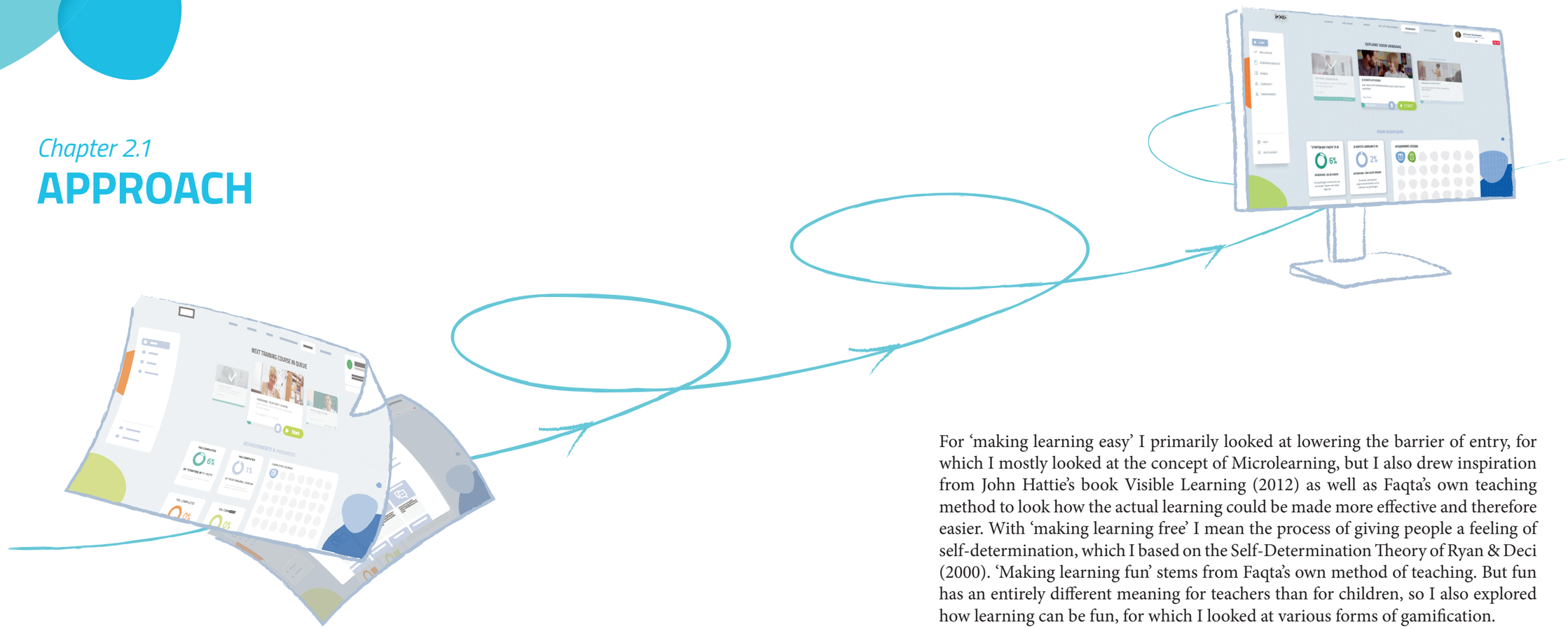
CHAPTER 2

A Framework for Motivation

Approaching the Problem

Chapter 2.1

APPROACH



Now it is finally time to actually address the main question - "how can primary school teachers be inspired & motivated to learn & apply new educational methods with the Faqta Academy". To do this, I went through a lengthy iterative process, alternating between researching, ideation and prototyping, which together took up the majority of the time spent on this project.

In this process, I explored the three angels mentioned just before, as seen in Figure 13 on page 29. I explored ways to approach these problems, rejected most of them but dived deeper into some of them to discover how they could and should be implemented. In the end, I discovered three ways of approaching the problem that I deemed to have the most potential when looking at the problem and the target audience. These I branded 'making learning easy', 'making learning free', and 'making learning fun'. All of them address the subquestions to various degrees and together they build up to a framework that can be used in the Academy to build the motivation necessary to convince teachers not only to try and use the Academy, but also to believe and apply what they learn within the Academy.

For 'making learning easy' I primarily looked at lowering the barrier of entry, for which I mostly looked at the concept of Microlearning, but I also drew inspiration from John Hattie's book Visible Learning (2012) as well as Faqta's own teaching method to look how the actual learning could be made more effective and therefore easier. With 'making learning free' I mean the process of giving people a feeling of self-determination, which I based on the Self-Determination Theory of Ryan & Deci (2000). 'Making learning fun' stems from Faqta's own method of teaching. But fun has an entirely different meaning for teachers than for children, so I also explored how learning can be fun, for which I looked at various forms of gamification.

As mentioned I also have looked at various other ways to approach the problems, but along the way I dropped these either because I discovered that these were not right for the target audience, because they seemed to be ineffective, or because I discovered that they were not worth my limited time. For example, I early on stopped researching how to market the Academy because Faqta already has a quality sales team and thus I decided to focus on things Faqta has less expertise in.

In the coming subchapters I will explore the three angles - easy, free & fun - how previous studies have approached them and how I have expanded on that research and adapted it for the Academy.

Summary

To motivate the teachers I have explored three ways of approaching the problem - making learning easy, making learning free and making learning fun.

Chapter 2.2

SELF-DETERMINATION

Before I can explain the actual design strategies I designed for the Academy, I first need to explain Self-Determination Theory. This is because this theory is applicable to every aspect of the Academy, and I later discovered that it even *needs* to be applied everywhere in the Academy. So before I can explain any aspect of the Academy, I first need to explain what Self-Determination Theory is, and why it is so important for the Academy.

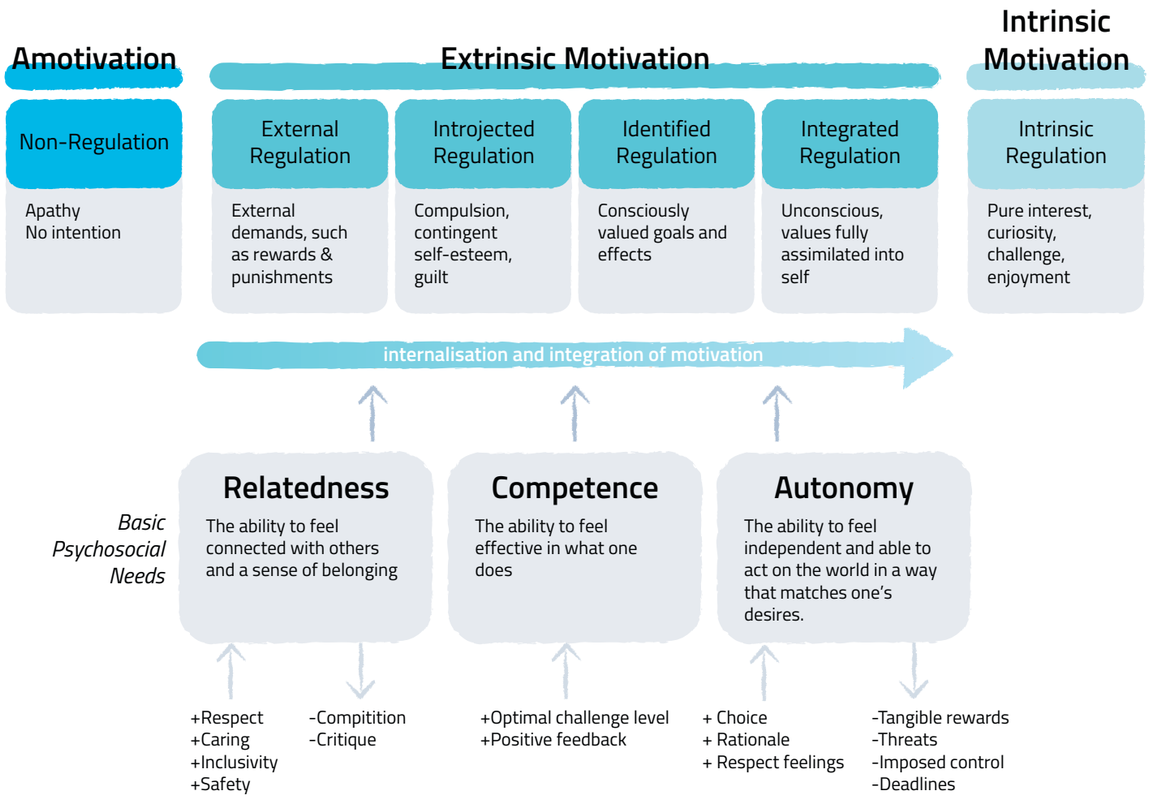


Figure 14 - Factors influencing internalization, that also are required for intrinsic motivation. Below several ways of impacting these factors are shown, based on Ryan & Deci's research.

Self-Determination Theory, by Ryan & Deci (2000), is one of the most widely accepted theories for motivation within psychology. It does not describe how motivation works in itself, but what factors can be used to manipulate people's motivation.

According to Ryan & Deci, there are two types of motivation, extrinsic and intrinsic. Intrinsic motivation is "the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, 2000). According to Self-Determination Theory there are three basic psychosocial needs that need to facilitate intrinsic motivation: autonomy, competence and relatedness, as seen in Figure 14.

However, "much of what people do is not, strictly speaking, intrinsically motivated, especially after early childhood when the freedom to be intrinsically motivated is increasingly curtailed by social pressures to do activities that are not interesting and to assume a variety of new responsibilities" (Ryan & La Guardia, 2000). This is likely also the case for Dutch primary school teachers. While I would personally hope most teachers would actually find intrinsic motivation to learn more about their job, at various points during my research teachers mentioned how some colleagues have lost their love for the job, and it is likely that these teachers will not find intrinsic motivation in their job anymore.

Luckily, Ryan & Deci also address this. In an earlier study they argue that external motivation can be divided into a scale of different types of regulation. As seen in Figure 14, closest to intrinsic motivation lies integrated regulation, meaning the person in question is motivated because they subconsciously value the outcome. On the other end of the spectrum lies external regulation, meaning that the motivation is regulated through external rewards and/or punishment, such as a salary. (Deci & Ryan, 1985).

In Self-Determination Theory, Ryan & Deci argue the same three factors that facilitate intrinsic motivation are also the factors that facilitate internalization of extrinsic motivation. Internalization in this case means to move the regulation of extrinsic motivation along the scale towards integrated regulation. Ryan & Deci name numerous positive effects of internalization, linking the many studies on the topic. As an example they use a 1989 study by Ryan & Conell, which discovered that as students internalized regulation, they took more effort and responsibility for their own learning, and got more enjoyment out of doing so.

As people internalize regulation, they start doing things because they truly believe in doing them, not because they continuously calculate that the outcome is positive (identified regulation), not because otherwise they would feel guilty (introjected regulation), and not because they think they might be fired (external regulation).

And facilitation of internalization is important for the Academy. If Faqta's vision is to be actually believed and truthfully applied, teachers need to be able to believe them, and to do that, they need to internalize their motivation to apply Faqta's vision & methodology. So to answer the subquestion "How can the teacher be inspired to actually apply what they have learned in their work?" Self-Determination Theory needs to be applied to the Academy.

And for that, we need to look at Autonomy, Competence & Relatedness. And, yes, some teachers will have intrinsic motivation to learn, and won't require internalization of regulation. But the same three factors need to be satisfied to prevent the Academy from undermining the intrinsic motivation. And if motivation is the main goal of this project, it would be unwise to do so.

So that is why Self-Determination Theory is important to the Academy. Ryan & Deci also gave a few pointers how to facilitate Autonomy, Competence & Relatedness, as seen in Figure 14, but I will explore these later (see Chapter 2.3).

Summary

Self-Determination Theory is a theory by Ryan & Deci on how motivation can be classified in multiple categories. Intrinsic motivation is the motivation to learn. Extrinsic motivation can be split into multiple categories, ranging from external regulation (doing something because of rewards/punishments) to internal regulation (doing something because you unconsciously value it).

The Academy is there to communicate a vision and methodology and in order for teachers to apply it, internal regulation is the best fit. To help facilitate both intrinsic motivation and internalization of extrinsic motivation, three factors need to be kept in mind: Autonomy, Competence and Relatedness (Ryan & Deci, 2012)

Chapter 2.3

MAKING IT EASY

Under the banner 'making learning easy' I looked at various design strategies for the Academy. These are mostly based on the needs & wishes of the target audience, Dutch primary school teachers. One of the first things I looked at was solving one of the biggest barriers that prevents teachers from being able to try the Academy. As discussed in *1.4.2 - "Motivations"*, that is the high workload and therefore lack of time.

Researching how to overcome this barrier, I stumbled upon a relatively new concept of Microlearning. Microlearning has no formal definition, but it can roughly be described as an e-learning method where the learning material is split into bite-sized chunks, transferred to the learner using short videos. It is already quite common in corporate environments for training purposes, as well as in freely available online education videos, and in several gamified learning apps. But within Dutch primary education it is not at all established yet. For example, take E-Wise, one of the bigger suppliers of e-learning within the market. They offer online training courses mostly within the range of 1 to 3 hours. In comparison, microlearning content is typically up to 15 minutes (Hug, Lindner & Bruck, 2006, p192).

I theorized how a 15 minute time slot is far easier to fit with a busy schedule, and therefore might be a lot easier for teachers to make time for a 15 minute course than to free up an entire afternoon for a training course. Early exploratory discussions with several teachers confirmed this idea, teachers were greatly enthusiastic about the concept of short, digestible digital lessons easy to do in-between other activities. Therefore I set out to further research microlearning and how it may be applied to the Academy.

2.3.1 Microlearning Theory

However, it appears little research has been done on microlearning. In an analysis by Leong, Sung, Au, & Blanchard, only 476 papers that touch upon the topic of microlearning were found (2020). Of these papers, a lot of them appear to be set in such different settings that they are not at all applicable to the Academy (e.g. science, service, health) or are of a low quality that they better be ignored (e.g. only consisting of a questionnaire or not citing sources).

The lack of research can possibly be explained because there might be a conflict of interest, as research into education mostly comes from educational institutes who are "trying to conserve and perpetuate forms of school learning and to accommodate learning technologies to these forms" (Hug et al., 2006, p13). It can also be explained because a significant interest in microlearning has only developed in the last three years (Leong et al., 2020). Whatever the case, little research has been conducted that is applicable on the Academy.

There have been *some* studies on the effectiveness of microlearning. In a study by Mohammed, Wakil & Nawroly (2018), primary school students showed 18% higher results and an increase in long-term knowledge retention, which is promising, even if the target audience of this study is adult teachers. And in a similar study, students obtained on average almost 20% higher results when content delivery was split into smaller section (Giurgiu, 2017).

These studies seem to indicate that microlearning would not be depriving the Academy of effectiveness, but even increase it. But as to how microlearning should be implemented, there has been no research establishing a framework for implementing microlearning, only examples of successful cases of microlearning and their limitations. For example, Vesselinov and Grego analysed Duolingo, a language learning app, in 2012. They found it was highly effective, especially for beginners. One of the biggest factors in its effectiveness was also found to be motivation, which again highlights the importance of the main research goal of this project.

2.3.2 Implementing Microlearning

Early on in the design process, I discussed microlearning with teachers along lines set out in paper prototypes such as the one in Figure 15. I asked numerous teachers what they would expect of various different lengths of lessons. Fifteen minute long lessons seemed to be the sweet spot. Make the lessons longer, and the time barrier became too big of an obstacle for many teachers and the effort expectations too high, especially for younger teachers and full-time employed teachers. Make the lessons shorter and many teachers, especially older teachers, had low expectations of the quality and depth of the lessons. Of course, this only deals with expectations, but expectations play a significant role in motivation for education (Walkey, McClure, Meyer & Weir, 2013).

More difficult is the actual design of the lessons with microlearning. As the lessons are only short, how should they be structured? What should they contain? Should they be related to each other, or should they be stand-alone?

Figure 15 - Early paper prototype used to communicate sequential microlearning to stakeholders, so they could estimate the right duration.

Looking at the latter, I argue that it is necessary for the Academy that the microlearning has to be sequential instead of singular. Jomah, Masoud, Kishore, & Aurelia (2016) looked at singular microlearning and they argue that microlearning is not suited for transfer of skills or behaviour. Secondly, spaced practise is significantly more effective than mass-practise (Hattie, 2019), so it makes sense to spread out learning moments. Sequential microlearning allows big concepts to be taught, spread out over a longer period of time. Thirdly, I also think sequential microlearning makes sense when looking at the needs of the target audience.

In my exploratory interviews (see *1.4.2 - "Motivations"*) I found that most teachers indicated that large training courses, advocating for a complete change in the teaching method, were completely demotivating. Instead, they were far more motivated if training courses presented with small, easy to apply modifications to their existing way of working. This was especially the case with teachers that fell within the early majority in the model of Roger. Faqta's older customers from schools that Faqta classified as "innovative" indicated that they had less problems in completely changing their way of working.

This makes sense, also looking at the competence factor from Self-Determination Theory. Competence means "the ability to feel effective in what one does" (Vinney, 2019). Looking at Roger's model, it makes sense that early adopters feel more competent, as early adopters have higher education, intelligence, are more

favourable to change, are less fatalistic than later adopters, and most importantly, they are far better at dealing with uncertainty than later adopters according to Roger (2003, p268-273). The early majority and later adopters will be more doubtful about their abilities in uncertain situations, such as when they are required to completely change their way of working. And as they are less favourable to change, they are also less willing to do so.

Sequential microlearning can help with both. Instead of one long course advocating for a complete change in methodology to conform with Faqta's vision and methodology, a sequential course can slowly build up to desired outcome without ever putting the teacher in a situation where they are completely uncertain about what to do. And as the changes are smaller and more gradual, the teachers should be less opposed to it.

For this, I looked at two things. First, how the individual lessons should be designed, connected, and communicated to the user. Secondly, I tried to confirm the effectiveness of sequential microlearning to maintain a feeling of competence and to uphold motivation, and how effective microlearning is for information retention.

Summary

Microlearning can help reduce the barrier of entry, because it reduces the time investment, a big barrier for teachers. Teachers are also more motivated with gradual change, and sequential microlearning building up such behaviour might be able to help with that.

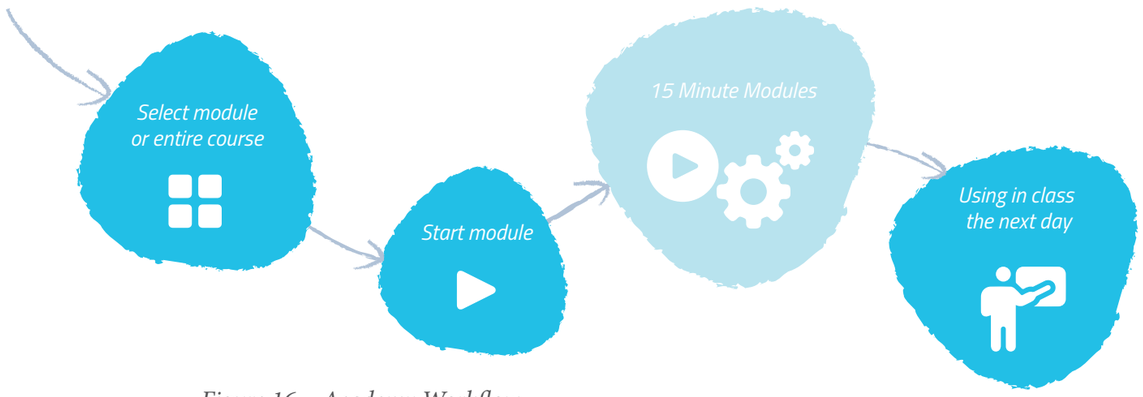


Figure 16 - Academy Workflow

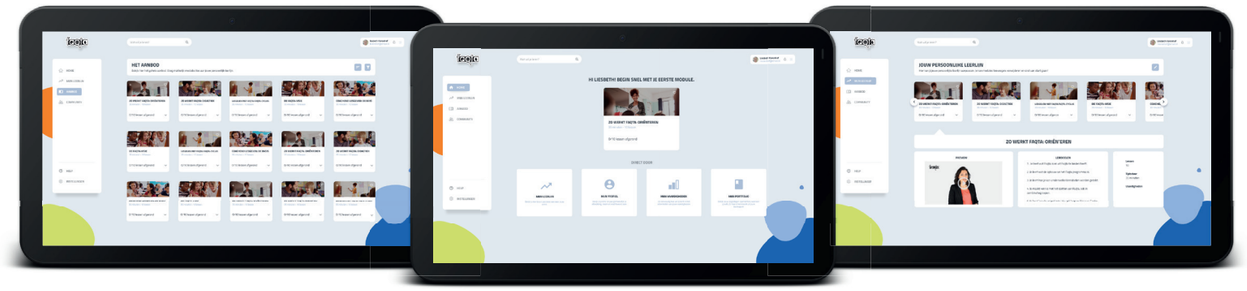


Figure 17 - The inventory, home page, and queue page as designed by van Gessel.

2.3.3 Communicating Microlearning

So, how should the Academy and the content for the Academy be designed to be able to incorporate microlearning effectively? For this I designed a workflow for the user to go (see Figure 16) through incorporating multiple design strategies, also connecting it to motivation. To explain this workflow and the design strategies behind it, let us go through it chronologically.

First, it is important that the microlearning is clearly communicated to the user. Both to make sure the user is aware of the length of the lesson (again, expectations play a large role in motivation), but also so the user can make an informed choice to manage later expectations (e.g. that the user is expected to complete later lessons in the sequence too).

For this step, I worked together with van Gessel, the other student working on the interface design of the Academy. In the interface she designed so far, she had created three webpages of relevance, shown in Figure 17. One page highlights the entire inventory of possible courses. These courses could be added to a queue, shown on a different page. The last page is the home screen, where the user could click on the course currently in the front of the queue.

This queue system was a great fit for microlearning. In order for microlearning to be added, only a few things had to change. Firstly, the inventory page had to be ordered in such a way that it would become clear how the courses were related to each other, shown in Figure 18. In the queue page, it was also necessary to show how lessons were connected. But during testing, it also became apparent that the important information, especially the length of the lesson, had to be highlighted. For this, I designed a few icons to catch the attention and that should highlight how little time it takes to complete the lesson. I also highlighted the subject of the lesson to help with the decision making process.

Users have to be able to pick and choose what lessons they want to complete. In the first prototype, I designed it in a way where users were only able to add entire courses (consisting of multiple microlearning lessons) to the queue. But users indicated that they might want to skip a lesson because they might already know about e.g. “coach questions”, but they would like to know more about “assessment with coaching”.

This also makes sense when looking at it with Self-Determination Theory in mind. According to Ryan & Deci, choice is an important underlying factor for Autonomy (2012). During the design process, I kept running into examples where I accidentally made a choice for the user which every time test participants noticed and actively disliked. Autonomy is “to feel independent and able to act” (Vinney, 2019). I also discovered that this also means a choice must be easy to make. For example, if the choice to skip a lesson is hidden in a different menu, users visibly showed annoyance and lacked motivation. I will discuss that further in *2.4.1 - “Imposed & Implied Control”*.

But what this means for the design of the queue webpage is that the button to remove a lesson from the queue should be clearly visible. What Faqta can do is give advice through text and visual cues. Which brings me back to the icons I designed,

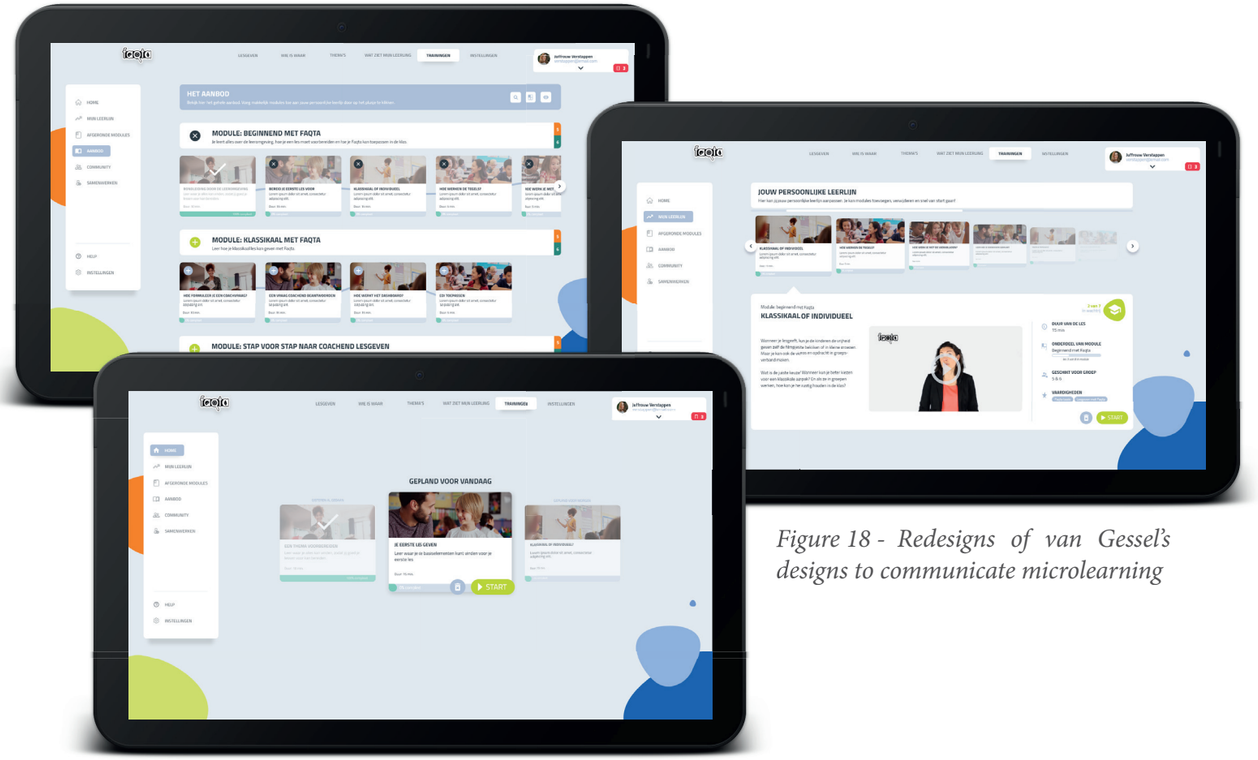


Figure 18 - Redesigns of van Gessel’s designs to communicate microlearning

showing the duration of the lesson and the topics of the lesson to help with the decision making process is an advisory way. I also added a clear, big and bright ‘start’ button, to encourage people to make the choice to start the lesson.

This same button I added in the home menu. I also started showing the next lesson and previous lesson within the home menu, to give context to the choice, again to help with the decision making process and to nudge the user to start the next lesson.

This is how microlearning can be communicated to the user, and as explained, this communication is important to facilitate choice. To test the effectiveness of the communication (among others), I created a digital prototype based on van Gessel’s prototype. Test participants were asked to think out loud and all participants noticed the length of the lessons, and understood how lessons were related to each other.

I did discover a few more things during testing. One thing I found was that the terms used for microlearning were also important. Initially, I used ‘lesson’ for the microlearning sessions and ‘module’ for the overarching connection between lessons. Specifically for teachers this was a confusing terminology, as these terms already have a meaning within teacher jargon. To solve this, van Gessel and I organized a joint generative session with Faqta employees, most of which had been teachers in the past. They were given the instruction to come up with terms that were meaningful, but did not have a negative connotation (such as ‘training’, which sounds like a lot of effort whereas microlearning consumes significantly less time than traditional training courses in Dutch primary education). In the session, it became clear that the individual lessons should be called ‘modules’, the connecting structure a ‘cursus’ (meaning course) and the queue was to be renamed to ‘mijn ontwikkeltraject’, a meaningful but unassociated term within Dutch primary education. The terminology problems likely only exist within the field of education, but it is important to address. During further tests, I did not notice any more teachers being confused by the terminology.

Another important note is that I also asked prototype test participants beforehand what they expected of the Academy. All test participants were Dutch primary school teachers, and all of them had quite pessimistic expectations of the Academy, knowing nothing of the design. Afterwards, I also asked them whether it was necessary to beforehand know of the design of the Academy. Every single participant indicated that it was necessary that Faqta somehow beforehand communicate that lessons were short, easily digestible lessons. It did not match their expectations but it was a positive surprise. But this does mean that it is vital for Faqta to communicate the microlearning part in their advertisement and sale strategy. At this point, I was personally satisfied with the design of the communication.

2.3.4 Importance of Practise

After the user makes the choice to start a module, they are taken to a page where they are guided throughout a lesson to learn its contents. But what is interesting about sequential microlearning is that between the modules in a course, users can also learn. As stated before, sequential microlearning can potentially be used to slowly build up to a different way of working, to help teachers slowly get adjusted and prevent teachers from getting demotivated.

It therefore makes sense to get the user to apply what they have learned to their work in between modules, to more naturally build up to behaviour change. Adding an element of practise also makes sense for another set of reasons. Jan van Wonderen, one of Faqta's founders, confirmed that it is a good strategy to look at different didactics and combine them. Whereas learning through video fits with the didactics Behaviourism and Cognitivism, learning through practise fits better with the other two big didactics, Connectivism and Constructivism. In Faqta's approach, all four are considered, and therefore it is useful to also apply this to the design of the Academy.

Additionally, in his book Visible Learning John Hattie also looked at practise in particular and found that that deliberate practise also has significant impact on learning ability (2009), providing additional reason to integrate a moment of practise into the Academy.

The application of practise could possibly also help in another manner, although I was unable to confirm this. As all teachers I spoke to were in some way motivated in their work by the children, showing the effects of their work on the children could possibly connect to their motivation in their work. By seeing the positive effects, they might be more motivated to continue learning.

Taking practise into account, a lesson should finish with the suggestion to put the learnt material into practise. Again, it should be phrased as a suggestion to not interfere with the Autonomy factor of Self-Determination Theory. Initially I phrased it in the imperative form, but that gave test participants a feeling of obligation, which they clearly did not like. Instead, Faqta should phrase it like an advice: "To get the most out of your learning, you can now put it into practise". Test participants also indicated that clear instruction should be given as to what and how the learnt material should be applied in the classroom, and a clear option to skip practise and go directly to the next lesson should be available too.

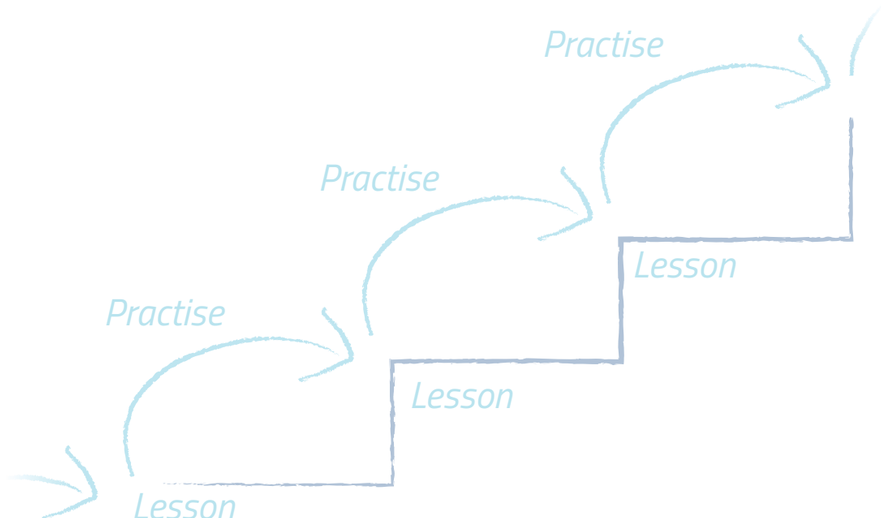


Figure 19 - Sequential microlearning sessions with practise in-between can help slowly build up to a large change in behaviour

Summary

Microlearning should be clearly communicated to users, not only because it shows how little time it costs to learn, reducing barriers of entry, but also because it helps users make a choice, which is important for Autonomy.

Microlearning also needs to be communicated when introducing the Academy, because it can help sell the Academy to users who would otherwise have negative expectations.

Between microlearning session, teachers should be advised to practise to help naturally guide change to their way of working.

2.3.5 Does Microlearning Work?

To see whether sequential microlearning with practise in between modules was actually more motivating and more effective than regular learning, I did a small experiment. But before I can discuss that experiment, some small background is necessary.

At one point during the project I was looking at a way to provide a role model to teachers, based on the theories of Stichting LeerKRACHT, who have developed a formula for how to successfully bring about change within schools. This I will briefly discuss in *3.1.6 - "Lesson Design"*, but for now it is important to know that one of the ideas I came up with was to organize a meeting.

This meeting developed as an idea on it's own. I theorized how it could help with the Relatedness aspect of Self-Determination Theory. I discussed the idea with teachers, and most of them were really enthusiastic. It could be a way for teachers to inspire each other, to transfer creative ideas between participants.

For this reason, when I created the experiment, I divided the participants into three groups. Group A would get all the lessons combined into a single video, group B would get three 8 minute modules spread out over a week, and group C would also get the three modules spread out over a week, but in addition they were to be part of a meeting after a week, as shown in Figure 20.

The aim of this experiment was to see how microlearning could help slowly build up behaviour change and how this slow change would influence motivation and information retention. Therefore, every week I asked people how motivated they were, and three weeks after the start of the experiment I asked every participant to recall what they remembered from the video.

The participants were sadly not all teachers, so I could not give them something they should try in the classroom. But I did want to test behaviour change, so I gave them tips on how to better brush your teeth, which is something that is applicable for everyone. To make it possible to transfer creative ideas in the meeting, I also left some creative freedom in the application of the content.

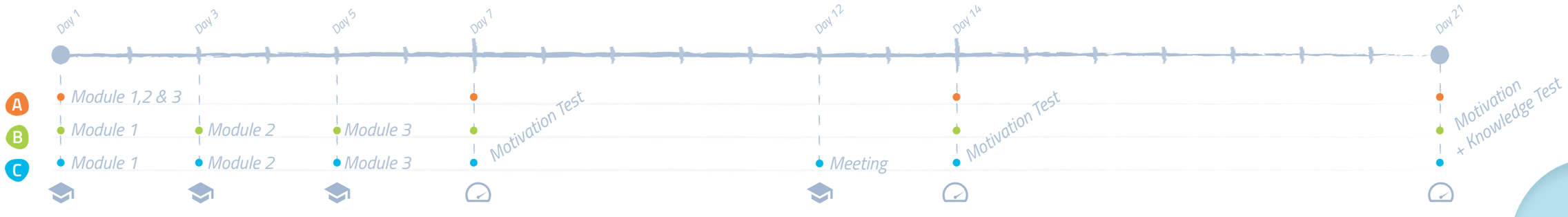


Figure 20 - Experiment schedule for the three participant groups

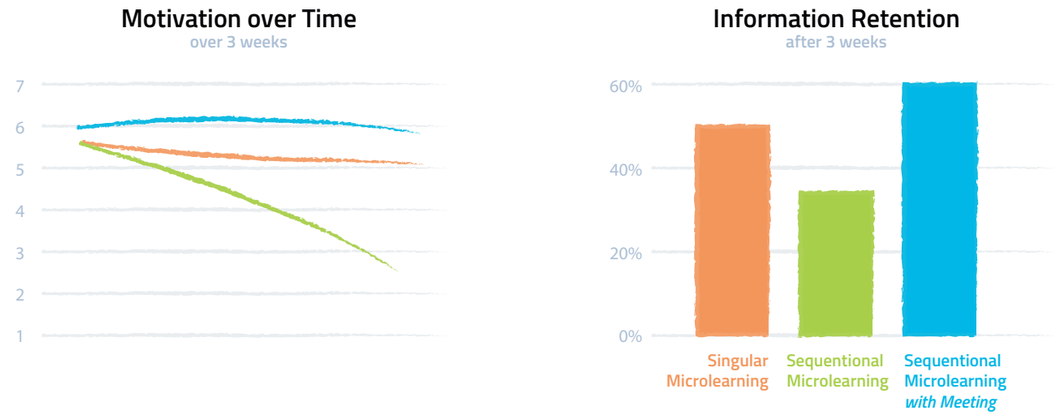


Figure 21 - Results, showing group C (in blue) being more motivated and remembering more

My hypothesis was that Group A would have the lowest motivation and knowledge retention, group B would have higher knowledge retention and motivation, and group C would have even higher motivation. Instead, group B fell massively short of group A, but group C did have higher results than both A and B, as seen in Figure 21.

This was surprising to me, and could be explained for a few reasons. It could be that the meeting is necessary for people to 'connect the dots' so to say. It could also be a fluke, which is quite likely as I only had 15 participants which is not at all statistically significant.

So while I might not have good quantitative data proving that sequential microlearning helps with motivation for behaviour change, I did get qualitative proof for the meeting. I asked participants from group B and group C whether the meeting (would have) helped with motivation. All participants I asked agreed how the ability to discuss the execution helped with motivation, as it was inspirational to hear others explain how they did it differently, according to several participants from group C. I also provided the option to ask questions, which allowed some worries to be taken away. In the experiment, I had also given explicit creative freedom in the instruction video to the participants, and participants from that experiment from all groups were positive about that creative freedom. This creative freedom is also what fuelled the discussion during the meeting, so translating this into the modules of Faqta would be a good way to go.

2.3.6 Faqta Connect

Based on this experiment, I also asked teachers about their opinion on such an online meeting after a digital course. Teachers agree that such a meeting would be great to transfer creativity and to hear what others throughout the country are doing.

Due to the Corona-19 pandemic, teachers also stated that they were more open to digital meetings. It would be a big plus actually, according to the teachers I spoke to, as a digital meeting takes a lot less time than traditional fairs, a similar construct to this meeting that apparently is already common in the education industry. Digital meetings are also much cheaper and easier for Faqta to organize.

I asked teachers what they would expect from such an online meeting, and I suggested many things, such as creative workshops organized by Faqta. But teachers actually want something very simple. First, the ability to ask questions to Faqta, taking away their insecurities about the execution, and afterwards, the possibility to discuss ideas in small groups. This could possibly be explicitly coupled to creative freedom in the design of the learning content itself. With communication products such as Zoom it is easy to divide groups into smaller groups, so providing this possibility should be easy.

These meetings could be specific to the different courses offered by Faqta, as it does not make sense for teachers that did an advanced course to discuss with beginners. However, not all the teachers that I spoke to agreed. Some did, but others said that discussing with advanced would provide them with a goal. That does make sense when looking at the reason I thought of the meeting in the first place: to provide a role model to teachers, as a role model is one of elements required for successful change in schools according to Stichting LeerKRACHT (2021). But one of the other teachers I spoke to indicated she did not really want to be used as a role model, so I would keep the meetings separate for either the different courses, or for the competence levels based on van Gessels' competence separation (see Figure 8 on page 23 or *2.4.3 - "Challenge Rating"*)

Based on my conservative estimates, Faqta can organize these kinds of meetings 3 to 4 times a year. That should provide meetings with sufficient participants to be able to discuss, but also provide them frequently enough that people still remember the content of the course freshly enough so they can connect the dots during the meeting. Users can simply be made aware of the meeting after they completed a course, where they can register for the next scheduled meeting.

Summary

In an experiment I gather some evidence that a meeting in combination with sequential microlearning helps with motivation and gradual change. More importantly, this meeting also helps with Competence and Relatedness. Teachers want the ability to ask questions to Faqta and discuss in small groups.

2.3.7 Building a Routine

Now that microlearning has been established for the Academy, there are still a few more problems to work out within the workflow of the Academy. As teachers are asked to practise in the classroom, it is also important they return the next day to the Academy. Whereas students have a structured approach for learning, with scheduled daily sessions - school, the teachers themselves do not have such structured approach.

According to Stichting LeerKRACHT, a structured approach is one of the four components required to successfully implement change (2021). Also Hattie confirms that 'organization' has significant benefits for students' performance (2009).

But forcing teachers to come back to the Academy is not a good idea looking at Self-Determination Theory, specifically Autonomy, as imposed control undermines the Autonomy factor of Self-Determination Theory (Ryan & Deci, 2012). This I also confirmed during testing. I tested several methods to inform and advise the user to come back to the Academy.

The best approach seems to be a blend of a pop-up and notification appearing within Faqta's regular platform when the teachers is preparing for the next day, one of the first approaches I designed, as shown in Figure 22. A circle would pop-up on the screen, informing the user to come back to the Academy, and after a few seconds it shrinks and turns into a little reminder next to the button leading to the Academy, similar to notification bubbles on mobile phones.

This design appears to be the right balance between disrupting and ignorable, so it is not pushing the user too much (which would disrupt Autonomy) but still providing an incentive and reminder to go back to the Academy.

It is important that this reminder only appears after school hours to not disrupt teaching, teachers confirmed. Teachers also said it should pop-up the next day and the next week if they choose to ignore it, as sometimes they would be too tired or busy or both to focus on learning.

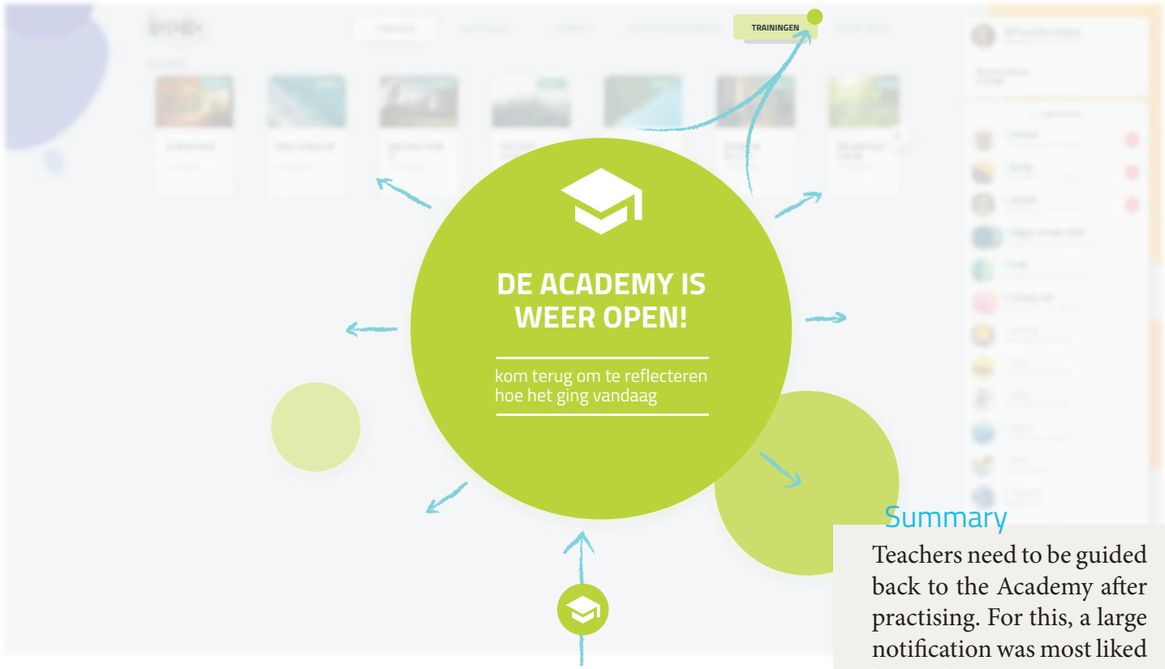


Figure 22 - Three stage blend between a pop-up and notification

Summary

Teachers need to be guided back to the Academy after practising. For this, a large notification was most liked by teachers.

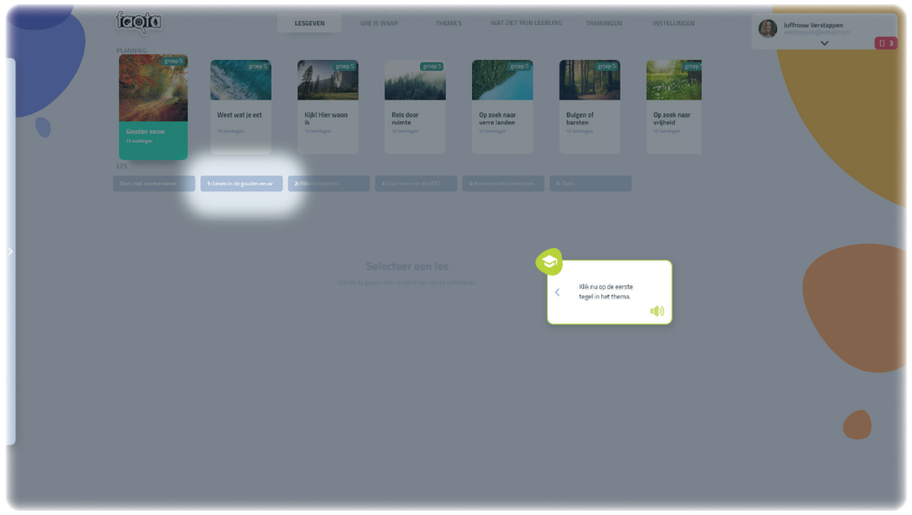


Figure 23 - Prototype of guided practise through the Faqta Platform with the Academy

2.3.8 Guided Practise

I also looked at different ways of delivery of the lessons itself. While based on Faqta's approach it made sense to use video as the primary way of delivering content to the teachers, I did not want to take this for granted. So in the fake lesson designed for the prototype, I used different ways of content delivery and analysed users' reactions.

It became clear video is the most engaging way to deliver content passively. Narrated text does work for smaller sections of text, such as a summary beforehand or instructions, but for longer paragraphs users quickly lost interest. Narrated text with the ability to turn off the audio gave users the best of both worlds, with some users preferring to read themselves and some people rather listening passively or reading along actively.

I also looked at gamified experiences for practise, which did not work out, and I discuss that later on in this report (see *2.5.7 - "Lesson Gamification"*). What I also looked at was integrating several other online learning sources Faqta has already designed.

One of the online learning sources Faqta already utilizes makes use of guided experience called appcues. Appcues is software from a company with the same name that helps users get acquainted with interfaces by guiding them through it. This method of guiding can easily be adapted to be used within the Academy, as

shown in an example in Figure 23.
This way of guiding users through Faqta's platform also appeared to be very useful for guided practise. A practical approach also seems to be preferred by teachers, both during testing with the prototype and in the exploratory interviews (see *1.4.2 - "Motivations"*). Application of this guided practise can definitely make sense. For example, users might be learning about 'how to prepare a lesson with Faqta'. After watching a video explaining the methodology, users can get instructions for where to find all the materials within Faqta's platform.

What I discovered worked best is giving very concrete, to-the-point instructions on what to click, while also using visual cues such as darkening the webpage except the button people should press. Longer, convoluted messages made it seem more complicated to some teachers than it is.

In this same system, the functionality can also be explained in context. For example, Faqta has a progress tracker for the children. The functionality, how to use it and what to use it for, can be explained both in the context of Faqta's vision and the context as in Faqta's platform. Teachers really liked this in context explanation combined with the practical approach of getting there.

This practical approach has an even larger benefit: it can be used to make even more efficient use of the teacher's time. For example, if the teacher is going through a module about preparing a lesson, they can actually prepare the lesson while learning. For the teacher this kills two birds with one stone, making doubly efficient use of their time.

Important to know is that this approach must be designed carefully in the design of the learning material. Multi-tasking should be avoided (Jomah, Masoud, Kishore & Aurelia, 2016), so during the course there should be a clear distinction between learning moments and guided work. Teachers also indicated that it needs to be abundantly clearly communicated if something they are doing, such as grading a student, is actually happening or just pretend.

But teachers do absolutely love the idea of making doubly efficient use of their time, and it can further help lowering the barrier of entry and help motivate teachers to start using the Academy. Again, it does need to be communicated beforehand, in marketing and sales, so teachers are aware of the benefits of the Academy. It might even be useful to have an introduction video to manage expectations.

Summary

Teachers like a practical approach in the lessons too. For this they can be guided through Faqta's platform and given explanation in context, with a system called Appcues.

2.3.9 Subchapter Conclusion: Workflow

In Figure 24 you can see what the workflow looks like as described so far. Users are able to pick and choose modules, but are nudged towards choosing entire courses, and are also nudged to actually start learning. The modules themselves should take up roughly 15 minutes, and be structured in such a way that teachers will be able to apply the learnt material in the classroom. The modules together build up to change the way of working in a natural way. After the users have practised a day in the classroom, the users are advised to go back to the Academy through a form of notification. Practise can also be added to the module itself in the form of guided navigation through Faqta's platform. After they complete a full course, they are invited to register for an online meeting where they can ask questions and discuss the application of the lessons.

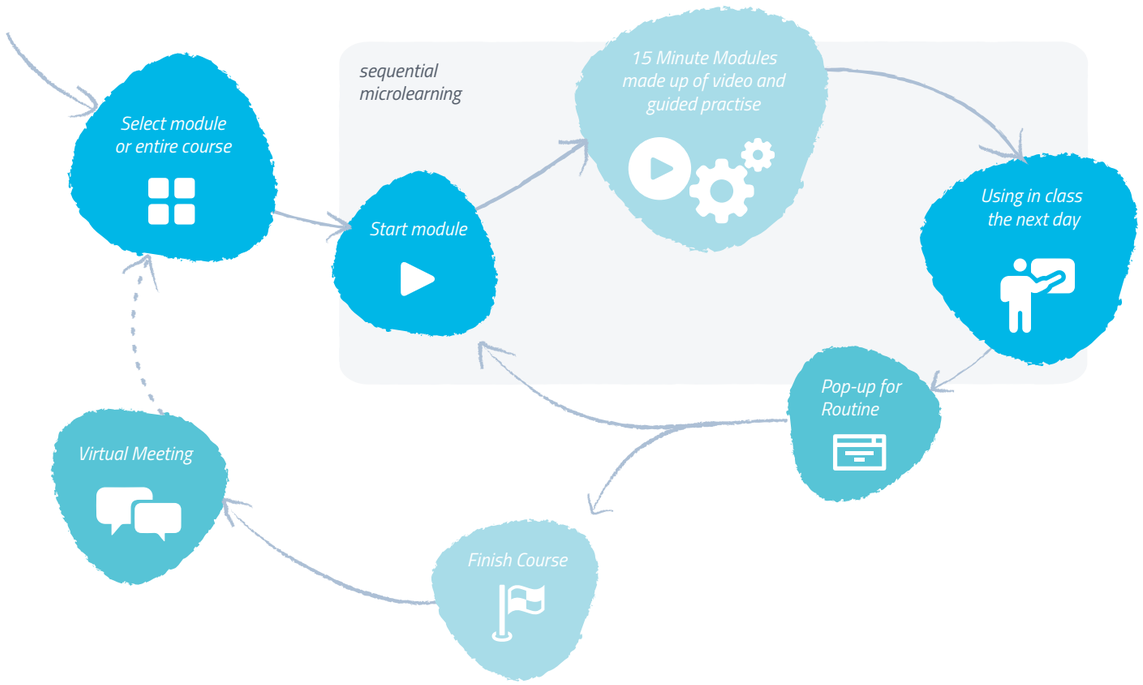


Figure 24 - Workflow overview. The main loop is formed by sequential microlearning

Chapter 2.4

MAKING IT FREE

For 'Making learning Free', I looked at what motivates teachers in their work, and I especially looked at Self-Determination Theory. Making learning free is in this case not referring to the monetization of the Academy, but to the concept of freedom, free will in particular.

I already discussed Self-Determination Theory, but as a reminder, this theory deals with how motivation works. To help internalize extrinsic motivation, and to not undermine intrinsic motivation, three factors need to be satisfied: Autonomy, Competence and Relatedness (Ryan & Deci, 2012). In the previous subchapter, I already gave a few examples of how these factors influence the design of the Academy, but in this subchapter I will go into more detail, starting with Autonomy.

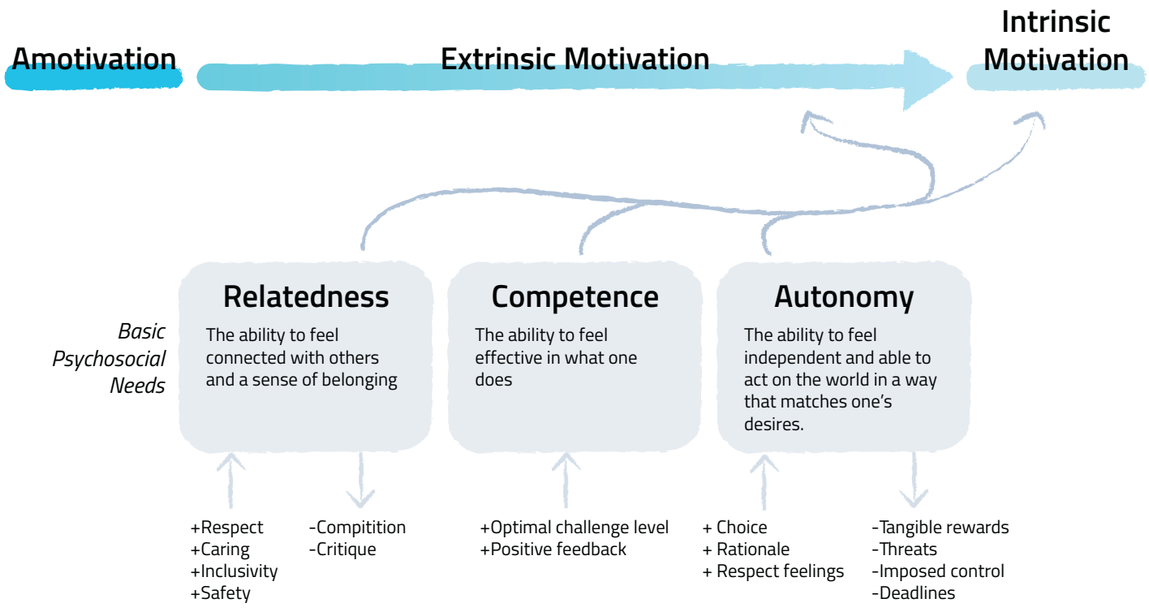


Figure 25 - How to influence Relatedness, Competence & Autonomy, the three factors required for internalization and intrinsic motivation

2.4.1 Imposed & Implied Control

As stated before, Choice is one of the most important ways to ensure a feeling of Autonomy (Ryan & Deci, 2012). But what I discovered is that choice in itself is not what creates Autonomy, but rather that a lack of choice undermines Autonomy. As soon as the design of the Academy makes a choice for what you can and cannot do, users take notice. Providing users with superficial choice does not help, instead users must be able to make meaningful choices about how to proceed. Otherwise, it could be seen as a form of imposed control, something which also undermines Autonomy (Ryan & Deci, 2012).

I already have shown multiple examples of this, but here is another. One of the prototyping tools I used has no ability to simulate video, so I faked video through audio and explained to test participant that it was a video. However, multiple test participants testing the prototype did ask whether it would be possible to skip parts of the video, as they might want to skip sections they already know.

Unintentionally, the design of the prototype had 'forced' them to watch the entire video. And while this was definitely not a choice I had continuously made, it was still a choice already made for the user which undermined Autonomy.

For users to feel free, all options have to be on the table. They need to be able to skip forwards, to go back and repeat part of the module, to skip the practise in between modules, and to quit the module altogether. And it does not end there, because this also applies to the design of the Academy outside of modules, as briefly discussed in *2.3.3 - "Communicating Microlearning"*.

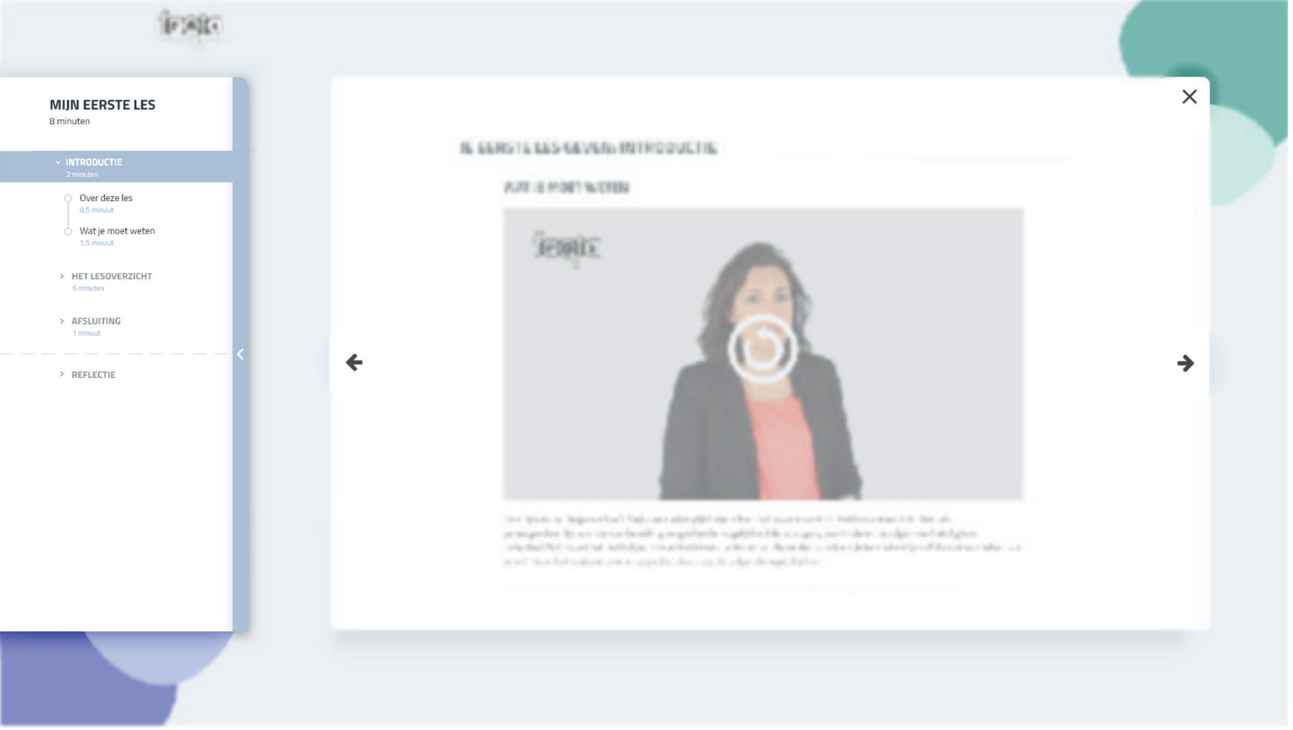


Figure 26 - Module page, with arrows, exit button, and navigation bar

To give an example of how all choices can be put on the table, Figure 26 shows a screen from the module itself. Arrows allow the user to navigate forward and backward, the cross at the top allows to user to quit at any point, and the navigation bar at the left allows users to go back to any section of the module, or to skip right to the end.

The choice can also not be made deliberately harder. Clearly making the delete button in the queue page very tiny is not only a bad user experience, but at least one participant initially thought it was not possible to remove a module from the queue, therefore obstructing choice.

I discovered that Imposed control also seems to extend to implied control. If the design of the Academy pushes the user very clearly in a certain direction, or if the wording is implying that you should do something it also rubs the users the wrong way. For example, in the early prototypes the modules ended with the message 'You are now ready to try it out in the classroom. Click here to turn off the Academy and to set a reminder to come back tomorrow'. This heavily pushes the user in a certain direction, and multiple test participants very clearly stated how this annoyed them severely, especially if they would rather go straight to the next lesson (and yes, this also is an example of how people clearly make use of the freedom to choose what to do).

Nudging, Not Forcing

Instead, the wording of the Academy needs to be in a far more advisory manner. When the wording was changed to 'Well done! We now advise you to try it out and come back tomorrow, as this helps with the learning process', no test participant complained about this wording anymore.

The same way of advice can also be integrated into the visual design of the Academy. This is commonly called 'nudging'. There are many different forms of nudging, but the one applicable here is 'padding the paths of least resistance'. For this, you can look at setting defaults but also clearly marking the preferred choice (Thaler, Sunstein & Balz, 2010). For example, you might give a little animation to the 'next' arrow in Figure 26, to nudge users forward. In Figure 27 another example is shown that clearly shows how exiting the Academy is the advised choice. The top button is more pronounced, nudging the user to clicking this button. The message on the left informs the user that they can now exit the Academy, or skip, but that exiting and practising is the advised option. I also gave some examples of nudges before, such as the pop-up in Figure 22 on page 50 and in *2.3.3 - "Communicating Microlearning"*.

Figure 27 - Module Complete page, with nudges towards the preferred option

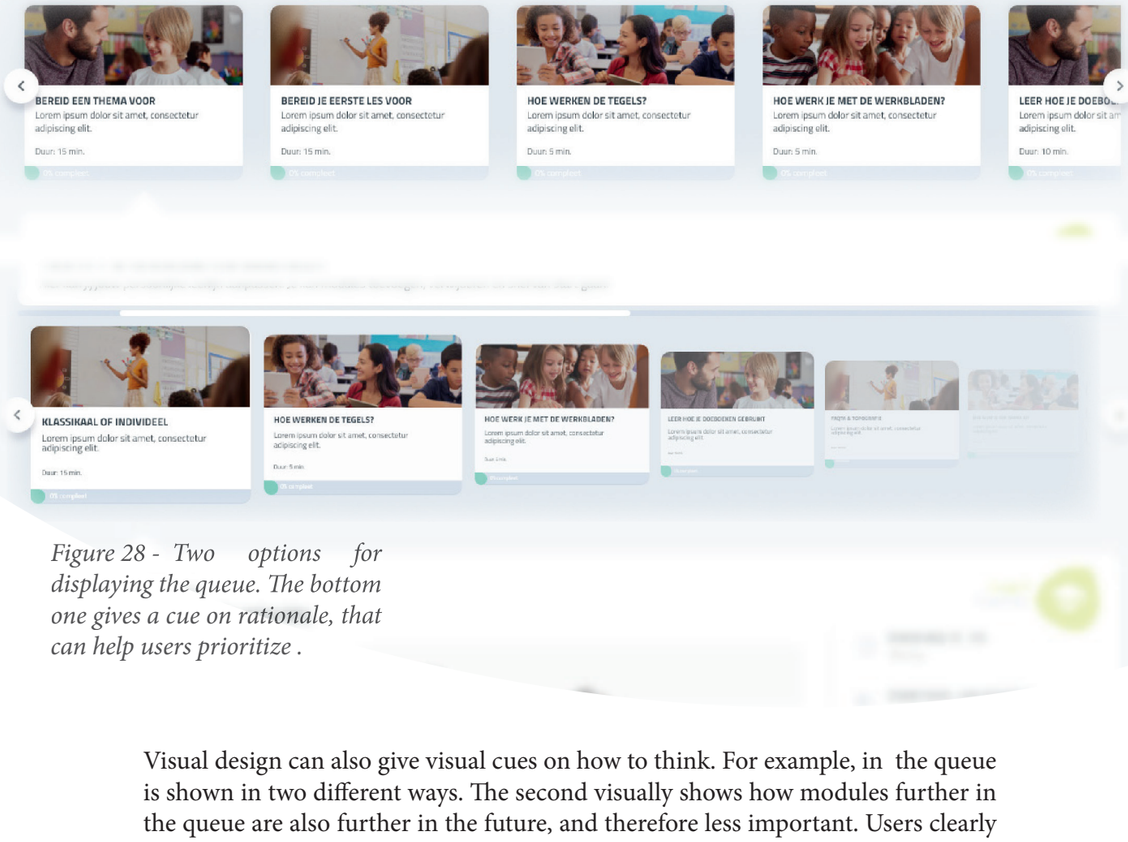


Figure 28 - Two options for displaying the queue. The bottom one gives a cue on rationale, that can help users prioritize .

Visual design can also give visual cues on how to think. For example, in the queue is shown in two different ways. The second visually shows how modules further in the queue are also further in the future, and therefore less important. Users clearly prefer this kind of design when presented with two options, as they said it helped them prioritize where they focussed on.

2.4.2 Rationale

Closing a module with the sentence 'Well done! We now advise you to try it out and come back tomorrow, as this helps with the learning process' has another benefit. This sentence namely also provides the teacher with a rationale why they should practise in the classroom.

Rationale is also important in order to provide the user with Autonomy, according to Ryan & Deci (2012). And in the Academy that can be used to give advice for small choices as described above, but more important is the use of rationale within the lessons.

For the digital prototype, I designed a fake module which teachers would go through. Not to test the module itself, but the delivery of the module. Yet most teachers did have comments on the design of the lesson. While most of it was disregardable because I am not an education expert and do not know how to design lessons,

one thing of interest is that teachers did seem to want the reason for why they are learning what they are learning. This does not have to be an in depth explanation of the theory. Better is to connect it to the intrinsic motivation of the target audience, the children. As I described in *1.4.2 - "Motivations"*, all teachers I spoke to were in some way motivated in their work because of the children. A good approach in the lessons seems to be to start with the effects of what they are learning on the children.

This approach also makes sense when looking at the vision for the Academy. If the Academy is there to communicate the vision and methodology of Faqta, it makes sense to communicate this with the Golden Circle of Sinek in mind (2011). Faqta should first communicate the vision- the why, then the methodology - the how and lastly how Faqta's platform can help with that - the what. The why does not have to be thoroughly explained unless the purpose of the module is purely to explain Faqta's vision; something that also Teunissen agrees with, who explains that Sinek's golden circle should not be applied to every form of communication coming from a company (2018). The vision therefore does not need to be communicated completely, only the relevant parts that provide enough rationale for the teacher to believe the Academy and to have reason for applying it.

Asking teachers about this, teachers I spoke with did agree that providing a reason why to do something did provide motivation both to learn it, and to apply it, therefore tackling two subquestions at once. They did however say that generic claims of 'increased results' were not enough, so the rationale does need to provide as slightly more in-depth explanation than that.

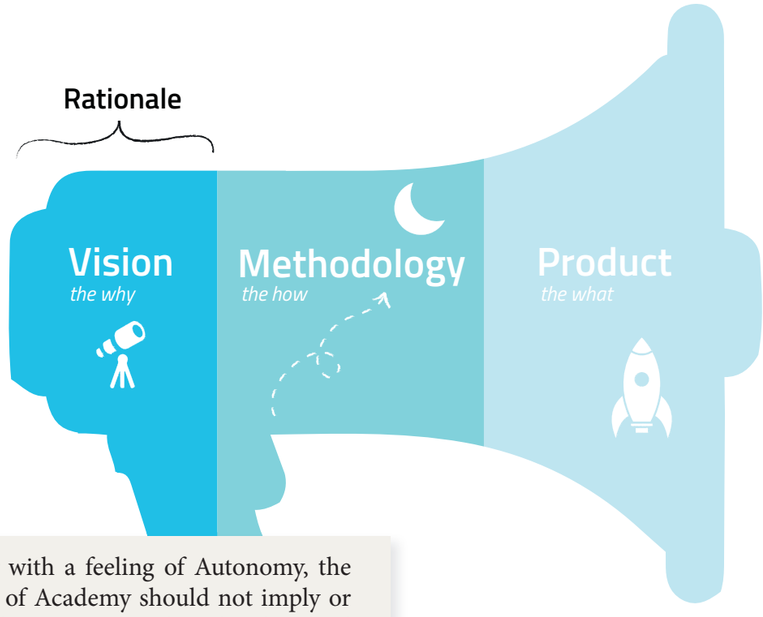


Figure 29 - Giving rationale by using the Golden Circle of Sinek

Summary

To provide the user with a feeling of Autonomy, the wording and design of Academy should not imply or impose control, but the user can be advised and nudged into a certain choice. It is also useful to provide the user with a rationale, especially for lessons, focussing on the positive effects on children.

2.4.3 Challenge Rating

Another factor influencing internalization of motivation is Competence, "the ability to feel effective in what one does" (Vinney, 2019). Multiple ways to influence Competence have been offered by Ryan & Deci (2012), but the one that is most applicable to the Academy is challenge rating. The difficulty of the courses offered in the Academy should match the expectations of the teachers. Too easy, and teachers lose interest. Too hard, and teachers will lose motivation because they might never get it right.

Problem is, different people have different expectations. Some teachers expect advanced theories on how to apply coaching with Faqta, while others might be looking for how they can start their first lesson. I have looked at several ways how the right challenge level can be given to teachers. Ideally, an advanced algorithm or a team of experts would for each user determine exactly what challenge level would be right, but this would of course not be viable for Faqta to achieve.

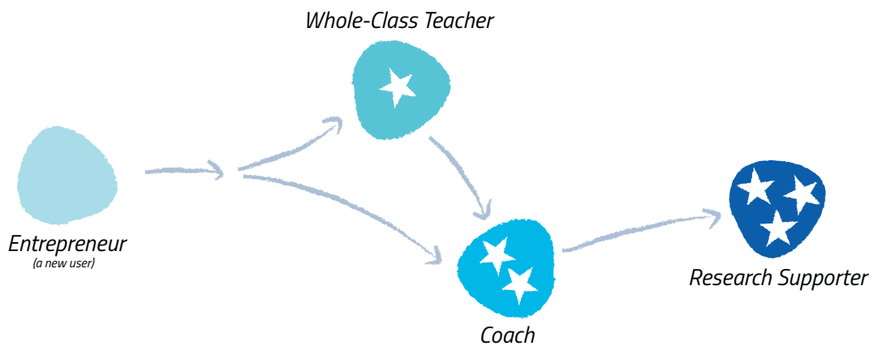


Figure 30 - Van Gessel's design for sorting teachers

Luckily, van Gessel already has designed something which is easily applicable in this case. In her design for the Academy, users are first met with a questionnaire asking some basic questions on what teachers already do and what they want to achieve. A simple algorithm would then automatically queue courses that would get them from where they are now and where they want to be. The courses, in her model, are categories in 4 categories, with some courses specifically designed to take teachers from one category to the next, as shown in Figure 30. These categories can easily be seen as a way to categorize challenge rating. But it remains important to give the user a choice, so the questionnaire should be skippable and it should clearly be communicated beforehand what the questionnaire does.

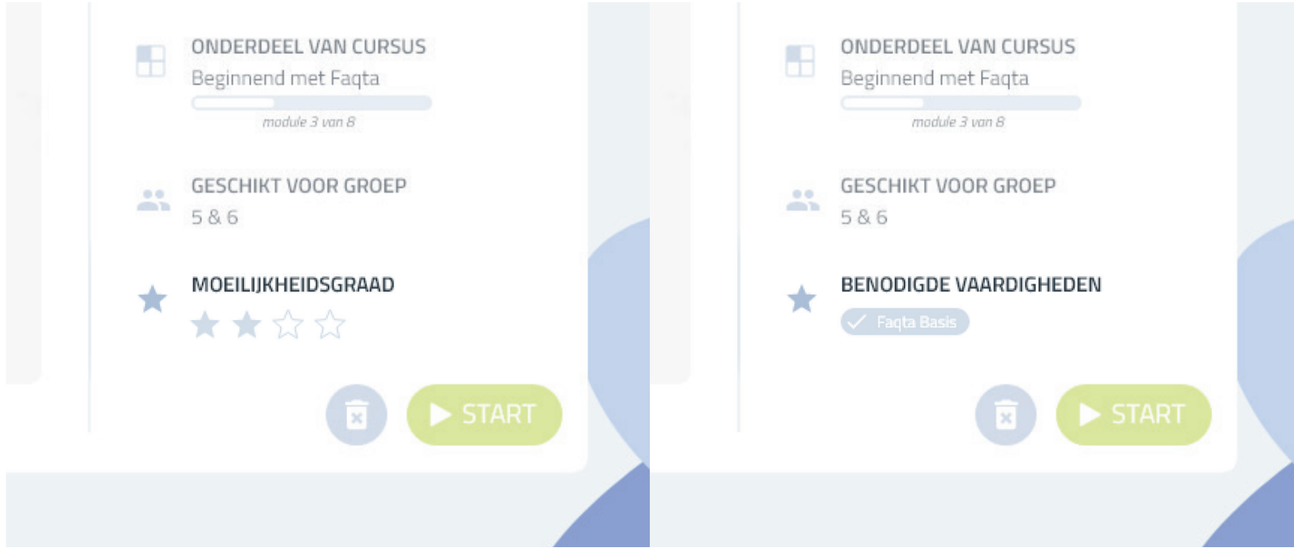


Figure 31 - Two options for communicating difficulty, a star rating (left) and required skills (right)

In case the user skips the questionnaire, the teacher can also make an informed decision themselves what challenge rating is right for them. To help with this choice, the challenge rating should be clearly communicated, for example like in Figure 31.

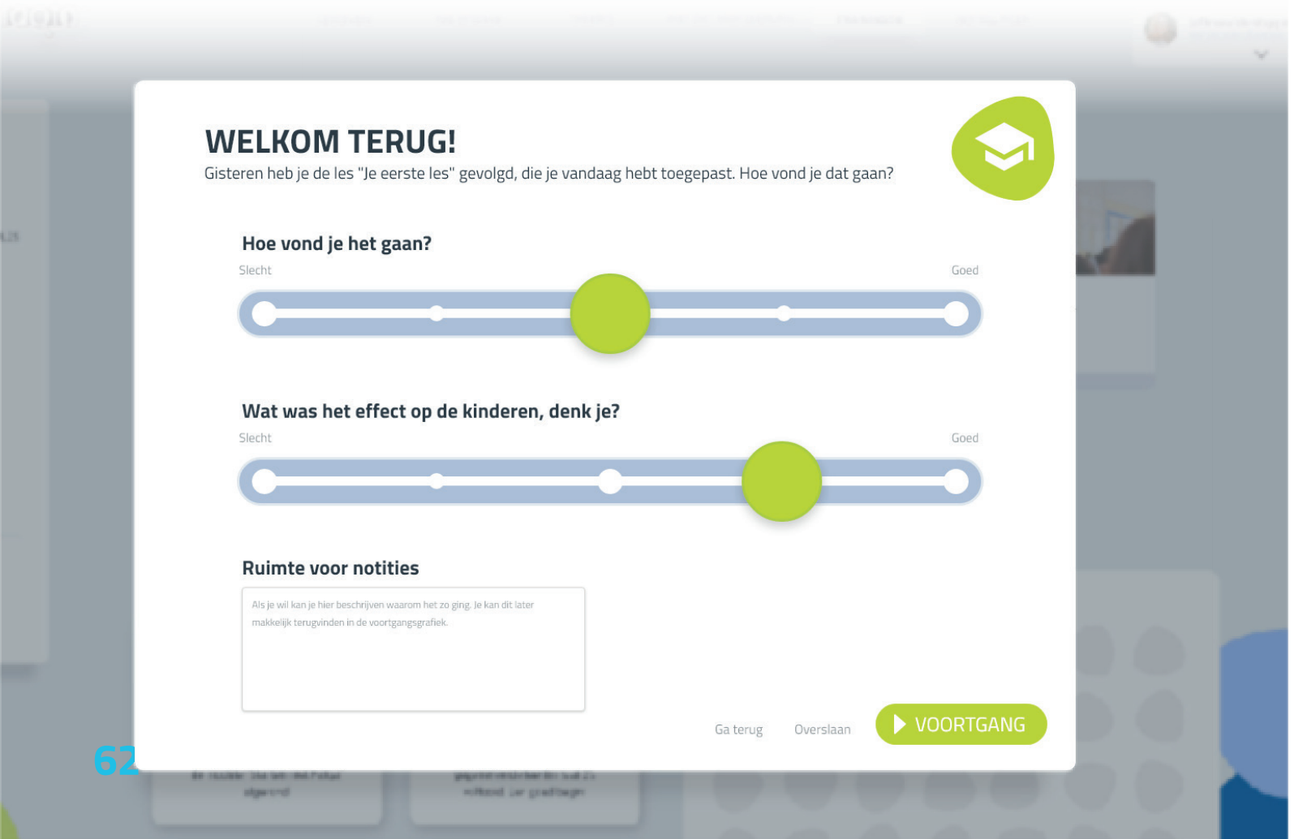
Teachers preferred the option where difficulty was directly shown to them in form of a star rating. Based on my observations and discussions however, I would advise to instead communicate the required skills. This is because it appeared that high difficulty rating for some teachers was a bit scary. The difficulty also does give the users a rationale what to choose. Lastly, if users already went through a course that gave them the required skills, this can be communicated, showing the teachers that they really should be able to do it. Or, in other words, that they are competent and they should feel so too. Based on my observations during testing, teachers would actually feel more competent if the Academy tells them they already have certain skills.

2.4.4 Feedback

Another important part for Competence is positive feedback (Ryan & Deci, 2012). The problem with the Academy is that there is no clear source of feedback, so I looked at various ways to provide feedback to the teachers, ranging from automated testing to calling Faqta.

Based on Visible Learning, I decided that the main source of feedback should be the user themselves. Reflecting is a highly influential positive factor in learning, according to Hattie (2017), and therefore asking the user to reflect could positively impact learning.

Figure 32 - Two sliders for retrospection, and room for notes



In the workflow of the Academy it makes sense to add this reflection after the notification, just before they start the next lesson. The notification discussed in *2.3.7 - "Building a Routine"* can easily be changed to ask the user to reflect. Teachers however seem to have negative expectations with the word 'Reflectie'. A notification popping up asking the teachers to reflect was met with groans and unwillingness. Instead, 'Kort Terugblikken' - 'Quick Retrospection' can be used, which appears to have a friendlier and less burdensome connotation to teachers.

For the design of the retrospection I looked to make it as easy and time efficient as possible, seeing how time and effort are a big barrier for teachers. If the user is asked to write down a reflection, every teacher I tested with would rather skip the reflection. Instead, I designed it in my prototype as a set of two sliders, with room for notes, as seen in Figure 32. To quote one of the teachers "Oh, it's that easy? Well that is no problem then". Teachers liked how easy it was to quickly reflect on their efforts.

One slider asks the teacher to rate how well that went, and another asks the teacher what they think the effect was on the children. The latter I added to connect to the motivation of teachers. As teachers are motivated by the children in their work (see *1.4.2 - "Motivations"*), coupling the retrospection to this motivation could have a positive effect.

I could not actually test whether this was the case sadly, as I would have to have had a real module teachers could apply and reflect on. But test participants seemed to be content with the slider. Some teachers even suggested the children themselves could be asked to rate the teacher. I think this would be a bad idea for one reason: teachers already seemed to think very little about the retrospection with the current design, and it is important that they at least pay some attention. Removing the slider where they have to critically review the effects of their action on others might remove even more attention from the retrospection.

Ryan & Deci also note the importance of positive feedback in particular (2012). To help nudge users into thinking positively, I looked at using gamification to do so, which I will discuss more in *2.5.8 - "Positive Retrospection"*.

2.4.5 Ownership

One important detail of the retrospection is that it cannot disappear into a void. Therefore, I designed a follow up screen where the user can look at an overview of their past retrospection, seen in Figure 33. If this screen is removed, teachers were considerably less enthusiastic about the retrospection screen.

This screen allows the teacher to be in charge of their own learning process. That of course also fits with Autonomy, but it also makes sense looking at ownership. Ownership is currently a hot topic within Dutch primary education, and also one of the core concepts behind Faqta's method. Ownership is a complex topic, but at the core it is all about taking responsibility (Koot, 2016). For children that means feeling responsible for learning, and in this case that is the same meaning in the Academy: taking responsibility for learning.

Why does ownership matter for the Academy? Ownership not only helps with learning efficiency (Hattie, 2019; Rainer & Matthews, 2002) but a higher ownership also leads the teacher to share the learnt material more (Schaep & de Bruijn, 2015). In other words, Schaep & de Bruijn seem to suggest that ownership increases the chance that teachers will actually apply the learnt material, which is great looking at subquestion 3 - "how can the teacher be inspired to actually apply what they have learned in their work?".

Ownership is a well researched topic within education and therefore there are already some frameworks and strategies available for creating ownership. Some big factors impacting ownership seem to align with self-determination theory - such as self-governance (Matusov & Marjanovic-Shane, 2017; Rainer & Matthews, 2002), which overlaps with Autonomy almost completely. Another big part of ownership is the establishment of a supportive, open and respectful learning community, which is difficult to do with an online learning platform but I will touch upon it in *2.4.6 - "Relatedness"*, as relatedness almost completely overlaps with this.

Another factor is paying attention to the learning (Rainer & Matthews, 2002) which hopefully will be reached if the teachers are motivated to learn, which is the goal of this project.

The last factor which is not yet addressed is introduced by Schaep and de Bruijn, who specifically looked at creating ownership for Dutch teachers. They found that ownership increases as goals are defined concretely, and if process is clearly communicated. The first one means that the instructions for the practise between learning sessions should be defined clearly and concretely, something which teachers also noted during testing of the prototype before I even knew about ownership. Initially, I gave no instructions for what to do in the classroom, the Academy just stated that they should try what they have learnt out in the classroom. Multiple teachers were confused at what they should do, so clearly defining what to do is clearly necessary.

That the process should be clearly communicated is done through a screen like the one shown in Figure 33. A graph shows the input of the sliders averaged over time, which modules were completed and the courses they were part of below the graph. Teachers can also find the notes they left when hovering over the graph, so they can easily follow their process and be in charge of it.

This screen is also a great example of Autonomy: all options are available. But in this case, the teacher gave themselves a quite negative review, so some options are clearly sorted to the front and highlighted in green. One of these is also a clear example of Relatedness: a button showing which colleagues already have completed this module, which I will discuss in the coming section.

Summary

Competence is the feeling that you have the ability to do something. This is integrated into the Academy through a challenge rating, an automated queue system based on a questionnaire to automatically align the challenge rating to the user, and through a self-feedback system.

Figure 33 - Two sliders for retrospection, and room for notes

2.4.6 Relatedness

The last factor impacting motivation is Relatedness, "the ability to feel connected with others and a sense of belonging" (Vinney, 2019). As I explained before, implementing relatedness is quite hard in a digital platform. Unlike with something like service design, there is no other person present for the Academy. But I have designed several small interventions that help with Relatedness.

As shown just before in Figure 33, one of these is present within the retrospection screen. One of the options presented shows which colleagues did the module before you, or if none did, which colleagues also have this module in the queue. It is a small detail, but it was absolutely loved by teachers, who liked the ability to pick a colleague to discuss with. The option to pick one is important, as the teacher can then pick themselves who they feel like they can trust. They can then discuss together, in a social environment in which the teacher feels Relatedness.

Figure 33 also shows several other options dealing with relatedness, such as the option to discuss online with other teachers of the Faqta Forum, the ability to chat or call with Faqta (something which already exists), or more tips. These options were significantly less important to teachers, most of them were completely ignored. When I asked teachers what options they were considering, only the options not dealing with relatedness (try in the class again, rewatch the module…) and the option to talk to colleagues were considered. This makes sense, as they already have a feeling of respect and trust with colleagues. If this option was not available, for example if they were the only ones doing a course, only the option to chat with Faqta was considered, so the other options can safely be removed without negatively impacting Relatedness.

Figure 34 - For this module there is professional support available

2.4.7 External Help

While testing the Academy, it also became clear that teachers, especially older teachers, do not always trust online sources. Asking for an explanation revealed that this has nothing to do with the design of the Academy, but the mere idea of video. As teacher credibility is one of the biggest factors impacting learning efficiency (Hattie, 2019), this was quite worrying. So I looked at several ways to mitigate this problem.

Luckily, I managed to solve the problem by accident. In one of the last interviews I spoke to one of the external employees of Faqta, one of the trainers handling the implementation course. He was visibly worried for his job. For this reason I added a button in the inventory page (see Figure 34) where users were able to request a companion course, held physically by one of the external trainers. My idea behind this was that it could be an additional source of revenue, which was not at all my main concern with the Academy. Still, I wanted to address the viability of the Academy.

What surprised me was that the same teachers that were worried about the credibility of video also stated that the combination of digital courses and regular old-fashioned courses would be more valuable than these options individually would be. It must however be noted that other teachers did not have strong feelings one way or another.

In my interview with one of the external trainers it was also clear that their main work was calming down the teachers so it appears external trainers could definitely help with creating a supportive social environment. And as trainers need to be paid for, it likely also means that school teams will work together on completing a course, when the school is paying for training, which also nudges teachers into working together. Speaking of working together, I also looked at supporting this practise in the Academy.

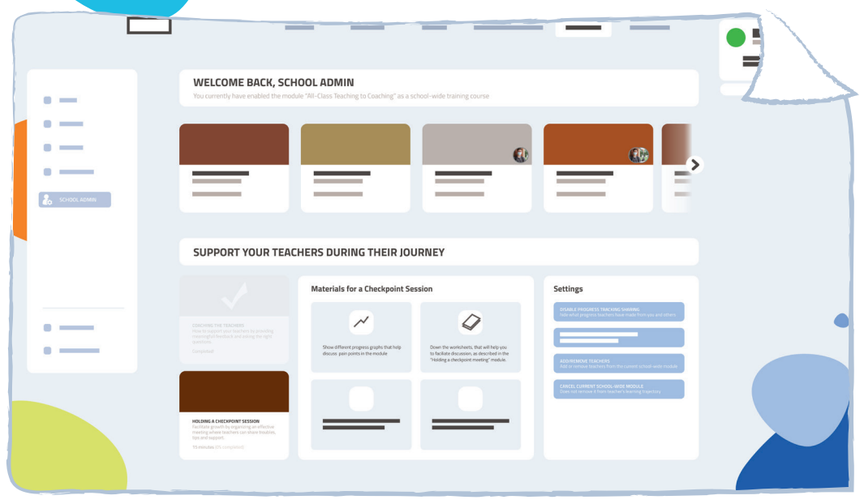


Figure 35 - Paper prototype for the school admin screen

2.4.8 Working Together

It makes sense to support working together on a course. To support the creation of a learning community to encourage ownership (Rainer & Matthews, 2002), and to create a feeling of belonging, but also because working together on a common goal is also a form of gamification, which I will discuss in *2.5.5 - "Social Elements"*.

Initially, I designed a screen (shown in Figure 35) where school administrators could select a course and add it to everyone's queue, and see the progress of the teachers. In this same screen I thought of offering short modules; not for the teachers, but for the school administrators, to teach them to teach the teachers in a way that fits with Faqta's approach and builds up a feeling of relatedness.

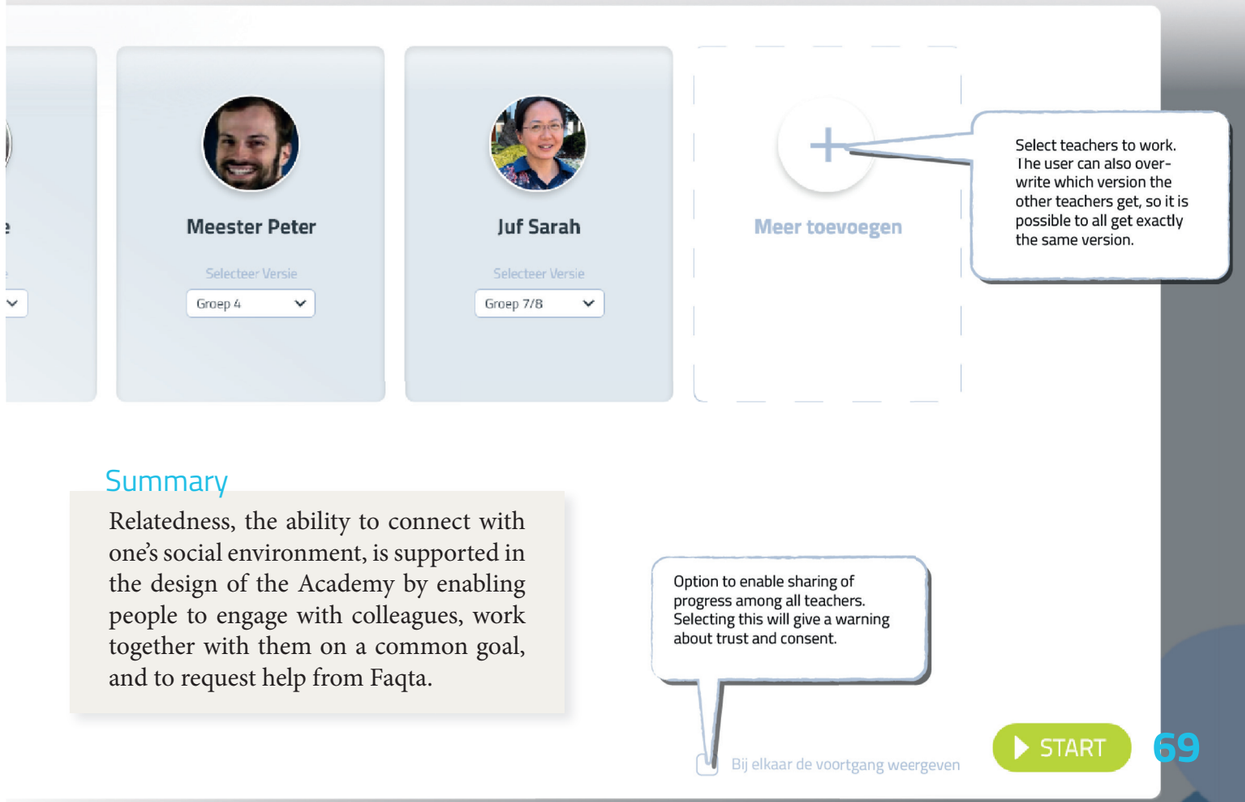
While the idea to teach the school staff to function as a coach for the teachers was met with support, the idea that school administrators could follow the progress of teachers was met with contempt by some teachers and administrators. That makes sense: it creates an environment not of social encouragement and trust, boosting Relatedness, but of implied control, undermining Autonomy & Relatedness alike.

However, other teachers insisted that such a screen was a necessity, or they feared some colleagues would not at all look at the Academy. They indicated that such 'unfairness' would likely demotivate them from putting effort into the Academy. Ryan & Deci do not specifically talk about fairness in their theory of Self-Determination, but it could be argued that fairness can be seen as a form of respect to your fellow colleagues, respect being mentioned as a factor for Relatedness (2012).

This is a conundrum. What's more, this design also fails in another way. Discussing the prototype with several stakeholders within Faqta, they informed me that some schools work without a hierarchy. In these schools there would be no administrators to start a school-wide course.

So I looked at simplifying the system. In my last prototype, when teachers selected a course to add to their queue, they got the option to work together on it. If they selected this option, they would be taken to a screen where they can add teachers to work together with.

Figure 36 - Last prototype with a simplified experience. Still, teachers are in complete control.



In the queue page an option would appear that would enable progress tracking. Before they could enable it, a confirmation would pop-up informing them that it would be enabled for everyone and that they should likely ask for consent first. This way, the Academy forces the user to discuss trust beforehand, hopefully leading to relatedness.

Testing this with teachers from both sides, both seemed to be content with this approach. While it is to be seen whether it helps with Relatedness in the long term, for now it seems to be able to support both trust and fairness, depending on the approach of school teams.

2.4.9 Subchapter Conclusion: Workflow

Looking again at the workflow of the Academy, the integration of Self-Determination alters it again, as shown in the darker shade of blue in Figure 37. The possibility to work together is supported by the possibility to work together when selecting a course. Feedback, important for competence, is present after practise in the classroom, in the form of reflection/retrospection. The right challenge rating is integrated in both the manual selection of modules, but also in the automated selection of courses through a questionnaire beforehand.

And choice is also clearly added to Figure 37 when comparing it to workflow shown previously: dashed arrows indicate the possibility to stop, quit, postpone, skip (parts of) or repeat (parts of) modules and entire courses. Choice is of course important for Autonomy, but so is rationale, which is what the modules should start with, also looking at the Golden Circle of Sinek.

In the entire Academy it is important the user can make choices. The Academy should only mildly advise on what choice to make.

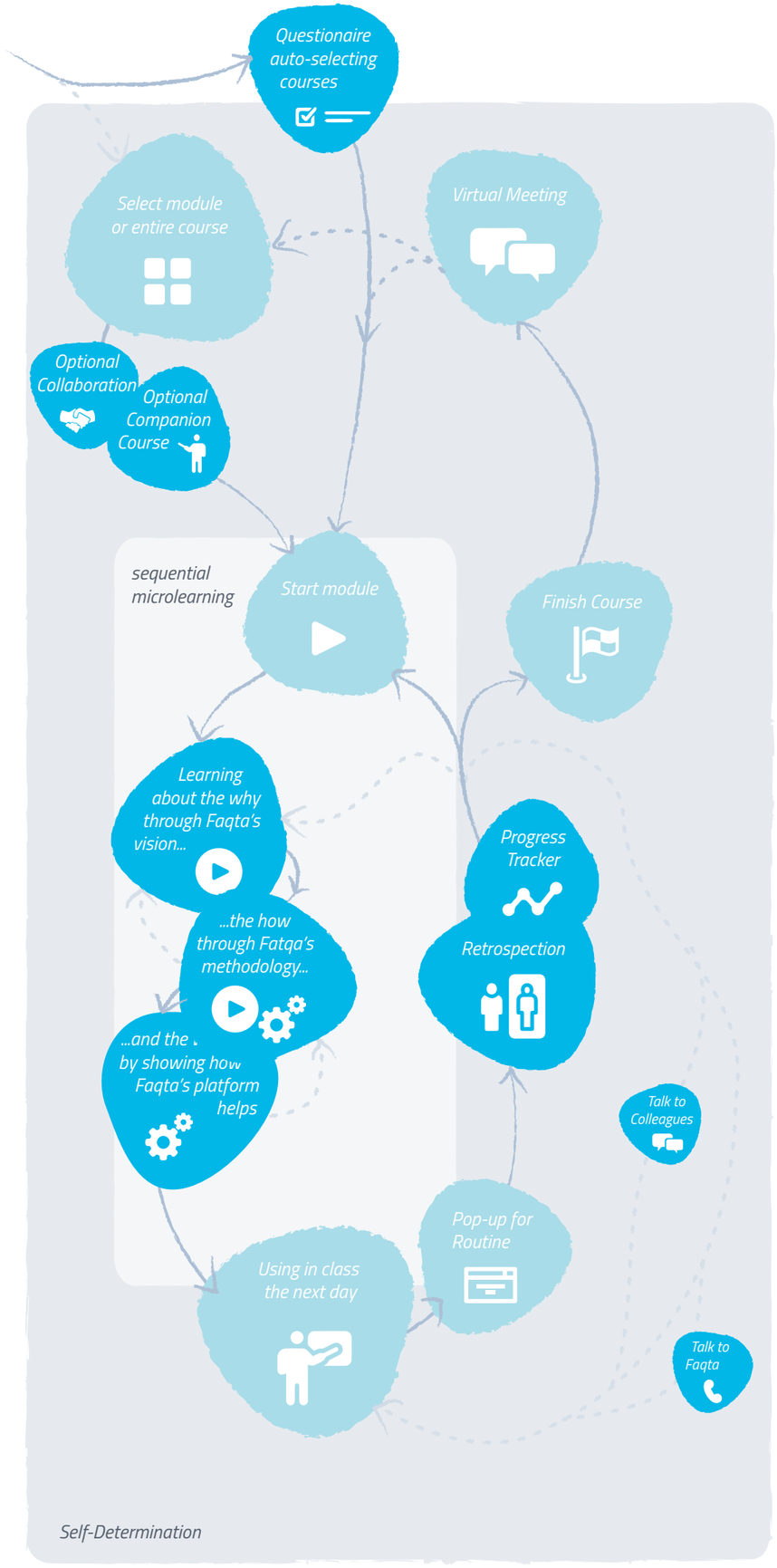


Figure 37 - Workflow flowchart, with the shade of blue showing alterations since last time

Chapter 2.5

MAKING IT FUN

The last design strategy for the Academy I explored is 'Making learning Fun'. This does not stem from the needs or motivations of the target audience like the other two strategies, but from Faqta's own vision. One of the core aspects of Faqta's vision is that learning should be fun, so the children will be thoroughly motivated to learn and explore. I tried to translate this aspect of Faqta's approach to the Academy, looking mostly at gamification. Gamification, according to Hattie, has a positive effect on learning, but is not among the strongest effects. However, boredom is one of the strongest negative effects (Hattie, 2019), so perhaps Gamification can prevent boredom and hopefully encourage enthusiasm for the learning process itself.

'Making learning Easy' primarily concerned sub-question 1, "How can people be convinced to try the Academy?", while 'Making learning Free' primarily concerned sub-question 3, "How can the teacher be inspired to actually apply what they have learned in their work?". This is not It comes to no surprise then that this subchapter will mostly look at sub-question 2, "How can the Academy keep them engaged & motivated to keep learning?", starting with the theory for gamification.

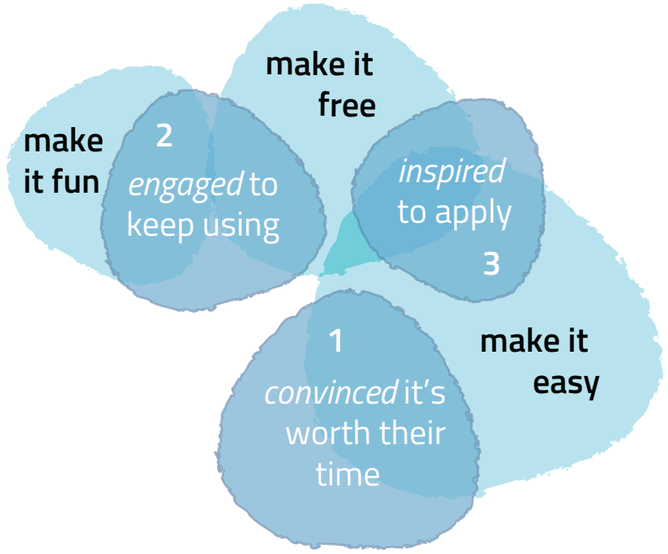


Figure 38 - Three subquestions and which design strategies address them

2.5.1 Gamification Theory

Gamification in education is nothing new, and the basic elements have been thoroughly researched and validated. For example, Strmecki, Bernik, & Radosevic (2015) specifically looked at applying gamification in online learning platforms, and they analysed the effectiveness of several game mechanics and dynamics on motivation and education. Mechanics being the functional components users interact with, and dynamics are the interaction between these components and the user (Zichermann & Cunningham, 2011).

Strmecki et al. do state two prerequisite conditions for the gamification to be effective: as much feedback as possible and the freedom to fail. Rapid Feedback should speak for itself, and Freedom to fail means that the "Student is allowed to experiment on their own, there isn't any barrier on what the student is allowed to do, as well as when to do it. Inside any level, the student can access certain activities for an unlimited amount of time for the sake of learning. Challenge is open throughout the whole time that the e-course is active, so students can go back and forward with testing their knowledge" (Strmecki et al., 2015).

The importance of Freedom to Fail, and Rapid Feedback is also confirmed in a study by Stott & Neustaedter (2013). Additionally, they also highlighted the importance of player agency, the idea that the user actually has some input in the effects.

The funny thing is that all of these prerequisites seem to almost completely overlap with the three components of Self-Determination Theory. Van Roy and Zaman agree, and found that Self-Determination Theory can explain the prerequisites for gamification in education in particular (2017). They go on to introduce even more prerequisites for gamification based on Self-Determination Theory, but luckily all of these are already present in the Academy with the integration of Self-Determination Theory in *Chapter 2.4 - ""*.

This leaves nothing in the way of implementing game mechanics. The first mechanic I looked at is the easiest and most obvious to implement: rewarding.

Summary

One of Faqta's core beliefs is that learning should be fun, so I looked at bringing this to the Academy too. Gamification is a good way to do that. There are certain conditions that have to be met to add gamification, but they overlap with 'Making it Free', so they can be ignored.

2.5.2 Rewarding

For a reward to work, it must be “a designer’s artwork”, ”it should be fun”, and “somewhat difficult to obtain” (Strmecki et al., 2015). Strecki et al. specifically looked at badges, and found that this is one of the easiest ways to create a reward system for e-learning platforms. Also advisable is to show unobtained badges in some way, to drive people to collect them. It is however important that the rewards remain intangible, as tangible rewards can undermine autonomy (Ryan & Deci, 2012). So no physical trophies or fiscal rewards for the best learner.

In my initial design, I added a board of badges on the homepage of the Academy. When test participants completed a module, they would obtain a badge through a simple and very minimalistic animation. This animation serves to highlight their achievement. The badge itself I designed to be a unique artwork for every module.

This however proved too easy to obtain. Some users exclaimed, while thinking out loud, that they felt overwhelmed by the amount of badges they could obtain. To solve this, I removed the badges per module and instead only gave a badge for finishing a course. Van Gessel actually took this idea and come up with a different approach: handing out badges based on their progress towards learning certain skills.

Figure 39 - First design, with animated badges and graphs

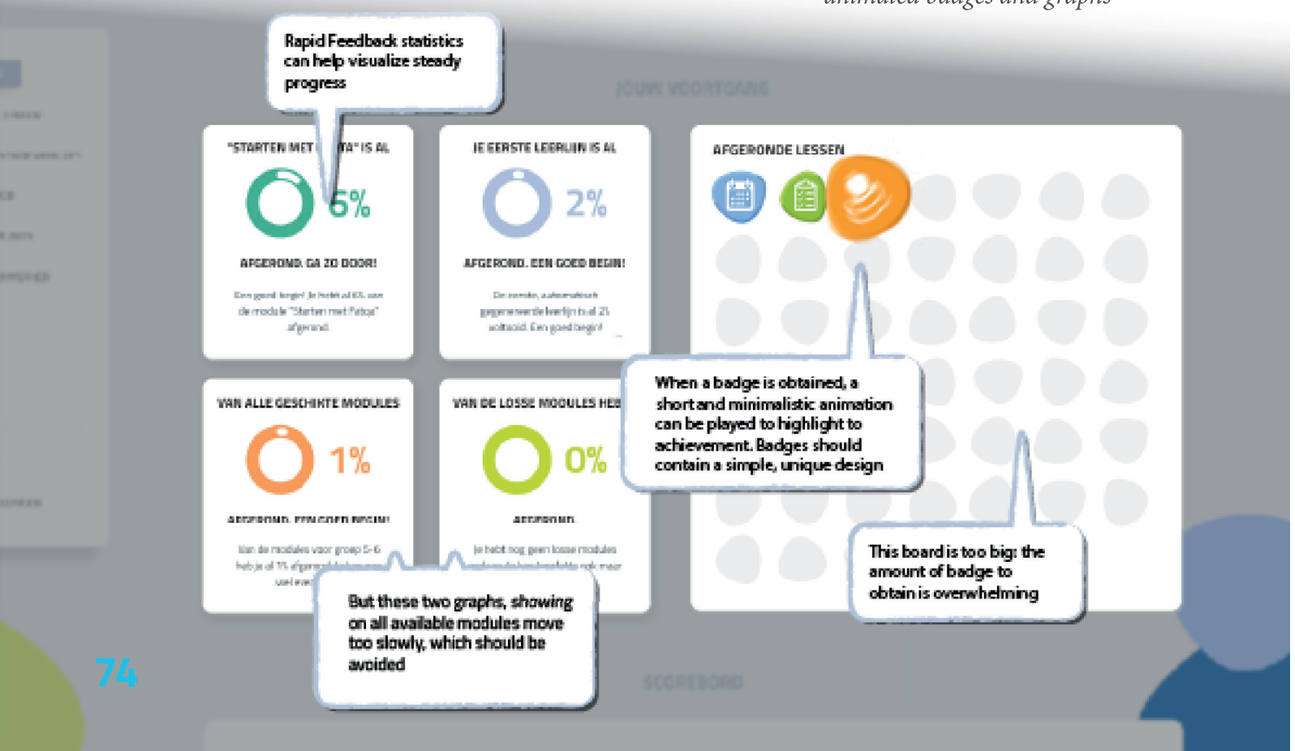


Figure 40 - Tracking progress to skill-based achievement badges, as designed by van Gessel

This makes a lot more sense. The goal of the Academy is not to finish courses, but to learn, and the gamification should highlight the importance of learning, and match the goal of the participant. Gamification should be coupled to the intrinsic motivation of the target audience (Stott & Neustaedter, 2013). And intrinsic motivation is, among others, the motivation to learn (Ryan & Deci, 2012). Teachers preferred this approach when presented with both options, as long as it is clear which courses and modules help them progress towards these badges. Showing the process towards obtaining these badges is also important, as rapid feedback is one of the prerequisites for gamification (Strmecki et al., 2015; Stott & Neustaedter, 2013).

As for the design of the badges, the effectiveness of the badges appears to indeed increase if designs are unique, as Strmecki et al. suggest (2015). When presented with multiple designs for badges, test participants mostly choose the minimalist, but unique designs, indicating that is the most motivating design.

2.5.3 Feedback

I also looked at adding a bit more feedback to the Academy in the form of statistics on the home page. Simple graphs showing the progress of going through the Academy and how many modules the user completed. These were generally liked, except a few specific ones showing the progress of the users compared to all available modules.

These graphs, as shown in Figure 39, would move only very slowly if a lot of modules are available. During testing this bothered several participants, who felt ‘overwhelmed’ by how much they would have to complete. Therefore these graphs should not be shown unless there are no courses in the queue. This way, these graphs will never animate after finishing a module, as they will only be visible if no modules are queued up.

Instead, graphs showing much of the current queue and current course has been completed. These graphs should move much quicker and therefore not feel as much as a big task.

Summary

A relatively easy way to add gamification is to add small rewards in the form of collectables and simple, minimalistic animations.

2.5.4 Visual Design

The most difficult part of gamification is to get an audio-visual design that works for the teachers. There appears to be a very thin line between 'fun, engaging but professional' and 'childish and condescending'. A minimalistic animation works for the teachers, but if sound effects or firework particles are added, teachers immediately dislike it. I tried to add fun animations and sound at points in the workflow where users should feel like they accomplished something, but it very easily became too patronizing for teachers.

This I found very curious, so I decided to look slightly more into this. I collected a whole bunch of visual designs (Figure 41) intended for teachers, and sorted them based on abstraction and childishness. I then asked several teachers to rank their visual attractiveness and how seriously this design addressed them on a scale of 1 to 7, shown in Figure 42 and Figure 43 respectively.

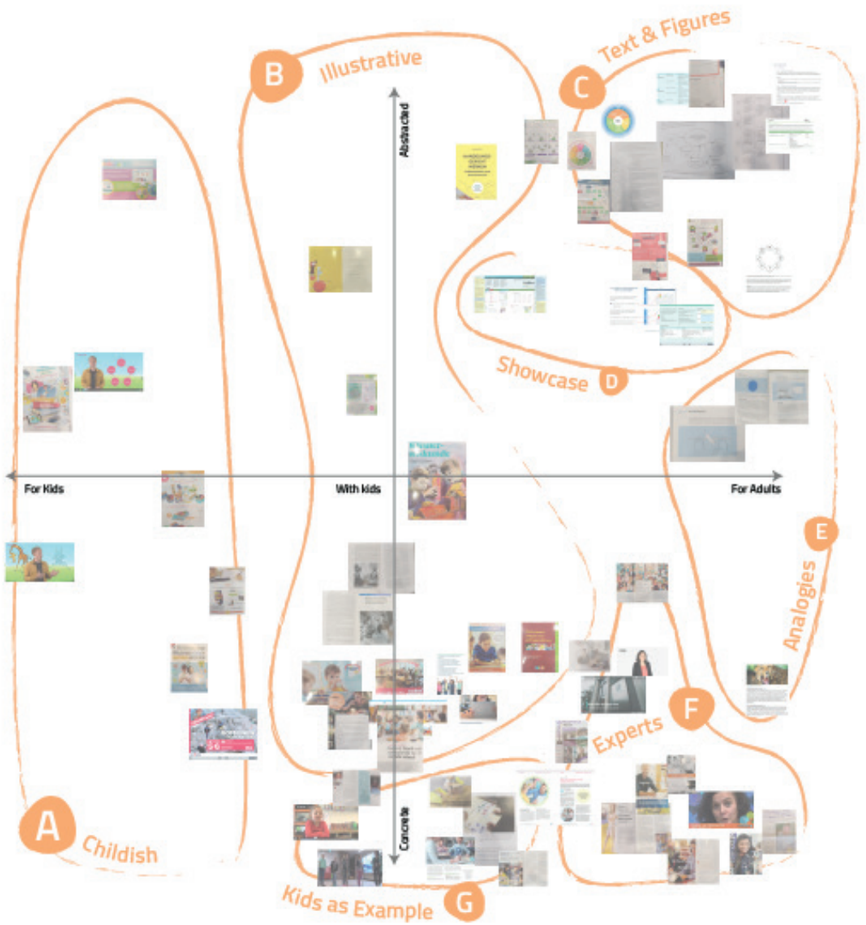


Figure 41 - Visual designs for teachers, sorted on childishness and abstraction level. General intentions of illustrations also appear to group together

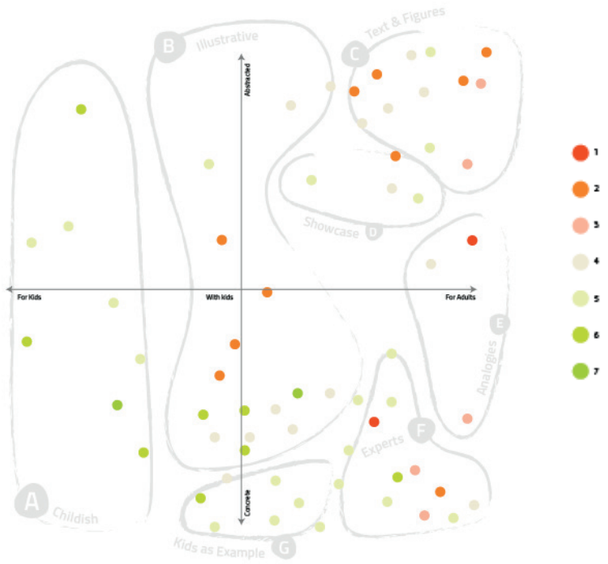


Figure 42 - Ratings for Aesthetics. In general, more childish designs were rated more visually pleasing

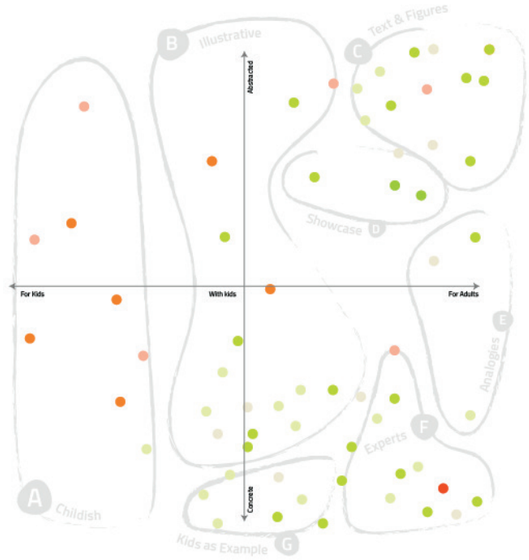


Figure 43 - Ratings for Seriousness. In general, less childish designs were rated more serious and respectful

Visual attractiveness, because it is important that the design of the rewards (Strmecki et al., 2015) and the Academy as a whole is engaging. The second factor was too see whether they felt respected as expert teachers by the designs, which is also important as teacher-student relationship (or in this case student-online learning platform relationship) has the largest effect on learning. Respect is especially important (Hattie, 2009), which is also confirmed by the Relatedness aspect from Self-Determination Theory (Ryan & Deci, 2012).

I found a clear correlation between the childishness of the design, the abstraction level of the design, and the response of the teachers. A low abstraction level, such as a pure video of children playing, was always liked. But as soon as abstracting elements were added, there was more clearly a balance. Childish drawings were seen as lacking seriousness and respect, while pure text was seen as visually unappealing. Combining the two, as in Figure 44, shows a pattern forming.

Figure 44 - Average between Seriousness and Aesthetics. Green means both scores were relatively high in this area.

Does this mean that the best approach for visual design for teachers is to stick to the lowest abstraction level? No, as different abstraction levels have different purposes. As also shown in Figure 44, things like graphs and text generally have a high abstraction level, but graphs are still are necessary to communicate abstract concepts to teachers.

It mostly means that a minimalistic, simple and clean design is necessary, to remain professional, and only minimal motion can be added to add an element of fun. Luckily, the design of the Academy made by Van Gessel is already clean and professional yet still visually engaging, something which all teachers I tested with noted. I did also look at what this might mean for the design of the content for the Academy, in *Appendix A*. For now, it can explain the difficulties I had designing gamification elements for teachers, and shows how special care has to be taken when designing fun visual elements for teachers.

Summary

There is a right amount of childishness to be reached in order for visual design to be fun and interesting, but also professional

2.5.5 Social Elements

Strmecki et al. also looked at leaderboards, something which Huang & Soman classify as a 'social element' (2013). However, Strmecki et al. found the implementation of leaderboards difficult to pull off within e-learning platforms (2015). This makes sense looking at the Relatedness element of Self-Determination, as competition completely undermines relatedness (Ryan & Deci, 2012). What causes competition to work in some contexts and not in others is unclear to me, perhaps it does not work when competition is between members of the social group that should be the inclusive environment. Maybe it is only between members of different social groups, but that is a complete guess. What is actually clear to me is that leaderboards are not appreciated by teachers. Some test participants showed some interest in the leaderboards, but others flat out rejected the idea. I did look at an opt-in system for the leaderboard, but I estimate that it is not worth the investment from Faqta, especially seeing how it can undermine relatedness.

What does work is a concept introduced by Huang & Soman, interactive cooperation. By giving people a common goal to work towards, additional motivation can be created. This, however, I already discussed in *2.4.8 - "Working Together"*. I also looked at further gamifying this experience, by giving a visual storyline, but this was not appreciated by teachers. In fact, a storyline was not at all appreciated by teachers.

2.5.6 Storyline

Using storyline for gamification is something which is much less researched in the context of education. I have looked thoroughly at implementing storyline, because at one point during research I was looking at facilitating knowledge sharing between teachers and for this I looked at creating a shareable experience. I deemed a story as a perfect fit for a shareable experience.

Ultimately, I designed to drop research knowledge sharing between teachers as I discovered it was difficult to accomplish and could be a project on its own. But from my attempts to create a shareable experience I did learn; I looked at multiple ways of mapping teacher's learning experiences to a story, and I could not do it. Teachers were not motivated at all by the story elements I tried to introduce, even if I tried to keep it as simple as possible, such as a literal story about the learning experience. Teachers were not only not motivated, they were even actively demotivated if maintaining the storyline costs additional effort and time.

Stott & Neustaedter found that game mechanics come in many forms, and that one mechanic that works in one context might not work elsewhere (2013). And this is definitely the case for the use of a storyline. My conclusion from this is that storyline elements are simply not the right gamification element to try and apply to Dutch primary school teachers.

Figure 45 - Highlights of my failed attempts at bringing storyline to teachers

2.5.7 Lesson Gamification

In my attempts to create a shareable experience, I also looked at gamified assignments to add to the lessons. In my different attempts, I learnt that the gamified experiences should be kept simple, easy and quick, for teachers to be able to engage. This makes sense, as I already found out that minimalistic designs are necessary to prevent teachers from feeling disrespected, and that time is one of the biggest obstacles for teachers to be able to engage (see *1.4.2 - "Motivations"*), so any gaming experience longer than strictly necessary would be seen as waste of time, which teachers confirmed in my various design attempts - 'no that would take too long'.

What also worried teachers was the repeatability of gamified experiences. Teachers somewhat liked some of my designs, such as Figure 46, but said that it would only be interesting once or twice. As programming such an experience is quite a lot of work, according to Faqta, a non-reusable design would be unviable. As I did not manage to find a consistently and repeatably fun gamified lesson experience, I would advise against trying to implement such a system, also because gamified lessons do not greatly increase the quality of education (Hattie, 2009).

Figure 46 - Paper prototype for a slightly gamified exercise, where teachers have to build an action plan. Teachers I spoke to said it 'could work'.

Figure 47 - As a reminder, the retrospection screen, with two sliders to make reflecting easy and quick.

2.5.8 Positive Retrospection

Stott & Neustaedter state Designers should aim to find the intrinsic rewards that engage their target audience, and design game elements around that (2013). In the design of the retrospection screen, as described in *2.4.4 - "Feedback"*, I already looked at connecting to the intrinsic motivation of teachers by connecting one of the components of the motivation of teachers, the children. This retrospection screen was actually one of my main focuses for gamification, and not just to connect the experience to the intrinsic motivation of teachers.

For multiple reasons it is important that users should feel positive about their accomplishments. Self-efficacy, the feeling that one is capable of doing it, is one of the largest factors in Hattie's effect size lists (2012). It can also be seen as a rewording of the definition of Competence, which is "the ability to feel effective in what one does" according to Vinney (2019).

But it is important to not go overboard with the positivity. Not only would it likely not work as teachers might regard it as childish and condescending, but it might also undermine learning performance. According to Dweck's theory of Growth Mindset, students should think "I can learn to do this", as this is much more motivating than thinking with a fixed mindset, "I can't do this". Dweck states that it is important to be honest about the achievement of the student, but to then turn around and help them take the next step in growing (Dweck, 2015). So saying "good job!" regardless of actual progress would not help.

Therefore, users of the retrospection should be encouraged to feel a feeling of accomplishment and positive about their work, but should not overestimate their own progress.

For this, I looked at both visual encouragement and using audio. So far, I did not have much success with audio, and this is the only case where I found some success in the application of audio.

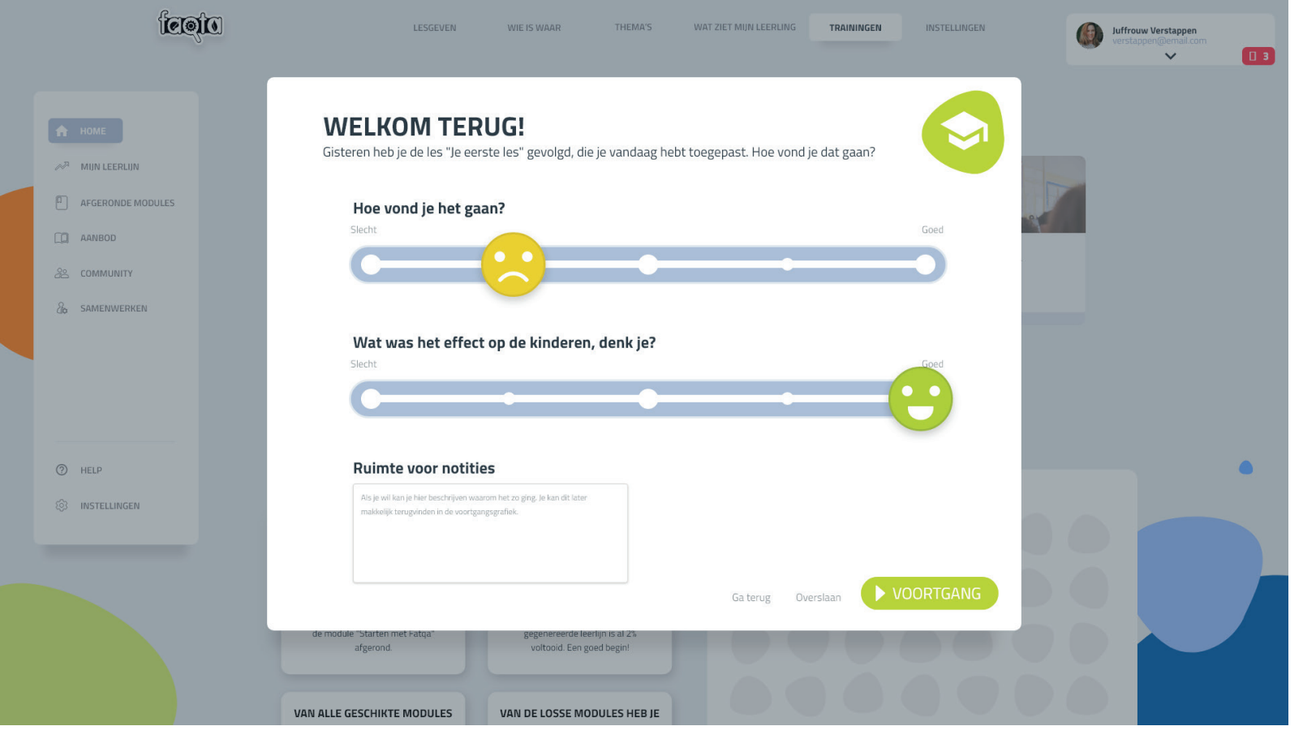


Figure 48 - Sliders with changing colour and faces, and a sling tone increasing or decreasing in pitch

To help visually encourage a positive attitude, I added faces to the sliders that change colour and expression as the slider is moved up and down. Additionally, I looked at several audio designs to support this communication, such as a rattling noise that went up in pitch as the slider moved up. The faces and colours were not remarked upon, so it appears they did not greatly annoy or motivate users. I tested a few sound designs, and the most well liked was a simple continuous tone reminiscent of an electric piano moving up and down in pitch.

I also looked at adding a simple melody to this screen, by adding and testing the response to several existing songs from various sources. Among these were “Close to you” by Nelson Riddle, “Cream in my milk” by Carlo Maria Cordio, “Tulpen Rallye” from The Heinz Kiessling Orchestra, “First Start” from the Nintendo Wii, “Ferðin Til Draumalandsins” by Mezzoforte and “Energy” from the Network Music Ensemble. These songs all have different styles, but are all generally obscure, quite simplistic and mildly positive background tracks.

The song that was most well liked however was “Rate your vid” from a game called Wii Music. That is not to say that teachers actually actively liked it. It just means that none of the teachers I tested with actively disliked the addition of this song to the retrospection screen, this song being the only one to not be actively bothering teachers. Some teachers did somewhat enjoy it, others were neutral. It should also be played a quite low volume, according to the teachers.

Music is quite expensive to commission and compose, so seeing how teachers did not thoroughly enjoy the music I would not advice Faqta to go through the trouble of adding music. The other gamified elements - the changing faces, shifting colours and sliding tone - were appreciated a lot more by teachers. Teachers really seemed positive about them, therefore it is plausible that these elements also nudge them into a more positive mood and attitude.

Summary

Teachers do not like a ‘storyline’ for gamification, and gamification in the lessons itself is also hard to pull off. Social elements do work, but they do not have to be further gamified.

Gamification with interactive animations and audio can be used to help nudge users into a positive attitude in the retrospection screen, important as positive mindset is important for learning and feeling Competence.

2.5.9 Subchapter Conclusion: Workflow

Gamification-like elements can be used to help users think positively. Social elements focussing on working together can also be used to create motivation. Adding rewards in the form of badges to the workflow, shown in Figure 49, is one of the most beloved designs that can be added to the Academy, and very motivating for some teachers with a collectors drive.

However, besides badges, gamification does not significantly change the workflow of the Academy, only the design of some of the steps along the way. Gamification appears to be difficult to pull off for this audience, mostly because the fun visual designs required for gamification can easily feel patronizing to Dutch primary school teachers. Still, I found several approaches and minimalistic designs that seem to work for them. Most important and easiest to implement are game elements giving a simple reward through an minimalistic animation.

And that concludes the entire framework for motivation. In the next chapter I will summarize my findings, look at some other things surrounding the framework and its application, and conclude the project.

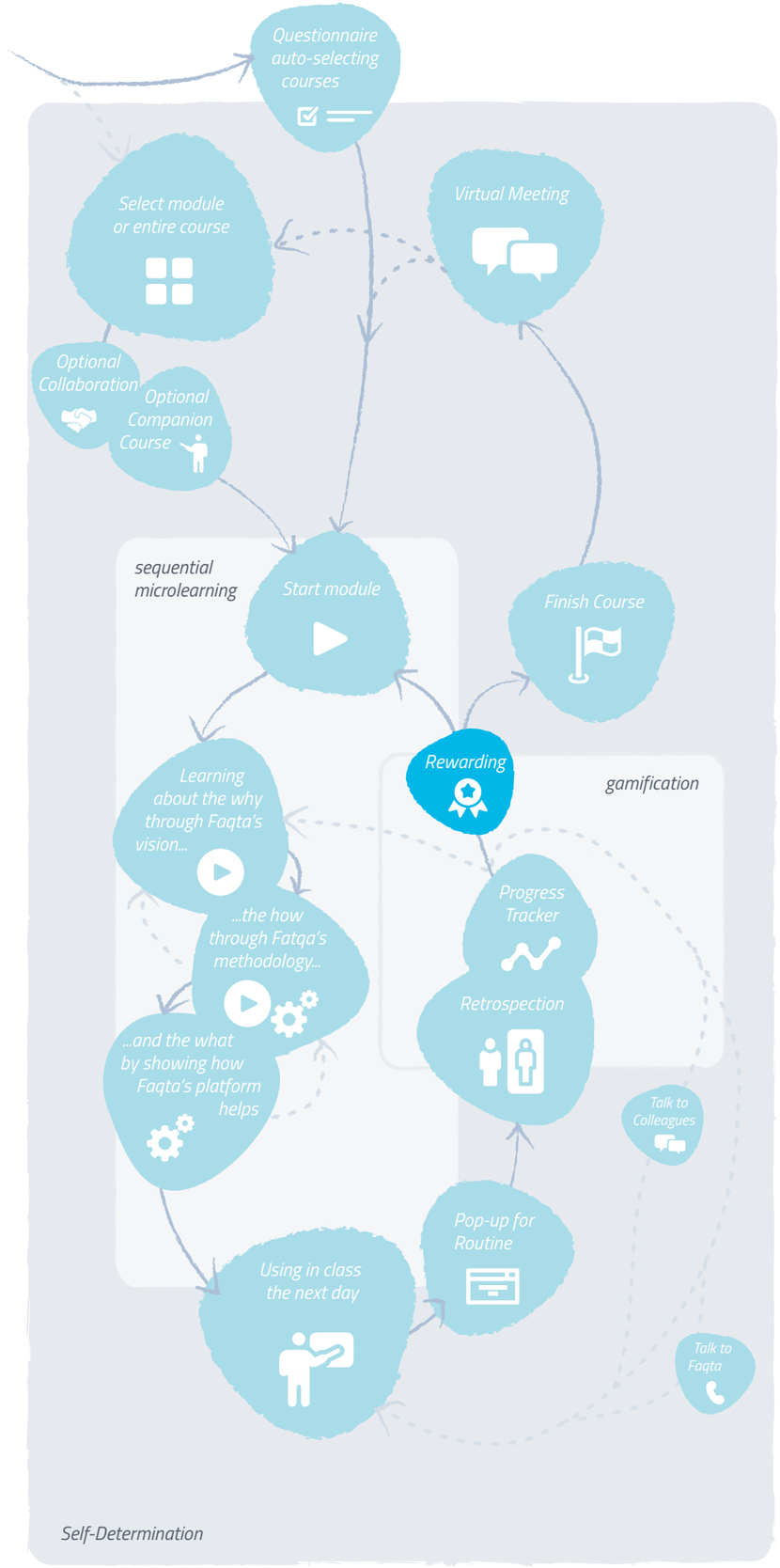


Figure 49 - Flowchart of the workflow.

CHAPTER 3
Connecting the Dots

Theoretical approach of the problem

Chapter 3.1

DISCUSSION

The creation of an online learning platform for an audience that has little time to use it is a difficult endeavour, and to get them motivated enough to start learning and applying what they have learnt is an even more difficult task.

Yet, with the strategies I have explored in this report - making learning easy, free and fun - I have reached a point where I am certain it is possible to create an e-learning platform that does not block or undermine motivation, but even actively supports motivation.

3.1.1 Vision

In the vision for the Academy I created, the Academy can help teachers get familiar with Faqta's vision for education, and learn how this vision is translated into Faqta's methodology, to help them and their field as a whole. The Faqta Academy is the missing link in Faqta's implementation process for schools, as there is currently no tool to help teachers with the clarifying phase of innovation adoption in organizations. In this phase, the innovation has to reach and be made clear to all members of an organization (Roger, 2009) and the Academy, an online learning platform, is the perfect fit.

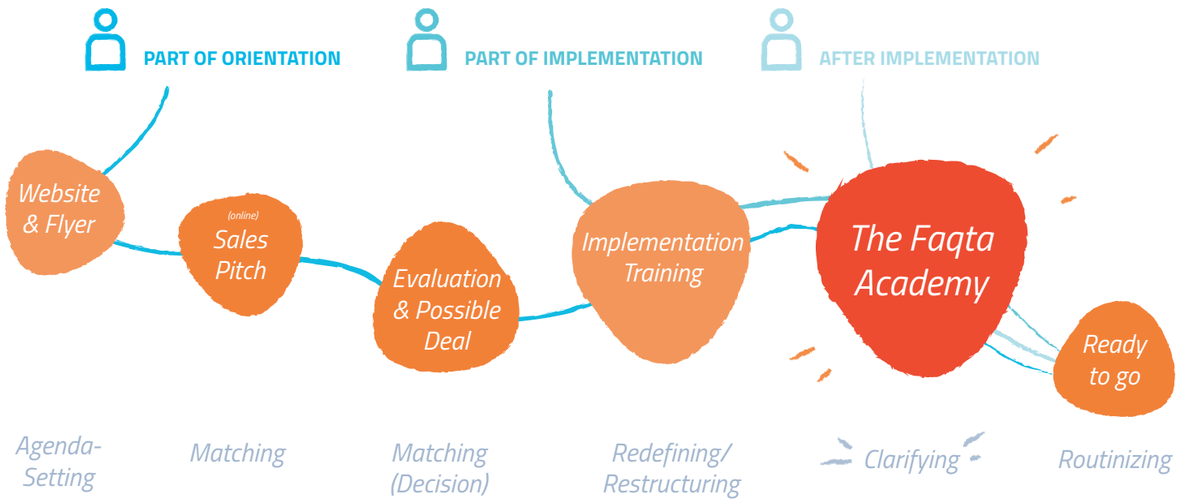


Figure 50 - The Faqta Academy as the last piece of the puzzle, completing Faqta's adoption process.

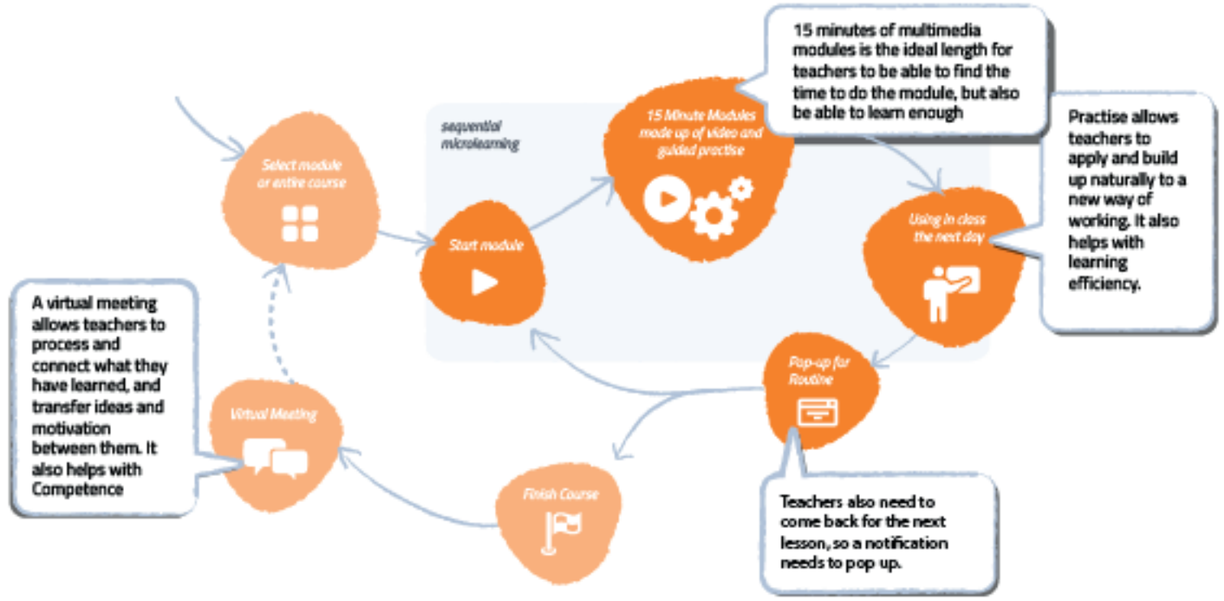


Figure 51 - Workflow of the Academy, looking purely at 'Making learning Easy'. The main learning loop users go through is a darker shade of orange.

3.1.2 Making Learning Easy

The biggest barrier to the deployment of the Academy as a learning platform for Dutch primary school teachers is a high workload and therefore a lack of time to learn. To address this problem, the concept of microlearning should be integrated into the Academy.

Microlearning divides training courses into smaller learning sessions that for teachers are more easily to slot into their busy schedule. It is important to communicate this beforehand so teachers can make an informed decision, otherwise teachers will assume that using the Academy will be a big drain on their time.

- Short sessions of about 15 minutes are ideal for fitting into a busy schedule. This needs to be communicated beforehand, to prevent teachers from expecting long courses that they cannot find time for.

The adoption of microlearning in a sequential manner can also help with another problem: the adoption of innovation. Teachers indicated that large, sweeping changes to their work would block the motivation to try and apply those changes. Faqta introduces a lot of ideas that appear to be incompatible with previous adopted ideas in the field of education; this can disrupt the adoption process (Roger, 2009).

With microlearning deployed in a sequential manner, the Academy can facilitate behaviour change in a more gradual, natural way. My small study does seem to indicate that in order to do that effectively, there must also be a moment where teachers can integrate and connect the learnt material together, something which could be related to 'strategies to integrate with prior knowledge', which is of significant influence on learning efficiency (Hattie, 2019). In any case, it is a form of spaced practise, which is also more effective (Hattie, 2019).

-To facilitate gradual behaviour change, sequential microlearning is ideal, also to help guide the adoption of innovation incompatible with previous adopted ideas in a more natural manner.

-Sequential microlearning should be coupled with a meeting session at the end to help connect the dots. This session also helps motivation by allowing people to ask questions (competence) and discuss in groups (relatedness). To help save time this meeting should be online.

To facilitate sequential microlearning, a learning routine should be established. Between learning sessions teachers can apply the learnt material to slowly build up to a different way of working, and after which they need to be called back to the Academy to get to the next microlearning session. This forms the main learning loop, which users will go through over a longer period of time. Taking this slowly and gradually is important, also when looking at the vision. If the Academy is to help with the clarifying phase, the process must not be rushed, as it might lead to the members of the organization rejecting the innovation: Faqta (Roger, 2009).

- To facilitate sequential microlearning, a learning loop must be established to help guide the learning process over a longer period of time.

3.1.3 Making Learning Free

It is also important that teachers are not forced into this loop, they cannot even be strongly encouraged to make use of this routine. The Academy can only nudge and advise users to behave in a certain way. As soon as the Academy tries to impose or imply control, teachers feel limited in their ability to act autonomously, losing motivation.

This is one of the ways Self-Determination Theory needs to be applied to the Academy. This project has shown the importance of the application of Self-Determination Theory, but this project also provides the basis for a set of guidelines of how to apply Self-Determination Theory in an e-learning platform.

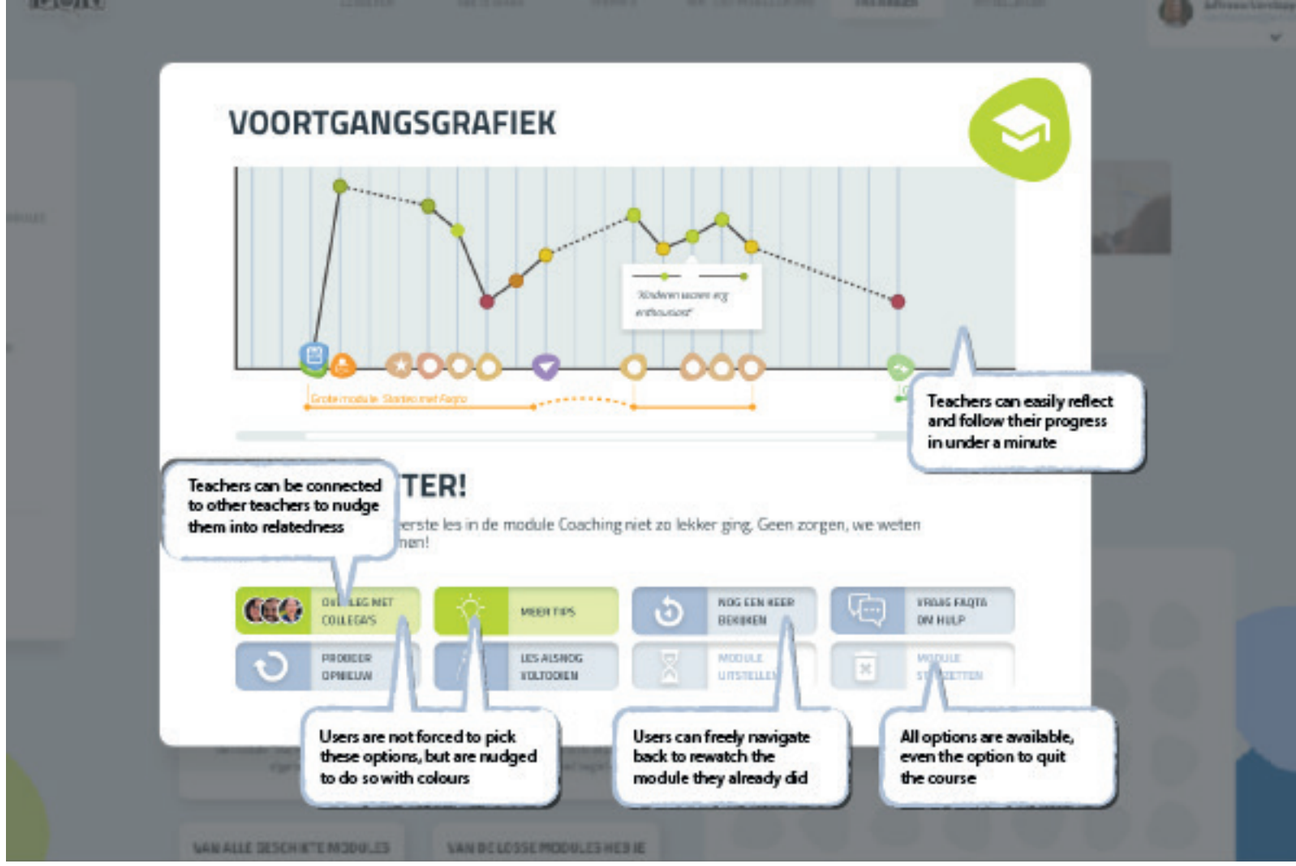


Figure 52 - The progress tracking screen has most of the key findings from 'Making Learning Free' integrated

-Users need to be free to navigate to any section of the module, and be able to freely move between any modules.

-When provided with a set of options, this must be a complete set of all options, including the option to quit.

-Design of the platform cannot make a choice more difficult, it can only add advice through subtle visual cues or textual advice.

Also important is the addition of rationale (Ryan & Deci, 2012). Rationale for the e-learning platform is mostly a section of the learning material itself. Looking at the vision, it makes sense to put this at the front, also looking at Sinek's golden circle. Teachers were more motivated when they understood why they are learning what they are learning. This why does need to remain concrete and to-the-point

- To facilitate motivation, lessons need to start by shortly communicating the vision, particularly focussing on sources of intrinsic motivation - in this case the children.

Next to Autonomy, also Competence is important for Self-Determination (Ryan & Deci, 2012). One way to address this is to give people the ability to take worries away in a meeting with Faqta where they can ask questions. Two other ways of impacting this appear to be importance in an e-learning platform: making sure the challenge rating matches, and positive feedback.

- Teachers need to be able to select courses of the right difficulty level. For this, communicating the required prior knowledge is useful. Also voluntary automated processes based on a questionnaire can work.

- Courses should be constructed in such a way to build up together to a larger whole, utilizing the course classification van Gessel produced. Teachers can then be sorted along this process and guided to that spot.

For positive feedback, self-reflection seems to be ideal, looking at how this is one of the most important factors in learning efficiency (Hattie, 2009).

- As time is a concern, self-reflections needs to be easy and of little effort

Relatedness, the last factor in Self-Determination, is influenced by the social environment (Ryan & Deci, 2012). The establishment of a supportive learner community is also important for ownership (Rainer & Matthew, 2002). And working together to a common goal can also be seen as a gamified experience (Strmecki, Bernik, & Radosevic, 2015). While it is hard to digitally create relatedness or nudge users into such a social environment, I found a few strategies to do so.

- Users can be made aware of others that have learned or are learning the same thing, advising the user to discuss together, especially when motivation might be on the lowest point (when self-reflection is negative)

- Users can be enabled to work together on the same course, optionally following each other progress

- The Academy also can facilitate advertisements for physical companion courses, which will bring in coaches that help facilitate relatedness, and additionally bring more trust into the Academy for some teachers

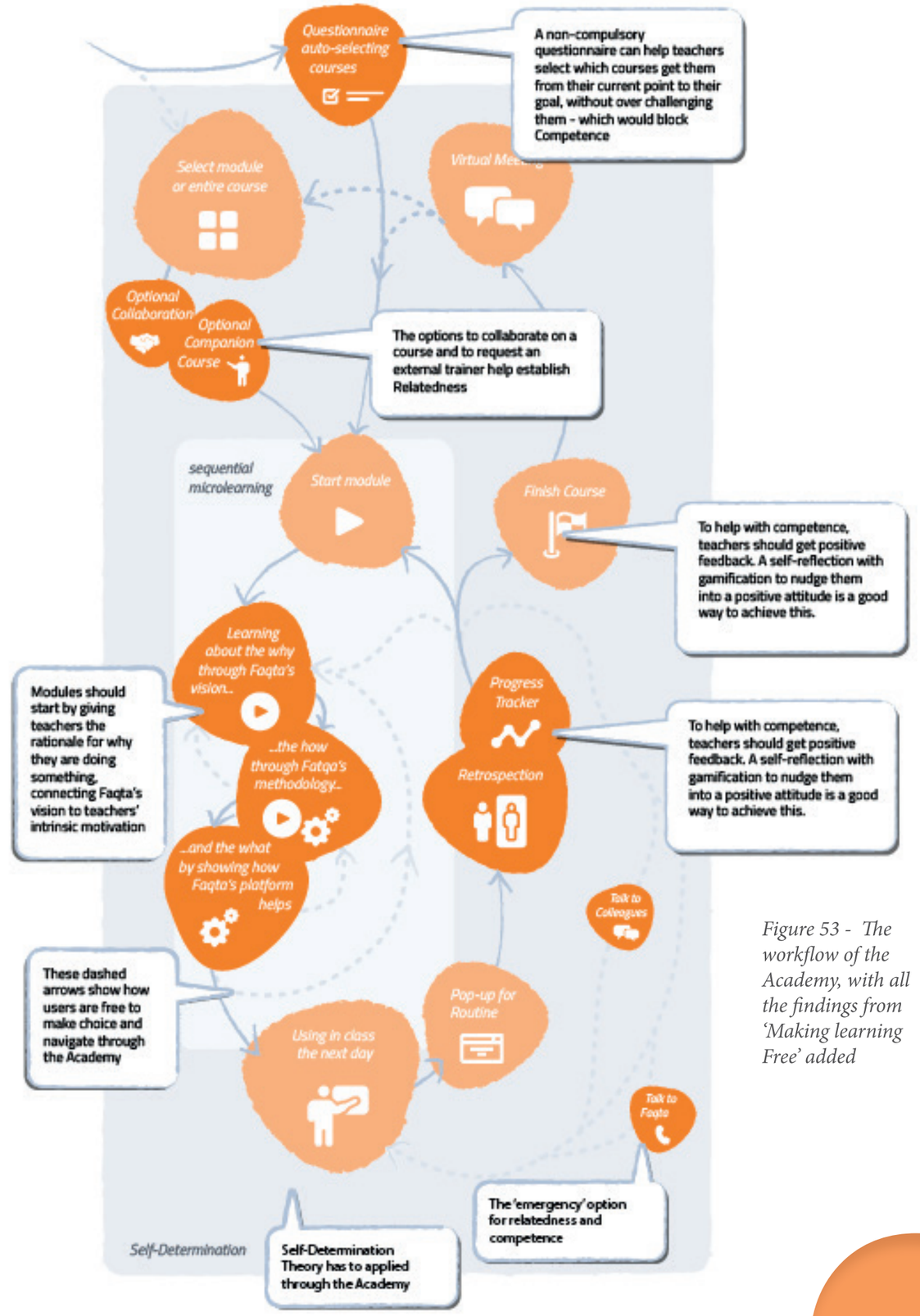


Figure 53 - The workflow of the Academy, with all the findings from 'Making learning Free' added

3.1.4 Making learning Fun

To help motivate teachers during learning, gamification can be used. Gamification, however, is difficult for this target audience. Teachers quickly feel not being taken seriously as professionals, and teachers indicated that for the learning process it is important to be taken seriously.

- Simple rewards in the form of short, minimalistic animations can be utilized to give a small boost to motivation at points of accomplishments in the learning routine.

- Rewards in the form of unique badges for gaining certain skills can couple the reward system to intrinsic motivation.

- To help promote a positive attitude during self-reflection, increasing the chance of the user feeling competent, minimalistic sound design and interactive animations can be applied

3.1.5 Faqta Circle for Adults

The workflow for the Academy I created can also be seen in the context of Faqta's methodology, especially the Faqta Circle. This circle can be connected directly to various points in the workflow. Connecting these might help Faqta develop the actual courses that will be hosted in the Academy.

The *Surprising*, which in Faqta's methodology is the capturing of interest of the children at the start of the theme, is present in the Academy in the decision process teachers go through before starting the learning process.

The *Discovering* here is made out of the modules, the *Doing* is the session in-between modules where teachers practise and apply what they have learnt in the classroom, and *Coaching* in this case takes the form of self-reflection.

The *Deepening* part could be present in the modules at the end of a course. As discussed in the *2.3.6 - "Faqta Connect"*, creative freedom can be given in the modules to allow teachers to experiment what works for them. This creative freedom and experimentation can been seen as deepening.

Concluding is then done in the meeting, where teachers can ask questions but mainly discuss their own way of applying what they have learnt, to transfer ideas and knowledge between teachers.

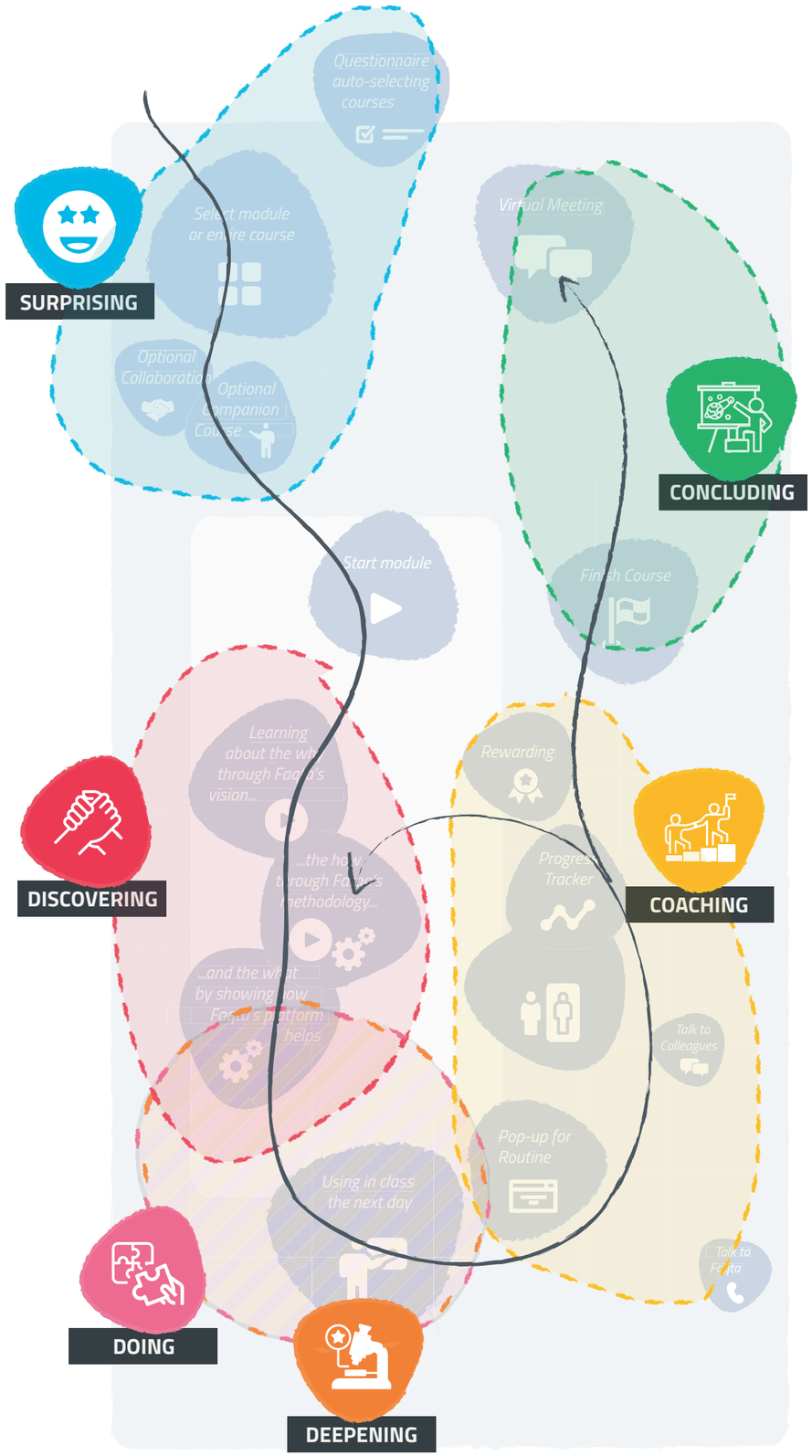


Figure 54 - The workflow compared with the Faqta Circle

3.1.6 Lesson Design

The goal of this project has never been to look at the design of the learning material itself, as I am not an expert on education and not qualified to design such lessons. Yet, I still found some things during my research and design process that will have an impact on the creation process of the lessons.

Most obvious is the application of microlearning, which means that courses will have to be divided into 15 minute modules. These modules should shortly explain why the teachers should pay attention, ideally by connecting Faqta's vision to how that impacts the children. This is based on Sinek's golden circle: first show the vision (shortly), then the methodology, and finally Faqta's platform and how this platform supports that methodology and vision.

Based on the theories of Stichting LeerKRACHT, I would also advise on adding a role model somewhere at the start of the courses, showing the application of Faqta's vision and methodology in practise.

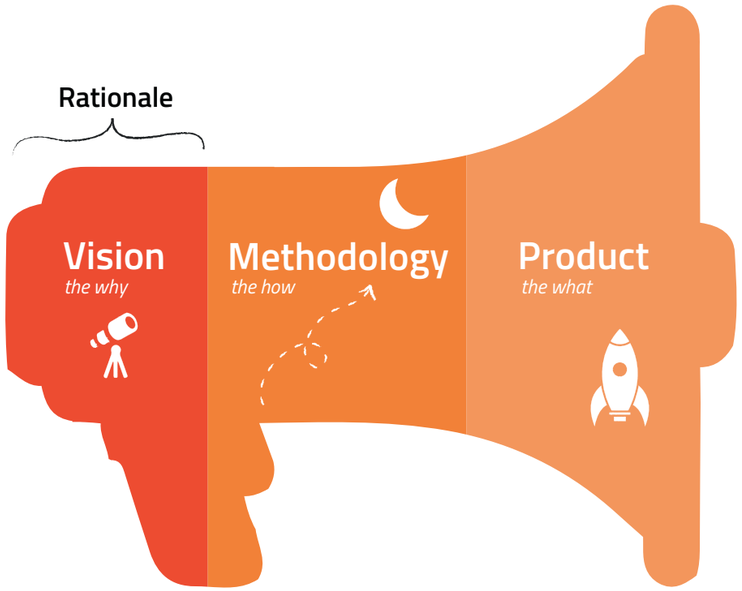


Figure 55 - Using the Golden Circle of Sinek to help teachers understand why they need to learn

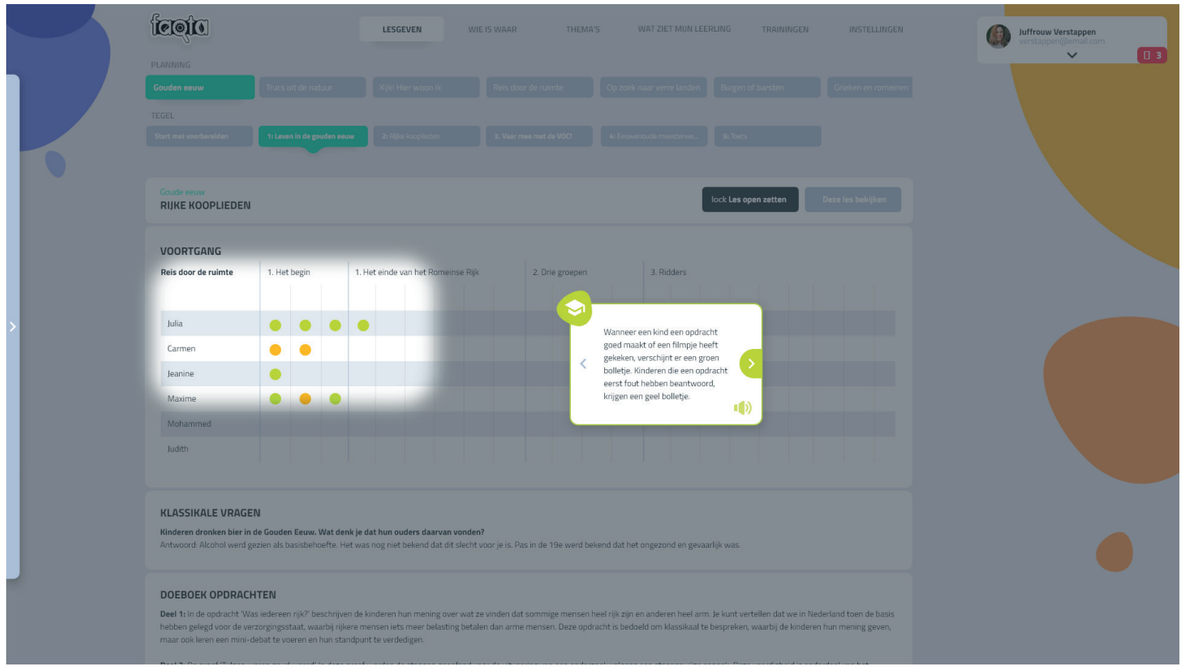


Figure 56 - Example of using appcues to explain in context

At the end of the modules, specific and concrete advice should be given on how to apply the learnt material in the practise in-between lessons. Speaking of practise, I also touched upon how the modules can be designed to facilitate guided practise within the modules, making use of appcues. These can be especially used to show the what - Faqta's platform - in context.

To help facilitate a fruitful discussion in the meeting after the end of courses, courses should also feature some creative freedom. "You could try doing it like this, or this or this, or try something entirely different yourself".

Modules and courses together should build up from the teachers current way of working to how teachers should work with Faqta. This way, the courses can help teachers to adopt Faqta's innovative ideas, even if they are incompatible with ideas already adopted.

Last thing is that teachers are very prone to feel unappreciated and not taken seriously as experts. I did shortly look at video design for teachers, which you can find in *Appendix A*.

3.1.7 Implementation Plan

In this project, many designs, design guidelines and strategies have been introduced. Some of them are very concrete, practical designs that have a high impact on a specific part of the design of the Academy, while others are general design guidelines that need to be applied throughout the entirety of the Academy.

Some of the design guidelines are expensive, time-consuming and/or difficult to set up, while others are extremely easy to facilitate. Some of them are of critical importance, while others only have a small impact on the experience. Therefore, in Figure 57, I have created an implementation plan that takes into account their criticality for the vision, their impact on teachers, their estimated difficulty/ expensiveness of development. This plan should help Faqta prioritize the most critical parts of the Academy.

	Phase 1	Phase 2	Phase 3	Phase 4
Available Courses	A few courses explaining the basics of Faqta	All courses required to fully explain Faqta's vision & methodology	Multiple versions of all courses, for different grades and approaches to Faqta	Also courses available for advanced use of Faqta for specific cases, e.g. gifted kids
Self-Determination Theory	Full Autonomy, teachers can see required prior knowledge for competence, relatedness is up to individual schools	Retrospection added for competence, meeting and colleague connection for relatedness	Companion courses added for some of the key courses, ability to collaborate	More companion courses, questionnaire added to more optimally guide teachers
Gamification	No gamification	Simple animations at key accomplishment screens, interactive animation in retrospection screen	Sound design gamified, reward badges with simple animations, and statistics in home screen	Optional: music is added
Module Design	Short Videos with practise in the classroom in between session	Appcues integrated into some key courses, meetings organized	For some courses optional companion courses are designed	More integration of appcues, some older courses reworked to better fit with other modules

Figure 57 - Implementation plan. the colours of the phases are also shown in the workflow chart, to demonstrate how the workflow will evolve during implementation

3.1.8 Applicability outside Faqta

The results I achieved in this study are specific for the Faqta Academy, but it is not unlikely that many of the same problems and solutions apply to other audiences. The application of microlearning can possibly help with gradual behaviour change and innovation adoption in other contexts. It is especially interesting for target audiences that similarly struggle with high workloads and little time.

The design strategies for applying Self-Determination Theory should be interesting for anyone trying to create an e-learning platform.

The gamification designs are likely the least applicable in other contexts. While my look into existing research might provide a good starting point for other studies, the design of the reward system is too audience specific. Gamification is simply hard to transfer between contexts (Stott & Neustaedter, 2013).

3.1.9 Limitations

During this project, I mostly relied on quick qualitative testing with a limited number of teachers to help in the early selection process of ideation. This means that some ideas that I disregarded within this project might have been able to work, but were disregarded because of an outlier. My final prototype, however, was tested qualitatively with a larger variety of teachers to confirm the validity of the design strategies, so I will maintain substantiation of these claims.

For my exploratory research beforehand, I would have liked to get more deep insights by participatory research on location but the Corona-19 pandemic has limited my abilities to do so, especially as I did not want to overburden the already stressed out teachers. With the start of the project coinciding with the start of the summer holiday, teachers were especially busy, which also limited the potential use of diary keeping or other generative research, as teachers indicated they did not have the time nor desire to participate in such studies. Which is a shame, as participatory design is especially effective for finding deeper knowledge, such as motivations, especially the ones unknown even to the person themselves (Sanders & Stappers, 2012). The reliance on interviews might have resulted in the flawed or incomplete claims about motivations from teachers, making *1.4.2 - "Motivations"* less reliable than I ideally would have liked it to be.

Without participatory design, also not possible due to the Corona-19 pandemic, getting to know the typical workday for teachers is more difficult, so the description of the typical workday in *1.4.1 - "The Typical Workday"* might not have been complete.

The experiment in *2.3.5 - "Does Microlearning Work?"* was a mere pilot study, and a dissatisfying one at that. To make real quantitative claims, a larger group of participants would be necessary.

3.1.10 Further Research

More quantitative research into microlearning has potential to completely reshape the design of adult education to better fit with the needs of an increasingly busy society. Especially research into the feasibility to use sequential microlearning to boost the adoption of innovations incompatible with previously adopted ideas, and more generally the feasibility of using sequential microlearning to facilitate gradual behaviour change, could help reshape (corporate) training courses to help with the adoption of innovations.

More qualitative verification of the design strategies utilizing Self-Determination Theory can help determine how these design strategies can help motivate and inspire people to actually pay attention and apply the learnt material from e-learning courses.

For Faqta itself, I would advise to look more into the design of video for teachers, as Faqta seems to have little experience with designing interesting and appealing videos for teachers.

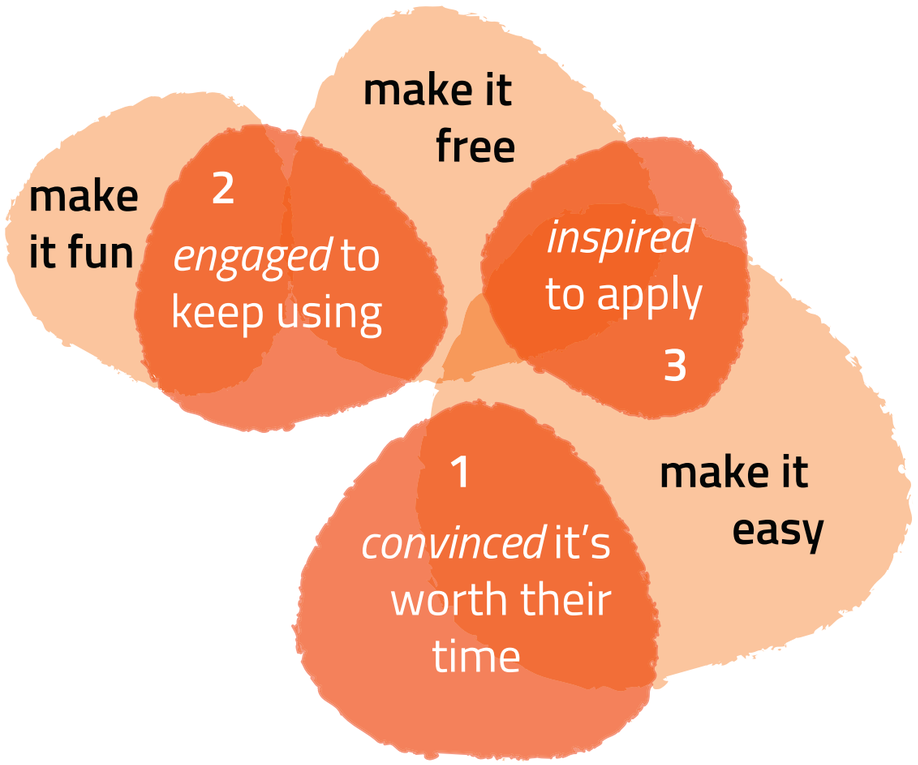


Figure 58 - Answering the three subquestions

Chapter 3.2

CONCLUSION

To conclude, let us look back at the vision for the Academy and the research questions.

How can people be convinced to try the Academy? Well, teachers do want to learn, but they simply cannot find enough time to try it. To convince them, they need to be made aware how easy it is and how little time it costs to use the Academy.

How can the Academy keep them engaged & motivated to keep learning? This is mostly answered by creating interesting content for the Academy. Keeping in mind the design guidelines for applying Self-Determination Theory will make sure the Academy can facilitate intrinsic motivation, as well as internalize extrinsic motivation, which will make it so they will be able to start valuing Faqta's methodology and vision unconsciously, and therefore motivated to learn about Faqta. Teachers also were more motivated to learn if they could apply what they have learned, and if the lessons have a practical approach. For this, sequential microlearning sessions with actual practise in-between sessions helps. This also helps answer the last question.

How can the teacher be inspired to actually apply what they have learned in their work? By making sure what they learn starts from their current situation and slowly builds up to the vision of Faqta. Make sure they have a concrete idea for how to apply it, but also know why they need to apply it like this.

Together, these answer the main research question. How can primary school teachers be inspired & motivated to learn & apply new educational methods with the Faqta Academy?

With these questions answered, nothing obviously stands in the way from reaching the vision I laid out for the Academy. The Academy should be able to be developed in such a way so Faqta can maintain their innovative vision for education and communicate this vision and corresponding methodology to their newest customers.

CHAPTER 4

Appendix & Bibliography

Sources & Sources

Appendix A

VIDEO FOR TEACHERS

At the end of my research, I also looked at video design for teachers. As discussed in *2.5.4 - "Visual Design"*, teachers seem to be prone to feeling not taken seriously with visual designs. As Faqta seems to have little experience designing longer, engaging videos, I thought some research into video design was warranted.

For this, I looked into Mayer's multimedia principles, specifically his design principles for video design. These provide guidelines for designing educational videos, making them as effective as possible.

Then, also based on the research in *2.5.4 - "Visual Design"*, I designed several videos. For the visual styles of these videos, I had looked at a minimalistic animation, an animation that looked like it was being drawn in, a more fluent moving animation, and a video recording. I also had 2 alternate versions of each of these, to have a slightly greater variety and to see whether small changes would have a big impact, which would have undermined the validity of my research.

The script for the video I had validated by someone from Faqta to confirm factual accuracy. The script and audio recording was the same for all 8 videos, to remove this as a factor that could have influenced the results.

As my earlier research had shown lower abstraction levels in general to be more effective, so I had expected non-animated version to be favourite. I tested the videos with 6 different teachers, and asked them about how visually attractive the videos were, and how serious they felt taken as a teacher, and at the end I asked them to pick all the videos that would work for them as a source for learning.

For the seriousness of the videos, I seemed to have a good job. All teachers felt taken seriously and respected by all the videos, although a few things were noted by teachers regarding seriousness.

The visual attractiveness as indicated by teachers differs per teacher, with especially 7 & 8 in Figure 59 contentious. A blend between version 1 & 2, with the narrator only briefly visible at the start of the video, was also offered as a good version by all

teachers. But the one version that was appreciated by all, and appreciated the most, is a blend between version 3 & 4. The movements of version 3 on the clean green background of version 4 would work best. The erasing animation and sound design of version 4 was not appreciated by all, and the lines in the background of version 3 were a bit 'schoolish', taking away from the seriousness of the aesthetics.

The simplistic drawings of people made it easier to associate with and project onto the drawings, according to several teachers. The drawing animation also made the videos more lively than the other options.

As for version 5 & 6, they were not really appreciated by teachers. They indicated that this was because this style of video did not really fit the goal of the video. If the goal of the video was to show how to do something or show a role model, all teachers agreed that this video style would have been the correct choice. But for the goal of this video - communicate a set of options for assessment - a higher abstraction level was necessary for this.

If you want to watch the videos, you can find them by scanning the QR code in Figure 60.

Figure 59 - Eight video designs

Figure 60 - Link to videos

Appendix B

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Picture Sources

Teacher Icon - designed by Geotatah from Flaticon
Parent Icon, Society Icon, Children Icon, Tech Icon, Sales, Gear, Teaching icon- designed by Freepik from Flaticon
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Badge icon - designed by Pixel Perfect from FlatIcon
Video icon - designed by Becris from FlatIcon

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Picture of group writing - Designed by GPointStudio from Freepik.com
Picture stressed person - designed by wayhomestudio from freepik.com
Picture of checklist - designed by lcd2020 from freepik.com

Appendix C

ORIGINAL BRIEF

Attached to the end, see next page.

Adapting Primary Education Methods for Older Audiences — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 26 - 05 - 2021 — 10 - 11 - 2021 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Education is constantly evolving, with new methods and learning theories being developed and adapted for tertiary, secondary and primary education. In the latter, teachers have an especially hard time applying the modern teaching methods. Unlike in secondary and tertiary education, they are not experts in one field but are expected to excel in all fields. They have to prepare lessons in wildly differentiated subjects every day while also managing to keep the children engaged and keeping up with a large mandatory administrative burden.These are demanding tasks and teachers have a hard time doing this already, nevermind also bettering themselves simultaneously, by researching and applying the newest teaching methods.

This is where Faqta comes in, a small company developing cutting edge teaching methods for primary schools in the Netherlands, and also the primary stakeholder involved in this project. They have been developing and perfecting a modern teaching method and software package and have deployed that package over the past 5 years. In Figure 1, the basic cycle children go through for each lesson is shown. In this cycle, the basic information transfer is automated through text and video, as are the assignments and research children do. Teachers, therefore, only have to focus on coaching and spurring enthusiasm and interest.

However, Faqta has noticed that some teachers have a hard time adapting to the new role that their method requires of them and they are currently in the process of creating an adapted version of their teaching method they use for children. This adapted version will then teach teachers, helping them adapt to the new methods, and to help them to prepare lessons and to develop their digital skills.

This is positive for all stakeholders involved. This includes Faqta of course, but also the children and the teachers. The teachers will benefit from better understanding of the teaching method and software, freeing up time more on their main job: teaching. Children will reap the benefits improved teaching will bring them.

The target audience, primary schools teachers, is easily accessible to me through personal contacts and through Faqta. Because the product will be mostly developed digitally, and tested through co-design and data-driven development, Corona lockdowns will be less of a hurdle than for most physical design projects. What is a big limitation is time: development and testing of an education system is a big undertaking and mostly likely I will only scratch the surface. Therefore, I should carefully pick undertakings and focus on research tasks with the biggest impact.

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introduction (continued): space for images

image / figure 1: 6 step learning cycle, developed for childern and to be adapted for teachers

image / figure 2: -

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PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Faqta has already partly developed the learning materials for the teachers, such as the video's, but this content still needs to find a home in an inspiring learning environment. This digital environment needs to be designed, and adapt the six stage learning cycle that was originally designed for children, to fit the needs of the teachers. This lead to the following questions:

1)How can the 6-stage learning cycle be adapted to fit the learning style of Dutch primary school teachers?
2)What are the needs and wishes for an inspiring digital learning environment fit for its target audience?
3)How can self-improvement in teaching be combined with the working processes teachers go through to prepare their lessons?

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I will start by adressing question 2 through interviews and desk research.Then through co-design and data-driven research through design I want to develop a prototype for an inspiring learning environment for teachers, to adress question 1 and 3 simultaneously.

The final delivery will be a concept product online environment that showcases the content Faqta already delivers in an intuitive and inspiring environment, that has been developed to fit the needs and wishes of teachers and can be integrated into their existing pattern of lesson preparation.

This final concept will be developed through 3 stages: firstly a paper prototype for ideating, then a medium fidelity prototype such as Adobe XD for increased test quality, and finally a high fidelity prototype to make quantitative testing possible, combining surveys to test whether participant retain information with data collection such a time recording and misclicks to test the effectiveness of the interface. To address research question 3 specifically, I might need to ask directly about the usefulness of the product and automated surveys often are better at capturing negative responses. The final prototype will likely take some time to develop, but I hope to recycle past projects and assets from the Adobe XD prototype.

In addition to this product, I would like to produce a scientific basis for the effectiveness of the product, as to prove its relevance for modern primary education. This would consist of scientifically substantiated data indicating test participants could recall information presented and find the information they needed. Additionally, I would like to assess whether participants actually liked to use the product for its intended use.

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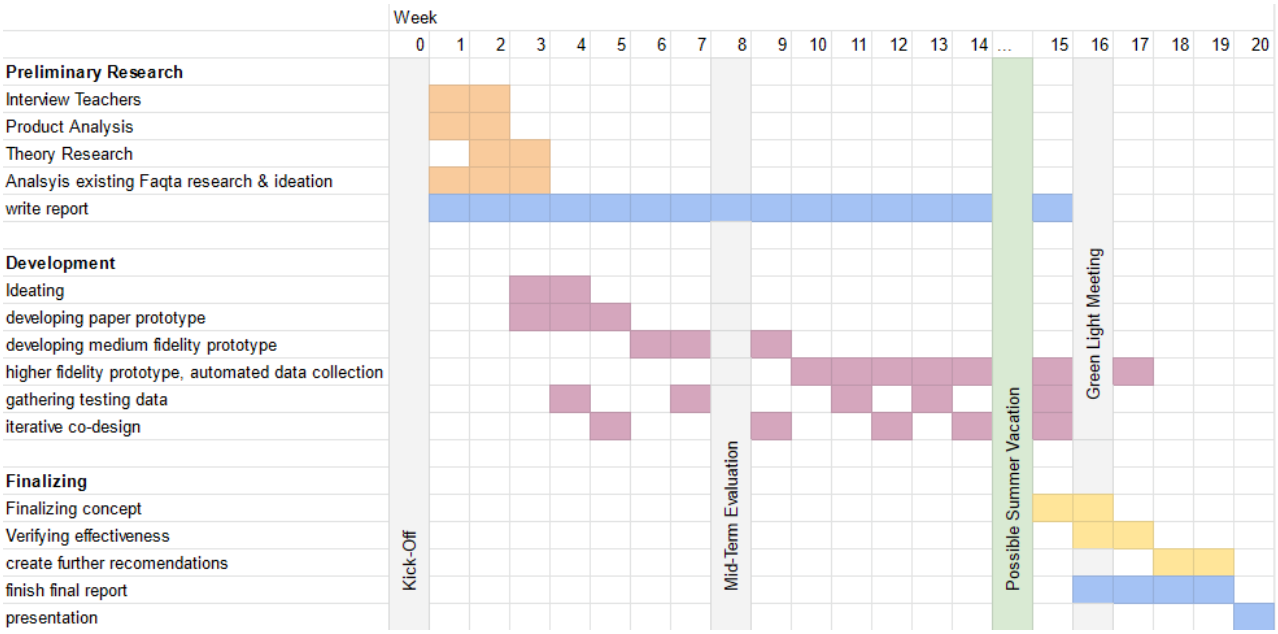
PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 26 - 5 - 2021 10 - 11 - 2021 end date



First I want to get accustomed to the project and stakeholders by doing some various analyses and already write down some of my first findings. Due to time restraints I quite quickly want to move to ideating and development, where I will be going through an iterative process of testing & data gathering, and co-design using this data. In the last few weeks I will be finalizing my product and verifying my finds with new test participants.

Depending on the availability of key persons, such as coaches, Faqta and test participants, I hope to work (partially) throughout the summer vacations but this is very dependent on availability.

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MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

I personally have great passion for the field of education, which is why I choose to reach out to Faqta. I like to have a positive impact with my design and primary education is in my experience one of the first big impacts on someone's life. Furthermore, It troubles me that there is less interest in education within the faculty than I would imagine there could be. While there is plenty of interest in bettering the education of the faculty, the significance of Industrial Design in the field of education is often overlooked, and I hope to explore the possibilities of Industrial Design in the field.

What I hope to learn myself is some of the theories of education and learning, and their application, both for personal application and possibly to help me make future developments in the field of education.

I want to apply various techniques I have learned in the bachelor and master, such as co-design and data-driven design. Furthermore, I am looking to prove my competence as a T-shape designer, with my broad knowledge of programming and various other relevant subjects, while also applying my knowledge as an expert designer. As mentioned before, I want to extend the broad knowledge I have to also cover more education related subjects, such as various didactics.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

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