

MOOC Retention Rate and Motivation

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ABSTRACT	5
INTRODUCTION	6
MASSIVE OPEN ONLINE COURSES	7
NOSTIS	7
VOCABULARY	8
THE RETENTION RATE.....	10
MOOC STUDENTS AND RETENTION RATE	11
REDEFINING RETENTION RATE	12
LONG TERM ENGAGEMENT AND MOTIVATION THEORY	14
UNDERSTANDING MOTIVATION (MOTIVATION THEORIES, EXTRINSIC AND INTRINSIC MOTIVATION)	14
MOTIVATION TYPES AND DIMENSIONS.....	14
ENHANCING MOTIVATION USING GAMIFICATION	16
PITFALLS OF ENHANCING MOTIVATION	18
HOW OTHERS APPROACH MOTIVATION?.....	18
METHODS AND DATA	20
THE FRAMING OF THIS PROJECT	20
THE EXPLORATION OF ONLINE EDUCATION	20
THE SURVEY.....	21
THE MOTIVATION INTERVIEWS	21
THE WORKSHOP	22
OBSERVING USER BEHAVIOR	22
THE PROTOTYPE TESTING	22
WHO ARE THE MOOC USERS?.....	24
USERS OF NOSTIS	24
MOTIVATION OF NOSTIS USERS.....	27
WHY DO PEOPLE LEAVE AND NEVER COME BACK?.....	27
OPTIMIZATIONS FOR RUSHERS AND SAMPLERS	29
THE EXPERIMENT RESULTS.....	30
THE MOOC ONBOARDING EXPERIENCE	32
THE WIREFRAME EXPLAINED	32
THE MOTIVATION HELPER	35
THE LACK OF TIME PROBLEM.....	35
WHY MOTIVATION HELPER	35
DISCUSSION	38
THE RESEARCH REFLECTION	38
OTHER CONCEPTS WORTH EXPLORING	38
THE MOTIVATION HELPER’S NEXT STEP	39
CONCLUSION.....	40
REFERENCES	41

Abstract

The average retention rate among online courses is reported to be around 10%, causing a lot of criticism of MOOCs. But the idea, that only 10% of users are successful and the remaining 90% fails, is wrong. This thesis explores through interviews and a survey, what does the 90% do, what are their motivations and behavior. Then, based on motivation theory and gamification, three MOOC platform optimizations are designed: 1) Improved course main page to convey all the important information the user needs to enroll. 2) Optimized experience for people finishing a course faster than usual. 3) A Motivation Helper aiming to enhance motivation of users by a notification system. All these designs were tested and evaluated, the results and next steps are then discussed.

MOOC retention rate og motivering

Den gennemsnitlige opretholdelse omkring online kurser er estimeret til omkring 10%. Dette har medført en masse kritik omkring MOOCs. Ideen omkring at kun 10% af brugerne har succes og at de resterende 90% fejler, er forkert. Gennem interviews og en rundspørge, udforsker dette speciale hvad der sker med de resterende 90%. Hvad er deres motivationer og adfærd? Baseret på motivations teorier og gamification, bliver tre MOOC platforms optimalere designet. 1) Forbedre kursets forside så den giver al den vigtige information brugerne behøver for at deltage. 2) En optimeret oplevelse for personer der færdiggøre et kursus hurtigere end normalt. 3) En motiverende hjælper der har til formål at forbedre motivationen hos brugerne via et notifikations system. Alle disse designs er blevet testet og evalueret, resultaterne og de næste nødvendige trin bliver derefter diskuteret.

Introduction

In 2014 I have co-created the NGO Nugis Finem which has a motto “There is a better life in more educated society”. Our biggest project is the first purely Czech Massive Open Online Course platform – Nostis. During the two years of its existence we have received empowering feedback from our users which kept me investing my time into improving Nostis. But while I was exploring the vast theme of online education, I have repeatedly stumbled over a critique of MOOCs based on the argument that in average only 10 % of enrolled students complete the course. This sounded like an awful number and it made me wonder what was happening with the 90 %. More than a research question I have constructed a research direction:

Why do people sign up for an online course, why do they leave and how can we encourage them to stay and complete the course?

Exploring and answering this question should help my colleagues in Nugis Finem and other MOOC creators and designers to provide better user experience to their users. In this chapter I introduce MOOCs and then focus on Nostis. I also include a vocabulary of the keywords used in the MOOC world and this thesis.

The second chapter is all about *The Retention Rate*, what it is and why it does not make sense in the current state. The following chapter *Long Term Engagement and Motivation Theory* gives a theoretical introduction into motivation theories and gamification on which I built my enhancements and prototypes.

The next chapter *Methods and Data* gives an overview of methods and tools I have used throughout my research and how I gathered my data. In chapter *Who Are the MOOC Users?* I delve into the world of a MOOC student, exploring their motivations and behavior and why people leave online courses.

Following three chapters *Optimization for Rushers and Samplers*, *The MOOC Onboarding Experience* and *The Motivation Helper* introduce the way I used the motivation theories and the research findings in order to boost retention rate and enhance user experience on Nostis. I close this thesis with a *Discussion* evaluating my approach and describing the next step, and *Conclusion*, where I provide a summary of the whole work.

“If I cite a non-English text, I use a translation directly in the text, but the original in non-English can still be found in a footnote.” – Ondrej

In this kind of box, I share my own experiences. While they didn't contribute directly to my research, my own experience has influenced my work.

Chapter summary

- To maintain an overview, there is a box at the end of every chapter, except the Introduction, summarizing the contents.

Massive Open Online Courses

MOOC¹ is a phenomenon of the 21st century, although the idea of distant education has been around for more than hundred years. The year 2012 was called The Year of the MOOC by The New York Times (Pappano 2012) because the leading universities released their first online courses and the publicity of free online education boomed. But after the initial excitement, a lot of well-grounded criticism appeared. (J. Kim 2012)

The MOOC revolution was meant to democratize education and bring top knowledge to all corners of the world. But these high goals are still not a reality. Internet connection stable and fast enough to play a video course is not available in many parts of the world and there is still the language barrier. Most of the popular courses are in English and although translations to various languages are sometimes present, the content is still not understandable to everyone. (Wildavsky 2014; Glass, Shiokawa-Baklan, and Saltarelli 2016)

Another concern is about the quality of the education with people claiming that the MOOC version of the course is inferior to the on-campus one (Laurillard 2014). The critics say, that from a pedagogical perspective, MOOCs are only focused on the “massive” and they lack any pedagogical innovation. (Karsenti 2013)

Another wave of criticism came because of very low reported retention rate. Only around 10 % of signed up students finish the course, sometimes dropping to a staggering 2.5 % (Ho et al. 2014). But taking just this number without thinking about what it represents is worth even more criticism. Most of the MOOC platforms do not offer any preview of the content without signing up and the sign-up button also serves as “Remind me when the course starts” giving the action several meanings.

Nostis

Nostis is a MOOC platform published in May 2015 by NGO Nugis Finem². Its first course was about Family Law and more law-themed courses followed. The platform was designed and developed by myself, therefore I have deep insight into how it works and access to any data available. At this time, we have 6 courses already, 5 about law and 1 about creativity. We collaborate with professors from various Czech Universities and experts in the field. As of 23rd May, we have 3404 registered users and 1237 certificates given among 4938 course enrollments, therefore we could calculate 25% retention rate across the 6 courses.

¹ Massive Open Online Course is: “A course of study made available over the Internet without charge to a very large number of people.” (“MOOC” 2017)

² Nugis Finem is a Czech NGO created in 2015 focused on educating general public. Czech website is at <https://www.nugisfinem.org>

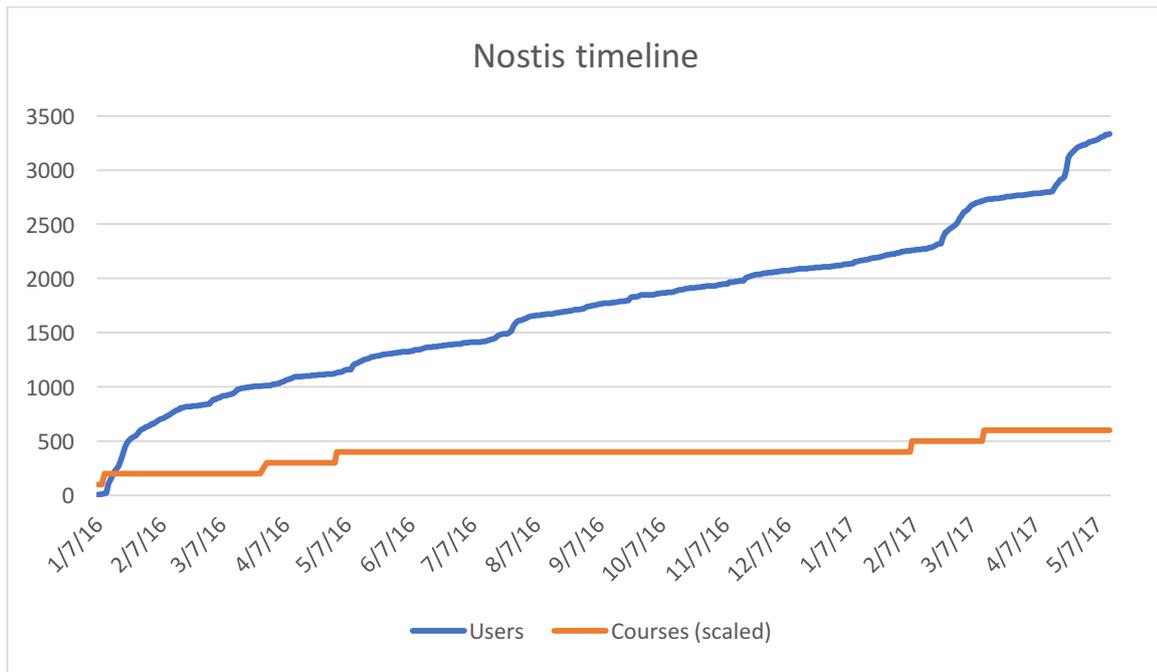


Figure 1: Development of signed up users and courses after a complete redesign in January 2016 until May 2017. Every new course brings a wave of new users.

Vocabulary

Since there are several terms connected to MOOCs that have special meaning, I would like to introduce them to the reader to avoid any confusion further in the text.

MOOC

The classical MOOC is served on an internet platform, where user registers and enrolls into a MOOC. The course has a set starting date and every week a new block of lectures opens containing also a quiz. After scoring a certain number of points in quizzes, user is awarded by a certificate.

Week / Block

A *block* is a set of lectures, often called a *week*, because usually every week a new block is accessible to the student.

Lecture

The basic building block of MOOCs, usually in a form of video. But these lectures can be also graphics, texts or additional materials.

Test / Quiz

Test or a quiz is a typical assessing tool. User is presented with a question and must choose a correct answer from given options. After submitting, user is awarded with points counting towards a certificate.

Peer assessment

Peer assessment is another assessment tool with higher pedagogical value than a test (Kulkarni et al. 2015). It has three stages, often again in a weekly rhythm: The first week users complete a given task by creating some kind of content. (writing an essay or commentary,

drawing diagrams, taking pictures, making a video...) The second week they grade several works of other peers by given criteria. And in the third and final stage the user can see their own content graded by several other students.

nostis PŘIHLAS SE

Byznys a právo

V tomto kurzu se podíváš nejdříve na to, jak funguje Excel, jak v něm vytvořit byznysplán a jak si spočítat, která investiční příležitost je pro tebe ta nejlepší. Poté ekonomii propojíme s právem a naučíme tě, jak to všechno zaúčtovat. Provázet tě bude doktor práv Jan Petrov, který se učil Business law v New Yorku.

SPUSTIT KURZ

První týden 0%

01	Úvod do kurzu Jan Petrov	01:42	
02	Soubory ke studiu Jan Petrov		
03	Základní funkce Excelu Jan Petrov	04:48	
04	Funkce odmocnina, zaokrouhlit a suma Jan Petrov	04:39	
05	Formát a obsah buněk Jan Petrov	04:46	
06	Relativní odkazy Jan Petrov	04:52	
07	Absolutní odkazy Jan Petrov	05:58	
08	Závěrečný test bloku Jan Petrov	Uzavře se za 2 týdny	

Druhý týden od 20.5.

	Soubory ke studiu Jan Petrov		
	Relativní a absolutní odkazy – opakování Jan Petrov	05:55	
	Odkazy - tržby a DPH Jan Petrov	02:31	

Tvůj přehled kurzu

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MÁS SPLNĚNO | BODŮ

45 bodů
TĚ DĚLÍ OD CERTIFIKÁTU

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Restartovat kurz

Figure 2: One of the courses on Nostis. The core elements are title, description and an enroll button. Below on the left is a list of lectures divided into blocks. On the right, there is an overview of points earned showing progress towards the certificate, a list of collaborating institutions and a list of lecturers.

The Retention Rate

The retention rate is for me the most interesting phenomenon in the world of MOOCs. It is a very loudly talked about but utterly misunderstood metric. As stated in the introduction, most reports, papers and criticism is using the value 10% retention rate. (Hood, Littlejohn, and Milligan 2015; Belanger and Thornton 2013; Adamopoulos 2013) Many studies even define the topic of MOOCs with this number, copying it from others, without considering how the metric is created and the impact this has on decision makers at universities.

*“Notably, MOOCs have been plagued by extremely high drop-out rates.”
(Zheng et al. 2015)*

University decision makers

The MOOCs on Nostis are mostly made with direct collaboration with teachers. We had problems negotiating with a university as the whole, because the key decision makers have almost no information about MOOCs and the easy to find criticism is often including this mythical retention rates as an argument.

The usual way to count retention rate is to take the number of successful students (completing criteria for a certificate) and divide them by the number of people who enrolled to the course. The act of enrolling means clicking on the “Enroll” button by user without knowing the intentions of the user.

The retention rate is often compared to enrollment to offline universities, but this has many problems. In sheer absolute numbers, even 1% retention rate in a MOOC, where 100 000 students enrolled, therefore 1000 students finished, is a great success where classic university course needs often several years to accomplish the same. Where MOOC enrollment requires email address and one click, classic universities have tough prerequisites and various fees. There is also no penalty in failing a MOOC, whereas students of classic universities have to invest much more time and resources into the course and failing is therefore much more costly (Ho et al. 2014).

From another perspective, continuous enrollment also skews the data. As those freshly enrolled cannot obtain a certificate yet, but they appear in statistics nevertheless. This has caused a temporary drop in retention rate to a stunning 2.5% on EdX platform (Ho et al. 2014).

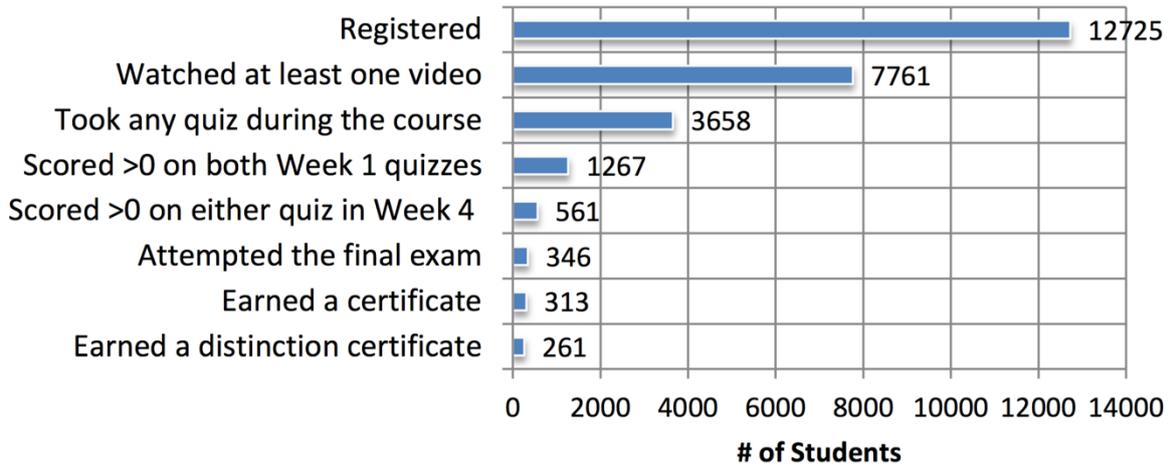


Figure 3: Student persistence in Bioelectricity course Fall 2012. (Belanger and Thornton 2013) A typical distribution of student engagement in a MOOC.

MOOC students and retention rate

The original approach to retention rate has very narrow success conditions tailored just for one kind of motivation: To complete whole course and earn a certificate. But there could be many kinds of motivation to click the enroll button. Those are for example:

1. Watch lectures, do exercises and earn certificate. (The classical approach.)
2. Only watch lectures and learn without exercises.
3. Access only some materials within a course (lecture, pdf, recommendation, forum...).
4. Look at what the course is like.
5. Look at what MOOCs look like.
6. Be reminded of the start of the course and then decide whether do it or not.

“Little research attention has been directed to the population of students who do not finish the courses in which they register; as a result it is difficult to fully capture the user experiences tied to retention problems, and many important reflections are missed.”(Zheng et al. 2015)

A study of disengagement from 3 courses showed an interesting behavior of MOOC students. Kizilcec, Piech, and Schneider (2013) identified 4 basic subpopulations of MOOC learners:

1. *‘Completing’*: learners who completed the majority of the assessments offered in the class. Though these participants varied in how well they performed on the assessment, they all at least attempted the assignments. This engagement pattern is most similar to a student in a traditional class.
2. *‘Auditing’*: learners who did assessments infrequently if at all and engaged instead by watching video lectures. Students in this cluster followed the course for the majority of its duration. No students in this cluster obtained course credit.
3. *‘Disengaging’*: learners who did assessments at the beginning of the course but then have a marked decrease in engagement (their engagement patterns look like Completing at the beginning of the course but then the student either disappears from

the course entirely or sparsely watches video lectures). The moments at which the learners disengage differ, but it is generally in the first third of the class.

4. ‘Sampling’: learners who watched video lectures for only one or two assessment periods (generally learners in this category watch just a single video). Though many learners “sample” at the beginning of the course, there are many others that briefly explore the material when the class is already fully under way.

The distribution of these participants varied among the 3 courses all with different difficulty.

Course	Auditing	Completing	Disengaging	Sampling
HS	6%	27%	28%	39%
UG	6%	8%	12%	74%
GS	9%	5%	6%	80%

Figure 4: A user behavior based on course difficulty. HS = high school, UG = Undergraduate, GS = graduate

Most interesting for me is the size of *sampling* group in relation to course difficulty. This result suggests, that over 74 % probably just looked at several videos and decided to leave the course for some reason. We can also see that in the difficult course, more people are just watching lectures and try to get the knowledge (auditing), while less people finish the course while staying on track, completing assessments and getting certificate.

In last few years I tried to do 2 courses where I have failed on paper, but I have finished them anyway. In courses Learning How to Learn and Gamification, I stopped doing exercises at some point and then I also stopped auditing, because I downloaded the remaining lectures to watch it later. I left the course because of lack of time, but I have returned to the content later. Thus, learning everything from the course, but not completing it in the general sense.

This behavior was explored further by another study (Zheng et al. 2015) where the intention behind signing up was explored by conducting interviews. The results suggest, that there are students who want to take only part of the knowledge inside a course, so called: “learning on demand”.

“I am only interested in the American history during the Cold War, I only studied those related lectures and skipped others. That was why I didn’t finish the course. I have already reached my goal.” (Zheng et al. 2015)

Redefining retention rate

Those examples of motivations and behavior, different than expected linear advancement towards certificate, made me wonder whether the problem with retention rate is not something in MOOCs, but the metric itself. Although it might sound like cheating, changing the rules for measuring retention rate and success of users makes a lot of sense in this case.

Inspired by *Jobs to be Done* framework (Christensen et al. 2016) I want to select and work only with those people, whose job to be done is to finish the whole course and earn

certificate. Then my retention rate would show, how many people had the intention to finish the course and then succeeded. And my aim is to help those users to stay on track.

But what other jobs to be done are satisfied or dissatisfied by Nostis? And should I ignore those, who do not have the intention to earn certificate? To find an answer, I had to understand our users and how motivation works.

The retention rate summary:

- MOOCs are often defined by low retention rate, which makes it hard for our NGO to negotiate support from universities.
- Studies show, that MOOC users have different motivations and different behavior.
- Retention rate is calculated by number of people enrolled divided by number of certificates given. This works only with a fraction of users ignoring many different motivations and behaviors.
- The retention rate is flawed. It does not represent what it should be.

Long term engagement and motivation theory

Every action and behavior have some kind of motivation behind it, and enrolling into a course is not an exception. In this chapter, I look at the theoretical basis of how human motivation works and how to empower it. Then I delve into gamification to find concrete frameworks and tools, that can help my users achieve their goal.

Understanding motivation (Motivation theories, extrinsic and intrinsic motivation)

The field of motivation as part of the discipline of psychology has matured over many decades including well-known examples as Pavlov's conditional psychology experiments or Maslow's pyramid. Motivation has as many definitions as points of view and various theorists are interested in different aspects of motivation.

A motive is what prompts a person to act in a certain way or at least develop an inclination for specific behavior. – Kast's and Rosznweig's definition (Pardee 1990)

Motivation is ultimately derived from a tension that results when one or more of our important needs are unsatisfied. – Dessler's definition (Pardee 1990)

To be motivated means to be moved to do something. A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated. – (Ryan and Deci 2000)

I chose to use theories of Richard M. Ryan and Edward L. Deci, who are often mentioned in context of gamification, motivation at work or in education. They respond well to the objections of previous generations of psychologists and their ideas made sense in context of my research. (This chapter tries to explain a combination of Self-Determination Theory, Organismic Integration Theory and Cognitive Evaluation Theory. Together these theories describe motivation.)

Motivation can be divided into extrinsic and intrinsic motivation, where intrinsic motivation refers to “*doing something because it is inherently interesting or enjoyable*” whereas extrinsic motivation refers to “*doing something because it leads to a separable outcome*”. (Ryan and Deci 2000) Motivation is not flat, but a multidimensional combination of various aspects and minor motivators. It is a relation between an actor and activity and cannot be easily generalized.

Motivation types and dimensions

Intrinsic motivation is often perceived as the strongest motivation. It was found in people and in animals and it is about learning, trying, and playful curiosity. It cannot be caused, but rather is facilitated and catalyzed. There are several types of extrinsic motivation. They are often seen as the alienated and almost “negative” types, but the case is not black and white. Since the end of our childhood the intrinsic motivation (careless exploration, pure fun and joy...) is often pushed aside by extrinsic ones (money, status, social demands, expectations), but that doesn't mean that our lives are driven solely by carrots and sticks.

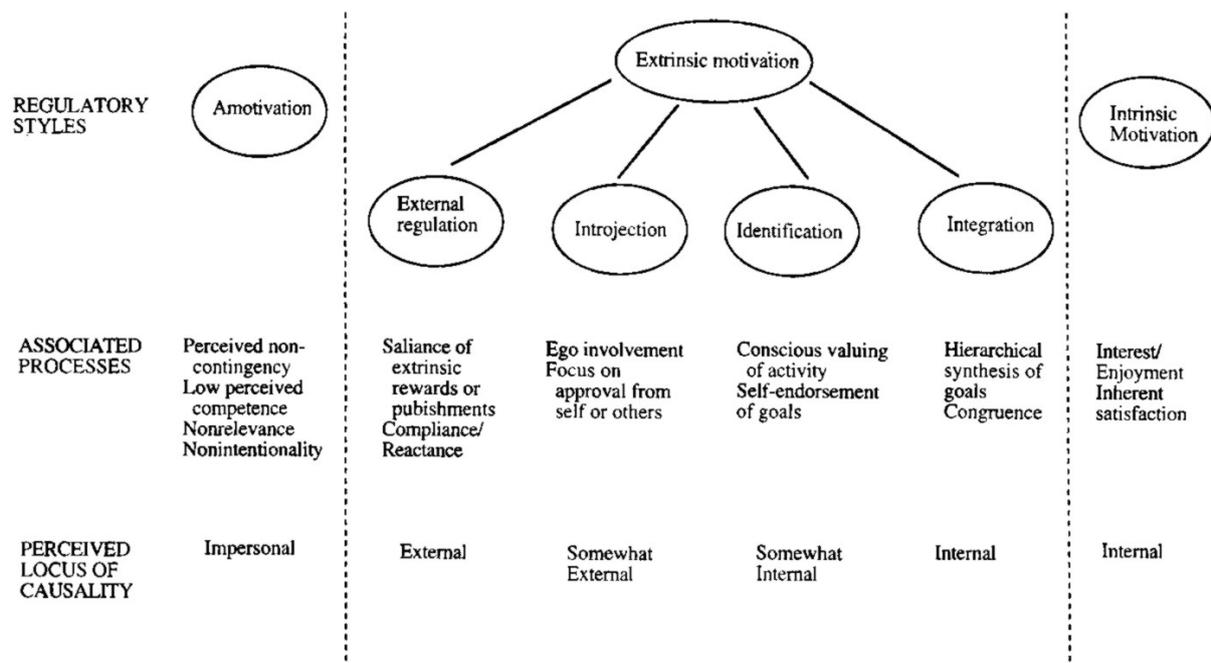


Figure 5: Visualization of motivation categories including 4 types of the extrinsic motivation.

On Figure 5 we can see the distinction between amotivation, which leads to no action, four types of extrinsic motivation and an intrinsic one. In general, the more we move to the right on the diagram, the stronger motivators there are. A motivation towards an activity can shift left or right in time. These motivation types are usually interwoven because an activity can be divided into smaller sub-activities with combination of motivations. For example, an activity of reading a history book can be divided into sub-activities with different motivations like sitting down because of tiredness, learning about history for fun, acquiring knowledge for history class, finishing a book to compete with a friend's reading challenge, etc.

I found a nice analogy of the motivation types in reading a book. This will probably apply only to me personally, but I hope it will explain the theory better. I am intrinsically motivated to read a good fantasy novel, because I find it fun. There is no external outcome, just a joy. I also enjoy reading about design which is still fun, but partly I want to be a better designer and change the world (integrated goal). I have also read a book about Spanish, which is a language I want to improve, because I want to travel and it would be quite useful (identification with self-set goal). I have started reading Lord of the Rings, because everybody around me have already did that and I wanted to be included in the discussion (approval from others). I have read few chapters of a book from mandatory reading list in high school to not fail an exam (extrinsic punishment). And finally, I did not read Fifty Shades of Grey because I had no inner interest, it does not align with my values, goals, my social circle does not appreciate it and I would get no reward whatsoever.

But motivation is multidimensional and it is strongly connected to the three following aspects that play a critical role: Relatedness, Competence and Autonomy. These aspects are maintaining intrinsic motivation and enhancing extrinsic motivation when present, they can

also hinder motivation when absent. The **Relatedness** is in play when the activity is valued by significant others, who the actor feels or would like to feel connected to. It could be family, peer group or a society. If an actor can relate to somebody who sees value in the activity, the motivation grows. The sense of **Competence** is about balance of feeling efficacious towards an action. For example, if a student feels that an activity is too hard (the student feels not competent enough), the motivation to do it decreases. But on the other hand, if the task is too easy, the motivation also declines. The bigger the gap between perceived competence and the difficulty of a task, the greater negative impact it has on motivation. Another aspect is **Autonomy**, where more autonomy leads to an internalization and introjection of a goal, meaning that the type of motivation can shift towards the right side of the diagram and get stronger. If the actor feels that her behavior is controlled, then her motivation is more likely to drop to weaker type.

This motivation theory explains well why and how some activities are so engaging and fun to do, but does not offer any direct tool for motivation enhancement. For this, I chose to research a field of gamification, that studies the engaging aspects of games. It builds on top of the extrinsic and intrinsic motivation theories, but offers frameworks and tools for enhancing motivation as game elements.

Enhancing motivation using gamification

Intrinsic motivation, as the strongest motivator, is all about fun and enjoyment, which is the basic building block of games. Based on Raph Koster, games are basically systems of patterns, which people enjoy learning and mastering. Our brain is wired in a way, that to achieve a better survival, it rewards us for learning and mastering patterns and skills. (Koster 2013)

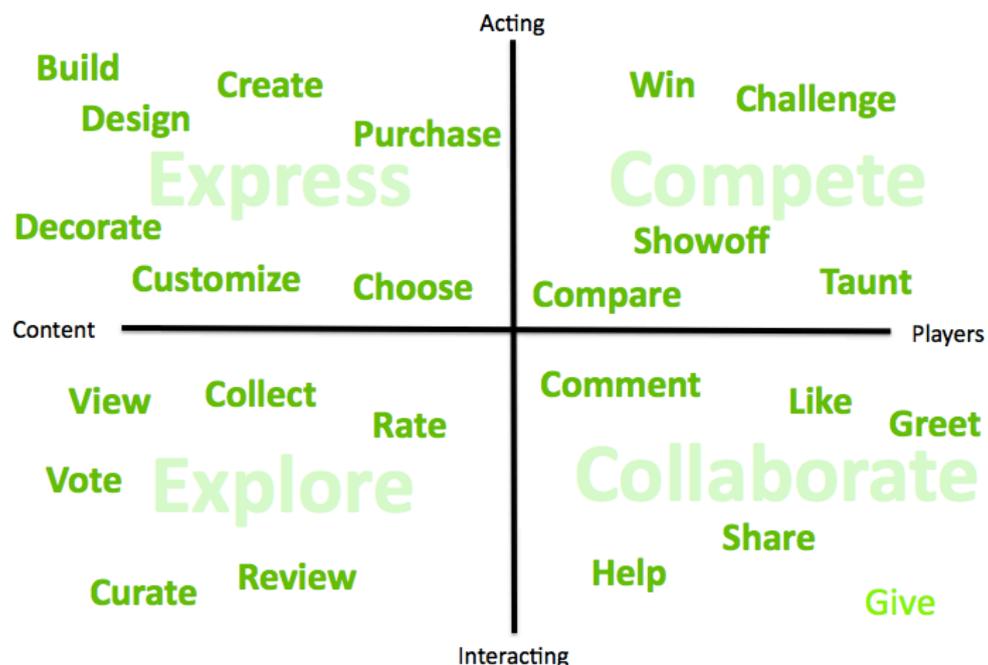


Figure 6: Jo Kim's player categories (2012)

But what makes games more fun, than reading a textbook? The gamification studies reveal the basic ideas behind games and how they work with human motivations. But not everyone enjoys every game. A game designer Jo Kim created a framework to divide people into four

categories based on their motivations in playing games. (A. J. Kim 2012) And comparing various MOOC motivation studies, I can see a link to MOOCs. A desire to Compete is solved by earning a certificate with a score mark, to Explore means having “collected” all the additional materials and to Collaborate means participation in discussion and organization of study groups. We are usually trying to cover all the aspects to engage all player types. It seems that there is a room for the Express motivator possibly in assignments or tasks inside a MOOC.

Every game is built of **Game Elements**, which could be broken down to a pyramid of 3 levels. In the highest level, there are **Game Dynamics**, which engage the core motivation of a player. It could be thought as a “grammar” of the game and it is connected to the player types mentioned above. Dynamics could be about relationships, narratives, progression, exploration... In the middle are **Game Mechanics** which could be thought as “verbs” of a game. They are the concrete rules representing a game dynamic. Those could be rewards, transactions, turns, challenges, cooperation, feedback. And in the lowest level are concrete **Game Components** which are the most basic building blocks of games. We can think of them as “nouns” which are representing and executing mechanics having the higher dynamic above. These are for example: points, inventory, dice rolls, leaderboards, achievements, progression bars, boss fights, maps, power-ups, superpowers, avatars, skills, health...

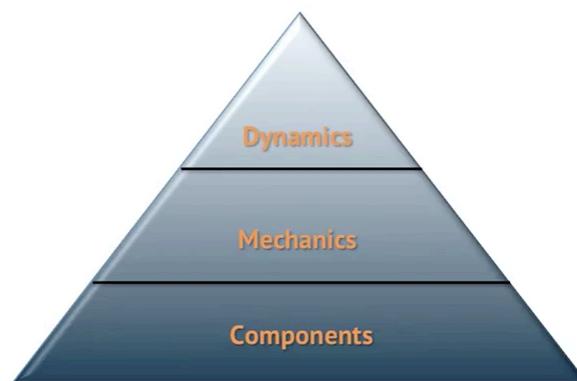


Figure 7: Pyramid of game elements

Engaging games are full of **activity loops**. These are either **engagement loops**, where a motivation leads to an action, that gives a feedback which enhances motivation, see Figure 8. And then there is a **progression loop**, where player should have a sense of progression through the content. The smaller steps there are to take, the less overwhelming the challenge is. Progression loop is often implemented as a set of smaller challenges divided by checkpoints (small progression loops) and ending with a “boss fight”. After defeating the last challenge, you progress to another level (bigger progression loops) and so on.



Figure 8: Engagement loop: An initial motivation causes and action, which results in a feedback enhancing motivation again.

There are many other interesting ways in which games enhance motivation of a player, that could be translated to MOOCs. For example storytelling (Altarriba 2014), which could be used to link lectures together and make the user curious about how it unfolds, progress bars showing how much the user has accomplished, collectible achievements or badges and much more. But in the context of this thesis, I chose to describe only the main principles, which are important to understand my design.

Pitfalls of enhancing motivation

While gamification introduces to my research a framing of the concept of fun and gives me a framework to enhance motivation, there are also pitfalls, that greatly diminish the motivation and must be avoided. As positive performance feedback enhances the more intrinsic motivation (e.g. praising “good job”, giving thumbs up), a negative feedback just makes the user feel less competent and lowers the motivation (e.g. emphasizing the wrong answers in a test result). Therefore, the activity loops must be executed well to support the feeling of mastery.

Looking back at the aspect of autonomy, there are more things to be careful about. Examples of controlling behavior which limits autonomy and therefore hinders motivation are: tangible rewards, directives, competition pressure, threats and deadlines. Unfortunately, gamification is often deployed only as points, badges and leaderboards (PBL) focusing on extrinsic motivation and using these potentially dangerous controlling elements (Trenholm 2015). This can lead to an overjustification effect (Carlson et al. 2009), where an introduction of rewards replaces intrinsic motivation by an extrinsic one. Furthermore, withdrawal of these rewards does not shift the extrinsic motivation back to an intrinsic one, but overall the motivation diminishes as these rewards are removed.

How others approach motivation?

Gamification is now leading the online motivation trends (Deterding 2012), hence there is a lot of resources available. But it is not easy to do the gamification right and the internet is filled with many simplified guides to gamification without deeper understanding of the issue. Some reports exist on gamification in context of MOOCs, but this development is very recent and studies are scarce. A review of several MOOC platforms (Hansch, Newman, and Schildhauer 2015) suggest, that PBL is the most widespread instrument of enhancing motivation. A detailed report from OpenHPI platform (Willems et al. 2014) stands as a great example of the aforementioned review.

The approach of OpenHPI platform is partially one of those, which I try to differentiate myself from. Their use of rewards is on the edge of controlling behavior and the points, obtained by a variety of very different actions, are just empty numbers without any further meaning. The points do not represent a mastery of a user, they do not represent helpfulness, they are a blend of everything and nothing. Therefore, a leaderboard based on these points does not make sense, too. Unfortunately, they have only designed their system and *tested it theoretically* on personas. The actual result of their modifications, while being the most interesting part, is nowhere to be found even after two years after publishing.

An interesting and inspiring use of PBL has StackOverflow³, often praised as a good example of gamification (Deterding 2011). The points and badges represent directly a reputation of a user. The only way to get rewards is being helpful to others by answering questions the best you can. Therefore, the gamification here emphasizes an aspect of relatedness and amplifies stronger types of motivation.

“Like anything else, gamification can be done well and can be done poorly. Companies that see the success of Foursquare or Farmville and just try to copy what they see, without understanding the stakeholders and their needs, are destined to fail—as are those who think they can replace meaningful rewards and incentives with empty points and badges, and manipulate users into doing things they don’t want to do.” - (Deterding 2012)

The motivation theories summary:

- Motivation of a person towards a certain task could be extrinsic (4 subtypes) or intrinsic (fun). The motivation is stronger the more intrinsic it is.
- Motivation is mainly influenced by: Relatedness, Competence and Autonomy.
- Gamification enhances motivation using principles like:
 - o Player types – different fun for different people.
 - o Activity loops – to show progress and enhance engagement.
 - o Game elements – frameworks and tools to enhance motivation.
- Current research explores use of gamification in MOOC platforms, but often only PBL is used. This might lead to overjustification effect and a failure.

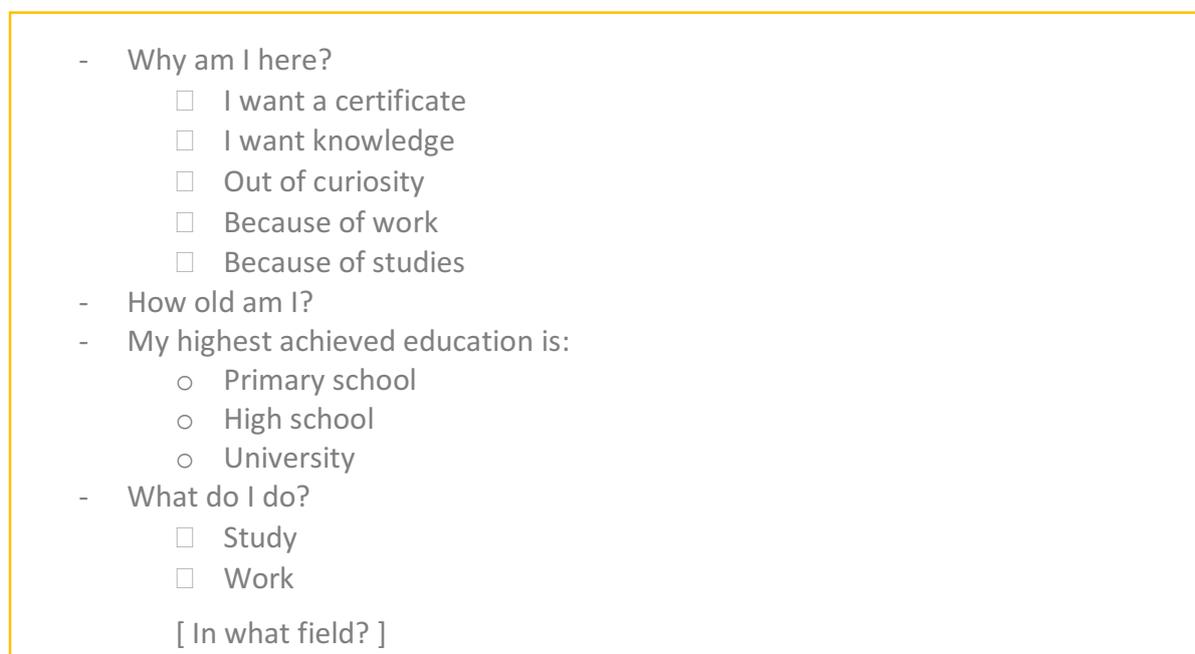
³ More on StackOverflow gamification at <https://blog.codinghorror.com/the-gamification/>

ranging from 30 to 80 minutes and 6 shorter interviews face to face with Danish students or friends.

While gathering data and re-listening to the interviews, we coded the reported experiences into themes and put them on a wall. A naturalistic approach of analysis (Silverman 2013) gave us basic overview of how students behave while learning online and their rough motivations.

The survey

To get better understanding of user motivation specifically on Nostis, I created a survey for our course participants where they could select multiple reasons for their course enrollment, select their job status, field and education. This survey was based on our exploratory interviews and others' research in this area. (Breslow et al. 2013; Belanger and Thornton 2013; Zheng et al. 2015) I wanted to compare our audience to other MOOCs and research so I included age into the survey. It is very easy to determine gender of Czechs using their name so I did not bother users with this question.



- Why am I here?
 - I want a certificate
 - I want knowledge
 - Out of curiosity
 - Because of work
 - Because of studies
- How old am I?
- My highest achieved education is:
 - Primary school
 - High school
 - University
- What do I do?
 - Study
 - Work

[In what field?]

Figure 10 A list of survey questions translated to English.

Respondents were filling the survey during a course. The survey was displayed at random lecture having only 2 questions from the set. This way I tried to minimize the disruption of user flow and by randomization in lectures to get balanced results of the progression within the course. About 1000 users participated but not everyone filled all the questions. I analyzed the motivation questions after 158 answers and discontinued this part of the survey because it did not make sense.

The motivation interviews

The motivation results from the survey were fuzzy so I wanted to clear up my insights. Because the Nostis users are scattered all around Czech Republic I conducted 4 cell phone interviews with those who have recently enrolled into a course and re-analyze one previous interview. While listening to the recordings, I took the constructivist approach, looking at

various hints, pauses and different roles that the participants took throughout the interview. I found that the survey was too strictly imposing our pre-defined categories onto the users. The motivations from the interviews were blending together having maybe one primary motivation, but not denying other motivations. In the interviews, I asked if people could do any online course whatsoever, what would it be about. Mostly they told me about a topic related to their work, which they also enjoyed and found fun to learn about, thus combining all the motivation categories together.

The workshop

I organized a workshop with stakeholders from Nugis Finem where I wanted to make sense of my research so far and to gather ideas about the next step. With those 5 people, I started by presenting my data so far, while answering their questions. One was truly inspiring:

“Do people go through the weekly block of lectures in one sitting? And do they want to finish a whole course in one weekend?”

We shared our experiences with MOOCs, what made us stay and what made us abandon it. Based on our findings, we ideated ways to make people stay with a course. We then focused on Nostis and what I could do in the scope of this thesis.

Observing user behavior

A big part of my study uses quantitative data gathered from Nostis database and analytical tools. Nostis collects dates and times of every completed lecture, course, earned certificate and test attempt, therefore there is a huge amount of data for analysis. To make sense of all this data, I used a direct SQL commands to count number, a trial version of Tableau software and Microsoft Excel to visualize and analyze the data. I always posed a question and then used the data to get an answer:

- How often do people watch lectures and in what patterns?
- Which days of a week and which times of a day?
- Do the watch more lectures in a row or just few lectures per day?
- How quickly do people finish a course?

The prototype testing

With the Motivation helper, I started by sketching the interface on a paper and then introducing the last one to 2 of my friends. I made them read the content and asked them, what do they think they are looking at and how could they use it. This user tests gave me a positive result regarding understandability and usability.

On the other hand, one of them told me that the functionality is not sufficient and she would need additional features more resembling a calendar. This made me wonder who is exactly the target group of this helper and how big it is. I decided to make a full-scale test – to put the prototype on the live website and see how many users would use it. Unfortunately, I got stuck in development and couldn't introduce the tool. I describe the prototype in detail including the next step in the chapter Motivation helper on page 35.

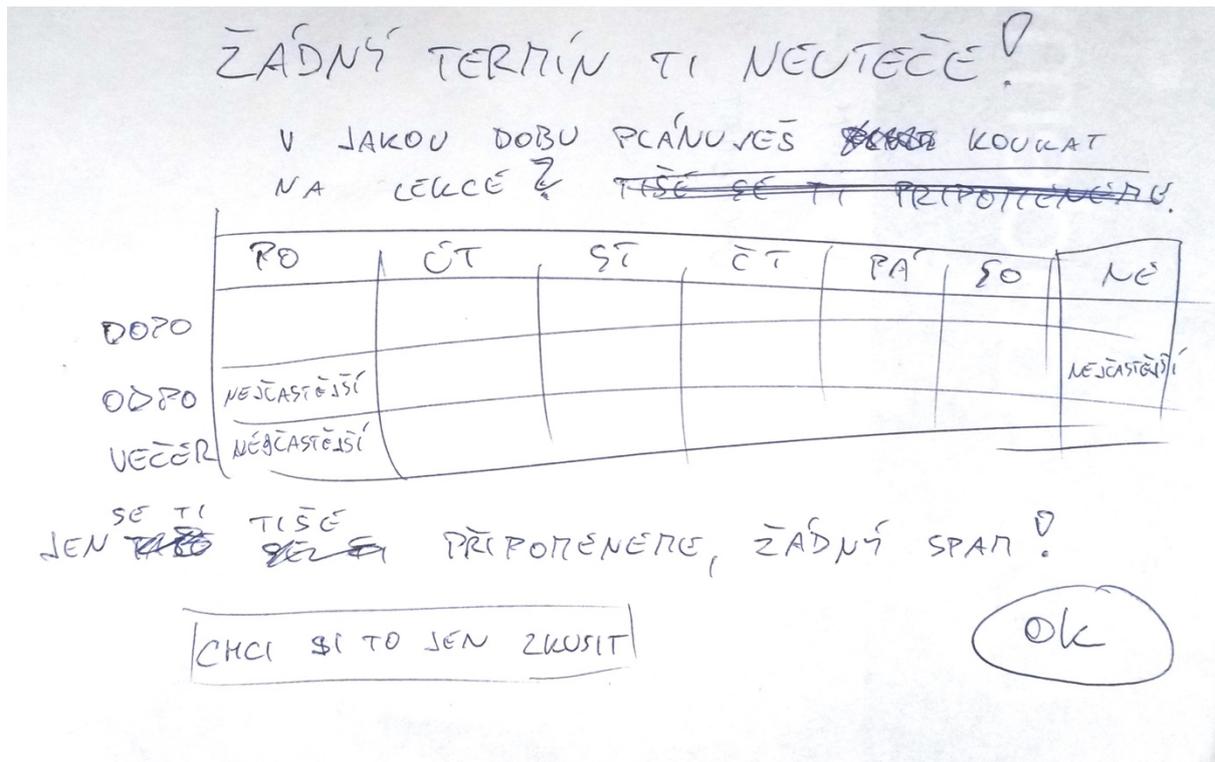


Figure 11: A sketch of the motivation helper with rough introduction of the tool and an interactive table where users can select the time of notification.

The methods and data summary:

- This project is focused on improvements to MOOC platform Nostis to boost retention rate using motivation theories.
- Project started with 15 exploratory interviews about online education
- The demographic data are based on a survey of 1000 participants; Motivation questions were answered by 158 people.
- I conducted 4 interviews to clarify user motivation.
- An ideation workshop with 5 stakeholders showed a direction of my prototypes.
- User behavior results are based on data from database and Google Analytics.
- I tested the prototypes and improvements with about 10 people in short sessions getting their immediate impression and feedback.

Who are the MOOC users?

To increase the retention rate in the way I have specified, I had to familiarize myself with users and understand their intentions. My main interest was their motivation and goals. To compare my own findings with different research reports in this area, most with English speaking audience, I was also gathering demographic data. The results were synthesized from 15 exploratory interviews, an online survey with Nostis users and 4 follow-up interviews.

Users of Nostis

A brief analysis of names of Nostis users shows that there are around 60% women and 40% men registered. The median age of Nostis users is 26, and the highest achieved education is dominated by high school finishers (55%) and followed by university graduates (36%) and people with basic knowledge have only 9%. But the most important discovery was the location of users.

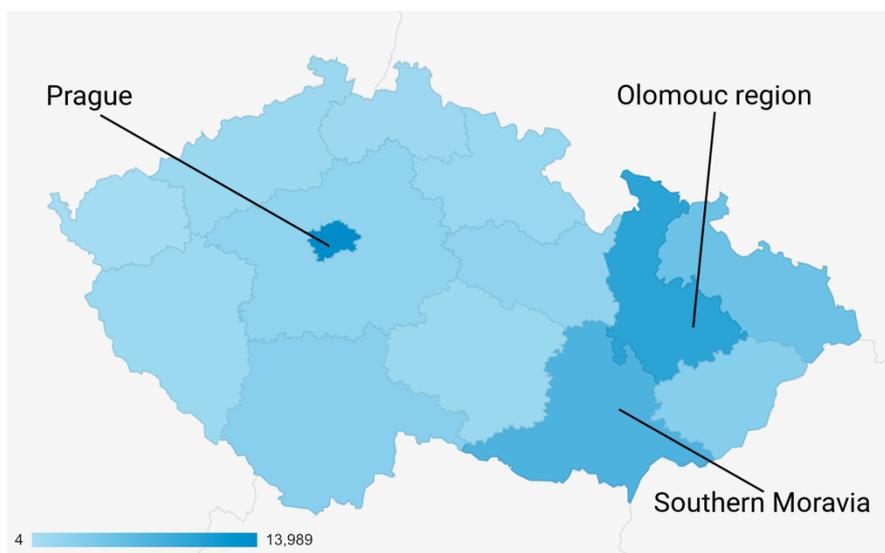


Figure 12: Map of Czech Republic showing number of sessions on nostis.org. The data are from the year 2016 where the audience was mostly from Olomouc area, followed by Southern Moravia.

The maps (Figure 12 and Figure 13) show inadequate distribution across the country, where primary regions are Olomouc and Southern Moravia. I ignore Prague on purpose, because many internet service providers for mobile connection are located there, hence the location of the session is also reported as Prague. This can happen on public wifis in buses and trains and most importantly on mobile connections and similar networks without a permanent location.

The regions of Olomouc and Southern Moravia are also the regions where most of the NGO members live and work or study. Since Nostis was mostly promoted by sharing on social media among friends and family, the results show the location where Nugis Finem friends and family are located. Also, Nugis Finem and its project Nostis are well known at Palacky University of Olomouc, therefore a lot of visits are from Olomouc itself.

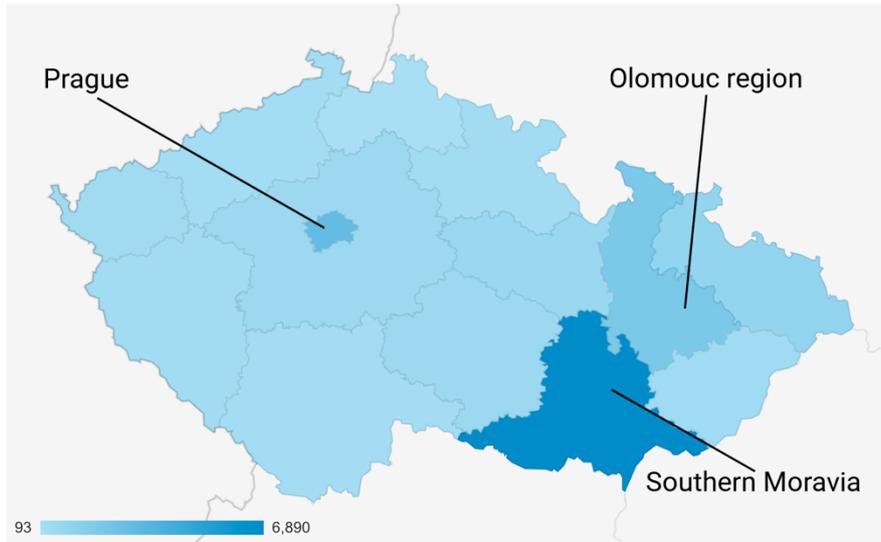


Figure 13: The map is from period of 16th January 2017 to 16th April 2017 and it shows session dominance in Southern Moravia.

At the beginning of this year, we launched a course with Masaryk University in Brno (Southern Moravia) as a part of an official university course. Therefore, most of the sessions this year are from Brno, where students were attending this course every week for new content.

Looking at the fields of occupation across both students and workers, next to the approximately 20% of law students, we have a big group of users with social and civil occupations, which are strongly tied to laws. I was unable to find any trace of this amount of law students in any other study suggesting, that the theme of a course is basically determining the audience.

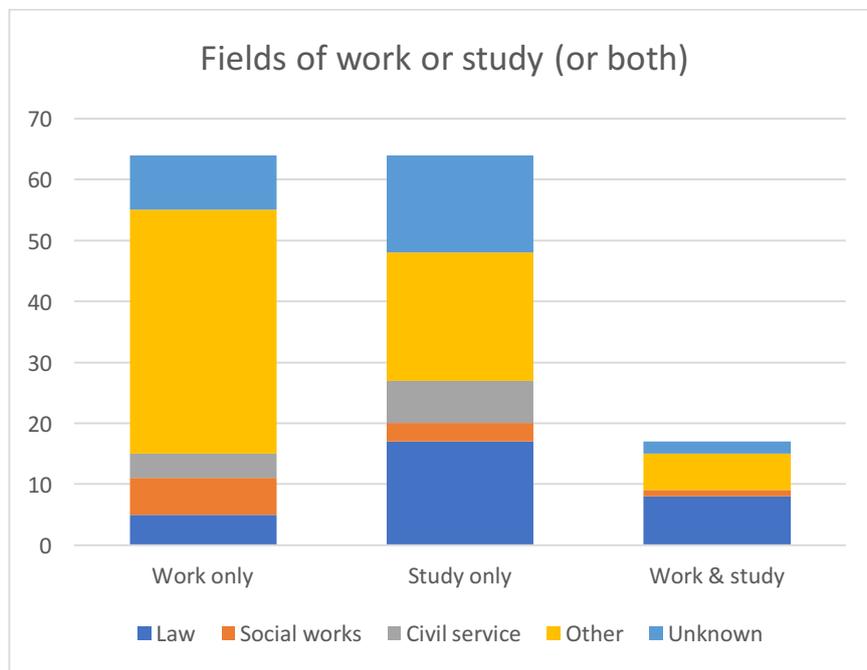


Figure 14: Survey results for occupation. Most users are from the field of law, but many users also come from social or civil occupations, where law plays a big role.

To conclude the demographic study, I can say that the audience of Nostis courses is determined by the topic of the course and marketing efforts. The comparison with studies from world-known platform containing various types of courses therefore did not make

sense. One pattern discovered did not make much sense to me, though. Why do the law students do courses about law? The assumption was, that these users already have the knowledge and therefore they are not interested in Nostis. Based on the data, I knew what kind of respondents to choose for further interviews and clarification of motivations.

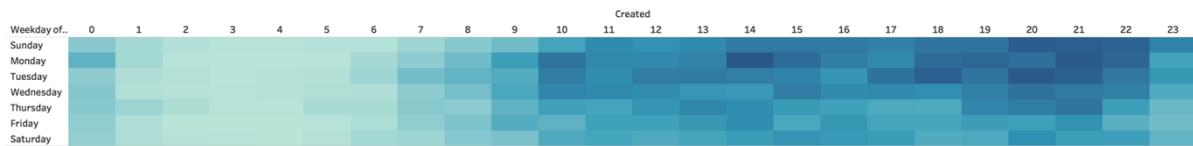


Figure 15: Weekly hours of completion. On X axis are hours, on Y axis weekdays starting with Sunday

To get a deeper understanding of Nostis users, I looked at their behavior patterns. The Figure 15 shows peaks of activity on Sunday afternoon, when deadlines are closing, and on Monday and Tuesday afternoons, when new content is available. Thursday, Friday and Saturday are quite calm in completed lecture count. Taking this to a next level, I could observe and identify people, who are highly motivated to learn and watch lectures right when they are available, or those, who struggle to keep with the pace. The Figure 16 suggests, that there are two very different learning styles. Some people spread the lectures through entire days and weeks, completing one lecture at a time, and on the other hand there is a group of people, who finish a whole block of lectures in one sitting.

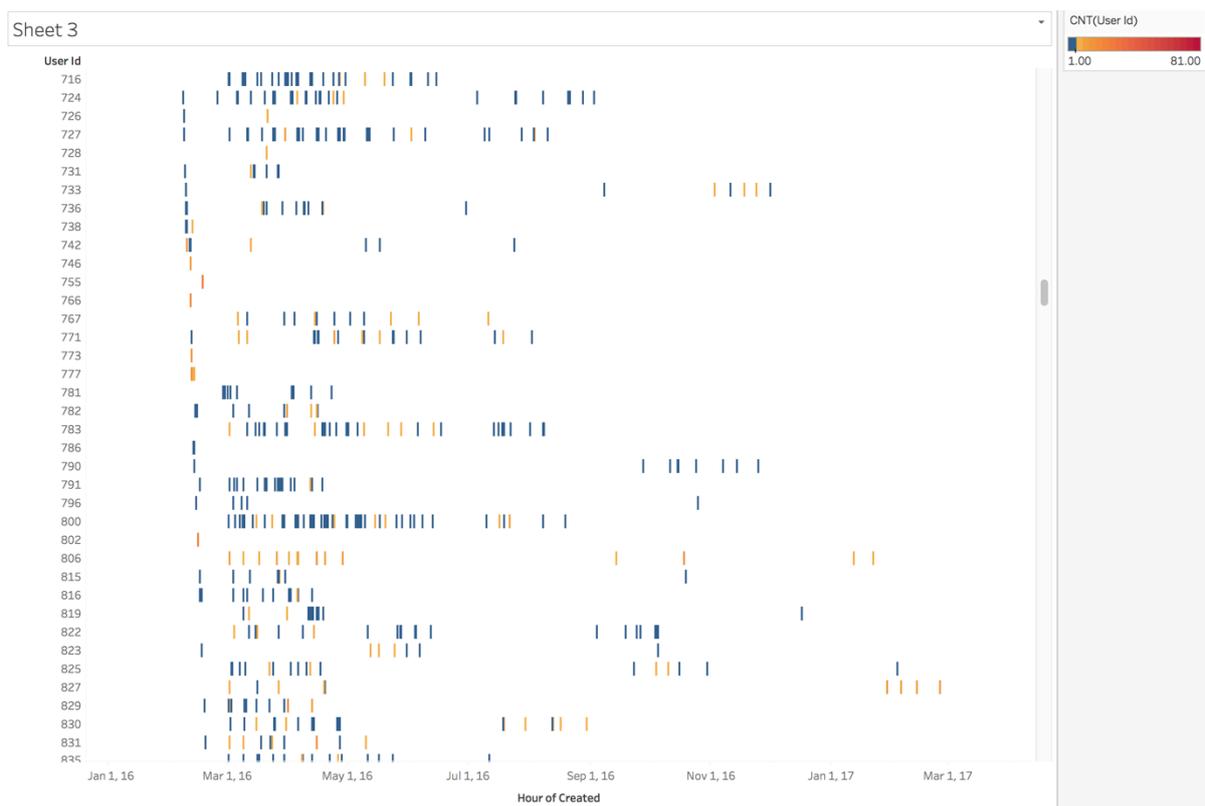


Figure 16: Graph showing lecture completion per hour on random sample of users. Blue line is one lecture in an hour, yellow 2 and the more red, the more lectures were completed per one hour. This disproves the hypothesis, that most people watch several lectures in a row, but both behavioral groups are more or less equal in distribution.

Motivation of Nostis users

In the survey, there was a multiple-choice question about user motivation. This attempt to sort users' motivation into categories used questions from similar studies (Zheng et al. 2015). As results, 39% of responses included desire for knowledge, 24% wanted a certificate, 20% was curiosity and 18% was connected to study or work. My assumption was, that this would clearly define user groups, but reported motivations were blended together and no pattern was clearly visible

A hypothesis emerged that the survey could be misinterpreted and the results are not correct. I realized that even I couldn't properly answer the question and for every MOOC my answer would be slightly different. Therefore, I decided to clarify the ideas about motivation with more interviews on a random sample of fresh course participants. This gave me better insights into what people want to do on Nostis:

Dana – A police officer mostly doing paperwork about law saw Nostis in TV, she looked it up and tried every course available. She finds it interesting because of her work but she finds it useful in her everyday life. She suggests that it's good to know the law in general.

Renata – Former job-seeker, finished school recently, but found a job already. A friend from a faculty of law suggested to do an online communism on Nostis. Her motivation was to increase her chances to find a job, but after getting employed, the motivation has fallen.

Robert – Student of Law, knows Nostis from school. He just wanted to refresh his knowledge so he started an online course. He would like to take another course for the same reason – to refresh his memory to be more confident in his field. A certificate from law course is meaningless for someone with law degree. This explains the motivation behind our big population of law students.

Soňa – A teacher who did the Family Law course because she was told from her daughter to do so. The theme was interesting to her and she has learned something throughout the course. The certificate has some kind of meaning for her; she has submitted it to her employer.

This leaves me with a conclusion, that motivation is not binary, it has many aspects which are hard to differentiate. In general, people want from Nostis useful knowledge for their work, study and daily life. The courses also satisfy curiosity about the topic. Any further categorization would be bending results to fit artificial boxes.

Why do people leave and never come back?

The overarching theme is that the more a person is interested in the topic of the course, the more willing she is to stick with it. And vice versa if there is almost no interest in the topic, then nothing can keep the student around. From the side of the student it is often her lack of time, procrastination and various distractions (Facebook, email, other tabs in browser...) that keep her from completing (Zheng et al. 2015).

From the MOOC point of view, there are also many aspects crucial to the retention rate. In the exploratory workshop with stakeholders, we used our past experiences and current research (Oakley, Poole, and Nestor 2016; Zheng et al. 2015) to come up with a list of aspects, that are the most crucial to the retention rate:

Like in an ordinary lecture at school, the most influential and engaging is the lecturer (Adamopoulos 2013). When the information is poorly presented, it can put off even the most interested users and vice versa; If the user is not so engaged with a theme of a MOOC, the presentation can be still so entertaining, that there is no reason to leave. In most MOOCs, there is a lecturer talking and possibly some kind of presentation in the background. Important is charisma of a lecturer, how clear he speaks and natural body language. Furthermore, better than one static camera is well thought movements and cuts keeping the user's attention along with a presentation and other post-production improvements.

From the technical point of view, audio quality is critical because of the spoken information, followed by video quality for the additional notes on the screen. Of course, a user must find the MOOC, navigate to lectures and fill tests without any major errors and failures. These basic website requirements are summarized by Řezáč's pyramid of web needs (2016) based on Maslow's pyramid. The basic idea is, that a service must first satisfy needs in following order: usefulness, discoverability, availability, accessibility, usability and trustworthiness. Only after mostly satisfying those aspects, the MOOC platform can be used without causing frustration and can climb the pyramid higher to persuasiveness, happiness of usage and making a bond with the user.

The theory of fun (Koster 2013) offers an additional reasons why the fun can diminish and become replaced by boredom. Following is a summary of those causes in context of MOOCs – basically replacing “player” by “user” and “game” by “course”:

- The user understands everything the topic can offer and the course becomes too easy.
- The user does not understand the topic and cannot connect the dots. The course is too hard.
- The pacing is too slow and new challenges come too late. The user loses interest and is easily distracted.
- The pacing is too fast and new challenges come too quickly. The user is getting lost and the course becomes just a noise.

The MOOC Users summary:

- Users of Nostis are determined by marketing activities and course topics.
- I found following groups of users:
 - o Law students repeating older knowledge
 - o People whose work is related to law. They benefit from the knowledge in their jobs and daily lives.
 - o There are also people who want to impress potential employer with a certificate, people who look only for a specific information and more...
- User behavior is connected to varying motivations, not everyone wants to follow a MOOC in the classical sense. Therefore, also on Nostis a different calculation of retention rate is needed.
- Crucial aspects of engagement besides the MOOC topic are: student's time capacities and motivation, lecturer's presentation abilities, audio and video quality, camera work, post-production and balanced difficulty.

Optimizations for rushers and samplers

“Such MOOCs should also be open to public at all times, allowing students who have immediate learning needs to access the course instantly and not wait for the next session being launched.” - suggested by Zheng et al. (2015)

The research shows, that there is a substantial group of people who are not using a MOOC in a way it was designed. I wanted to find out, whether these groups appear also on Nostis and if it would be worth to optimize the user experience for their goals. Among various use cases we thought of in a workshop with Nostis stakeholders, I found two hypothesis the easiest to explore together by one experiment:

- Rushers – people, for who the course is too slow and they want to finish it whole in just a few days.
- Samplers – people, who are searching on the internet for a specific information, which could be satisfied by a sole lecture or a small part of a whole MOOC. (Kizilcec, Piech, and Schneider 2013).

So far, these use cases were not supported by Nostis, because by default, lectures from upcoming blocks were not visible and they only appeared to a user after signing up and waiting for a week per block. Therefore, not even search engines could see all the content and many lectures were basically invisible. The reason behind this is that learning is more effective, when done in smaller chunks throughout a longer time span, so the knowledge has time to “absorb” (Koller 2012).

In my experimental design, I tried to keep this long-term study pattern, but also give the user an option to skip this recommendation and take and take a different approach. I display every lecture in a course, so users can have an overview of the content and search engines can index those lectures. But I added a lock icon to show, that the content is probably not accessible. Upon hovering, the locked lock icon is changed to an unlocked state, suggesting a possibility of interaction. Upon clicking on a locked lecture, user is presented with a message asking whether the user wants to hold on to the recommended pace, or whether she wants to unlock all content and proceed at her own pace. Every unlocked course was also saved to the database in order to measure the usage and determine the result of this experiment.

To make the lectures more easily findable, in addition to serving them to search engines, I added a text description to every page with lecture in one of our MOOCs. Therefore, search engines could get keywords for every page and then display the lecture in search results. Because Nostis already uses Google Analytics, a data about user acquisition could be compared from periods before and after this change and a result of the experiment determined.

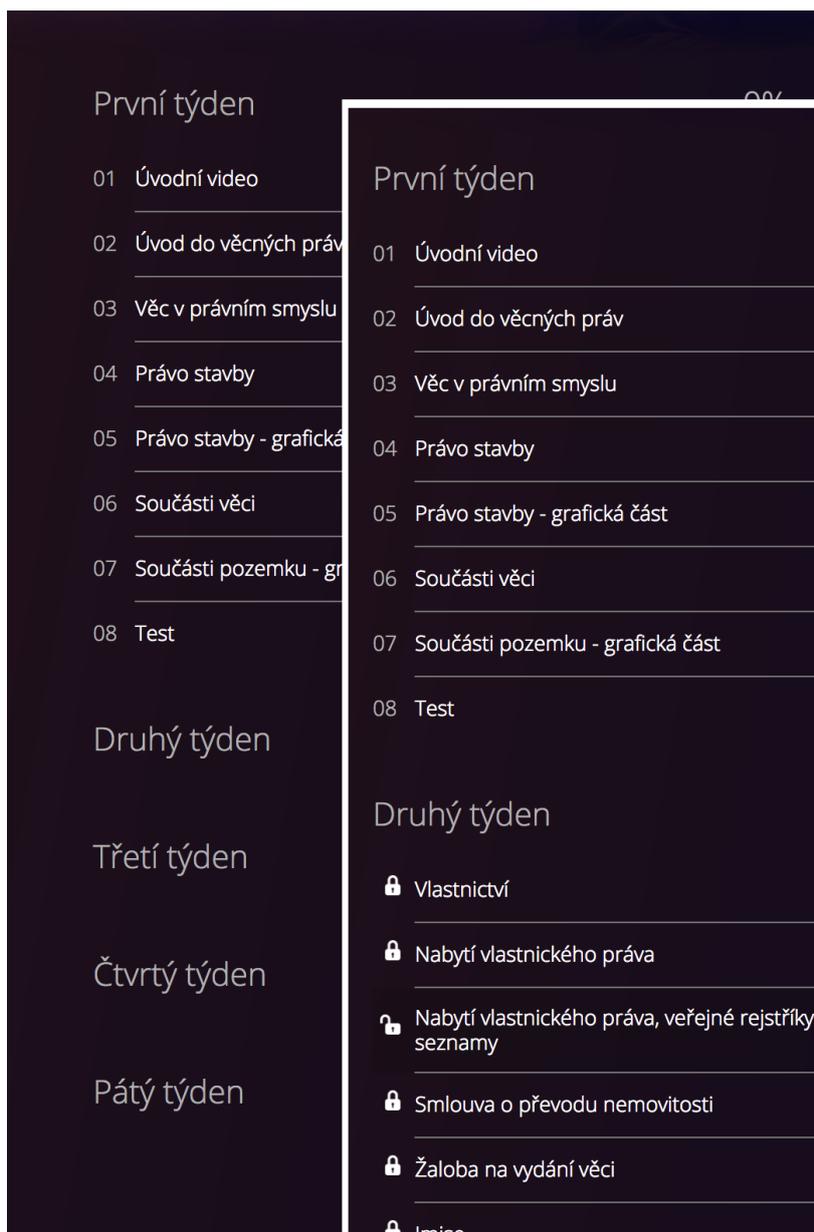


Figure 17: A screenshot of an original and optimized version of Nostis. On the left the lectures in blocks are hidden, on the right, there are lock icons for a quicker access to the MOOC content.

The experiment results

The experiment was running on Nostis for three months and the data from database show, that the unlock function was used 148 times out of 812 new enrollments. That means 18 % of users discovered and used this new feature. But the user could have just unlocked the content but then follow in normal pace. Therefore, I did a deeper graphical analysis of lecture watching patterns of those, who have already earned a certificate. Based on the Figure 18, I can say, that this experiment is successfully proving an existence of user base, which wants to finish a course faster than the default pace.

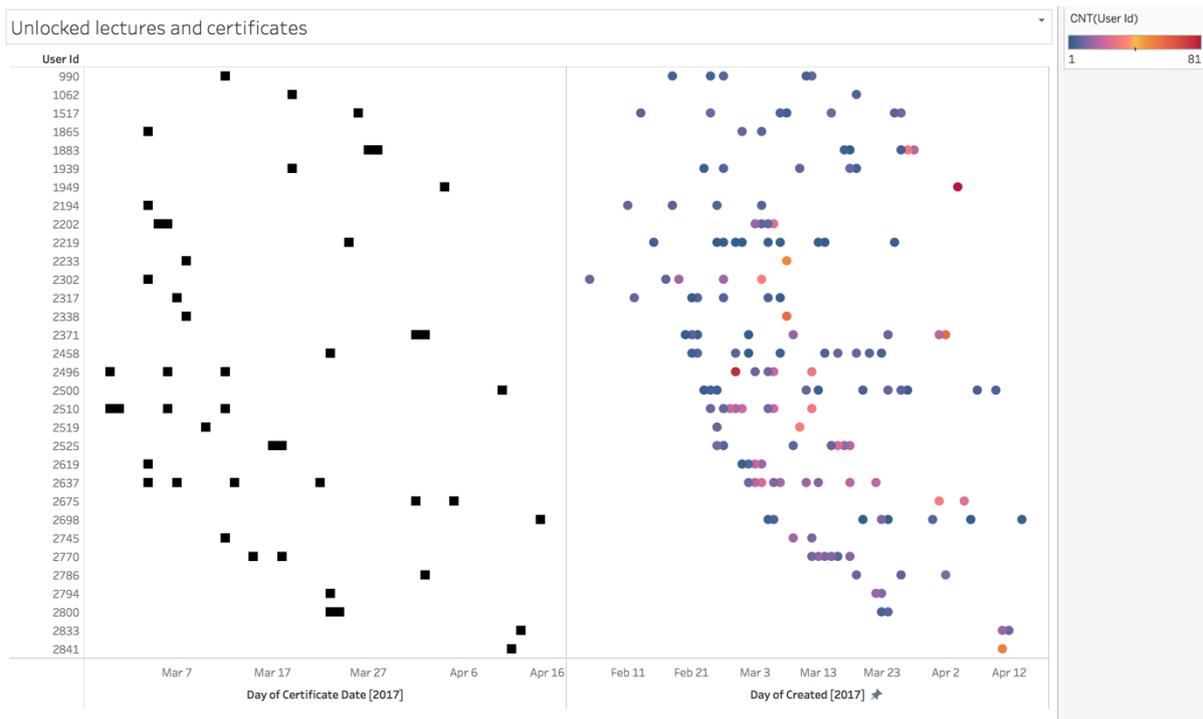


Figure 18: During 3 months, 32 users unlocked a course and later earned a certificate. This figure shows how many lectures were completed per day for those users. Every row is a user and there are two timelines (because I was unable to merge it). On the left, there are black squares representing earned certificates. On the right are total lectures completed per day in color gradients. Blue dot is one lecture, purple is around 10, pink 25, yellow 40 and through orange to 80 lectures in red. We can see that 25 people finished a whole course in a shorter time, than the course was designed for, proving, that the introduced optimization makes sense.

Unfortunately, the second part of the experiment, search engine optimization, did not yield a solid result. The data in Google Analytics showed no increase of traffic from search engines directly to lectures. The reason could lie in the chosen MOOC about business law and MS Excel. There is a lot of guides, tutorials, articles and other materials about this theme, so Nostis is usually not in the top results. To provide clear and conclusive data, the lectures of the MOOC needs to have a unique content and optimized textual description in context of possible search queries. Recently a MOOC platform Coursera started offering contents of a Gamification course to samplers through search engine optimization and a backdoor access proving, that my concept is worth evaluating.

Optimizations for rushers and samplers summary:

- Nostis was optimized for two user behavior groups:
 - o Rushers – to unlock and finish a course sooner than recommended.
 - o Samplers – to get only some information, not finishing a whole course.
- The experiment showed a presence of rushers, who unlocked and finished course earlier.
- Optimization for samplers did not work as expected and is inconclusive. On the other hand, Coursera introduced similar feature showing a potential.
- Nostis now appeals to more user groups with different jobs to be done.

The MOOC Onboarding Experience

“Bad [course], well... It can be actually good, but the description can be bad...”⁴ – Tomáš

To improve the retention rate, I tackle the problem of misunderstanding in the beginning of a course. Users might leave a course for several reasons, but inspired by a quote from Tomáš, I want to minimize the drop-out for following reasons:

- The content of the course is not what the user thought it is.
- The MOOC is too difficult for a user to grasp; the user is missing some prior knowledge.
- The MOOC is too trivial; the user already has the knowledge.
- The MOOC takes more time, than expected.
- The lecturer, video or audio quality of the course is not as expected.

By appealing to the right audience and deterring the wrong one, I aim to lower the number of enrolled students but increase the number of highly motivated ones. The more people know what to expect, the less frustration arises and the more positive emotions will the brand of Nostis gain. In the end, I can only enhance motivation of a user, who is already motivated to finish a course.

The wireframe in Figure 19 was made again with Jakub Rybář based on our initial exploratory research and then tested with random students all around university campus. We asked them about what for them is important to know when they decide for a course (online or offline), then we presented them our sketch to be sure about clarity. I have then slightly improved the wireframe based on the synthesis of all the data I have gathered in context of this thesis.

The wireframe explained

The course page wireframe is divided into several sections by a line. The top section is the most important one containing a title, very short claims about the course to attract user’s attention, picture of the main lecturer with a name and her institution and most importantly a play button in the middle suggesting there is a video in the background. After activating the video, it comes into foreground and the lecturer explains what the whole course is about. This is not only an attractive description of a course, but also a demonstration of the picture and sound quality of the MOOC and qualities of the lecturer. It is important for some users a search engines not to forget the textual description of a course, which I would partially hide also in the top section.

“I want to see the video so I know that it is not ugly and the lecturer does not have a boring voice.”⁵ – Eva

⁴ Czech original: “Blbej, třeba... On může být právě dobrej, ale může být jako blbě popsanej.”

⁵ Czech original: “No, já chci videto to video, aby to nebylo hnusný, nebo ten člověk nebyl hnusnej, nebo neměl blbej hlas.”

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Recommendations

Peter ★★☆☆

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Jane ★★★★★

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Course overview

1st week

Rookie learner

Procrastination

Memory

3rd week

Advanced learner

Mental palace

Chunking

2nd week

Master learner

Visual clues

Process

4th week

Guru learner

Meditation

Activity

Learn more

2

Figure 19: Wireframe of improved course page.

The second section of the wireframe pinpoints the most important data which are now missing on Nostis. There is a short explanation of who the course is for – law students, experienced civil engineers, or just general public. This is connected to a difficulty level just below, which could be combined together. Difficulty represents how much confidence and knowledge is required from the user in general. And the third essential information is about time needed to complete the course. It is optimal to describe how many hours per week the lectures and assignments would take, and how many weeks does the course last. On the right is the button to start the course which emphasizes the cost – free. Some students said, that they have associated high quality course with a fee, and a free course means low quality to them. Hence it is important to show the quality of the course first in the video, and then emphasize the no-cost.

Another two blocks are dedicated to earning the trust of the user. There is a small preview of a certificate, list of lecturers and a list of collaborating institutions. These displays of authorities have a big impact on user's decisions. Below are testimonials and ratings of the MOOC from users. In the best scenario, the testimonials show would be from a similar user based on age, occupation or location. The more the people have in common, the higher trust there is, no matter how relevant the information is (Cialdini 2009).

At the bottom of the page, user can find lectures thematically divided into blocks. The videos should not be longer than approximately 6 minutes, because users start to lose attention around that time. Also, every lecture is a progression loop enhancing motivation as fast as the lecture ends. These lectures and blocks form checkpoints showing the user how much she has accomplished and that the next task is just another easy small bite.

The wireframe has not yet been implemented, it should highlight the most important information user needs to sign up for a course. To pick the most important element, it would be the top video. User should be able to get all the required information from there; therefore, it is crucial to make it right.

The onboarding experience summary:

- Users often leave a course because of lack of time, boring lecturer, bad audio or video quality or because of too difficult or already known content.
- I created a wireframe tackling these problems by displaying all the required information upfront in an introduction video and also textually on the page.
- The aim is to give enough information to the user before enrolling in.

The Motivation helper

The third concept I created, the motivation helper, was based on a stakeholder exploratory and ideation workshop. Other interesting concepts that emerged during the workshop are described in the Discussion chapter. The motivation helper utilizes the motivation theories and ideas from gamification to increase retention rate of users. It was tested with several participants, unfortunately a real deployment and following quantitative evaluation was in the end unsuccessful.

The lack of time problem

A study by Nawrot and Doucet (2014) identified the biggest threat to MOOC engagement - lack of time (“bad time organization, conflicting real life responsibilities, too much time consuming course”). My own understanding of “lack of time” is giving the activity low priority. If I absolutely want to finish my degree, I will invest my time into it. But if I do not have money for food, I might invest more time into job seeking, rather than studying. In other words, I am in this case motivated by my primary need to feed myself, rather than being motivated to learn something (and potentially die by hunger). Therefore, I see the real challenge not only as a “lack of time”, but also as a lack of motivation. This is nicely put by one of my interviewees:

“If I do not have the time, but I know that I REALLY need the course, then I will just create the time for it...” - Tomáš⁶

To tackle this problem, I designed a Motivation Helper – a time management & notification tool based on motivation theories to encourage users to stay on track with a course. After enrolling into a course and watching two lectures, the user is presented with a color-coded table (Figure 20). There are all weekdays and on Y axis time periods of a day: before noon, afternoon and evening. User sees 3 pre-selected fields meaning that he will be notified at these times to “Keep track with a course material and deadlines!” The user can modify the selection and times of notifications.

The basic idea of this tool is the notification management, where user is reminded that there is a learning to be done. It should serve those with time management problems, who have a hard time remembering what they wanted to do, or who gets easily distracted. But there is much more than that. To address the “lack of time” issue, I also want to force the user to consider, whether she has enough time for the course. The tool shows how much time the course will require and then asks the user to plan when they have time to learn.

Why motivation helper

Going back to the motivation theory, the tool keeps in mind the core principles of a motivation enhancers. The user has a complete control over the notification settings, therefore autonomy is preserved. I also tried to bring into play the aspect of relatedness in the form of the colorful grid. User can see, that the darker the field is, the more popular is this time among other participants. Therefore, user should get the feeling, that she is not alone and can see the actual behavior of her peers. The third aspect is competence, which I did not focus on in this tool.

⁶ Translated from Czech: “Když nemám čas a ... ten kurz, ale vím, že fakt jako potřebuju, tak si ten čas jakoby udělám [...]”

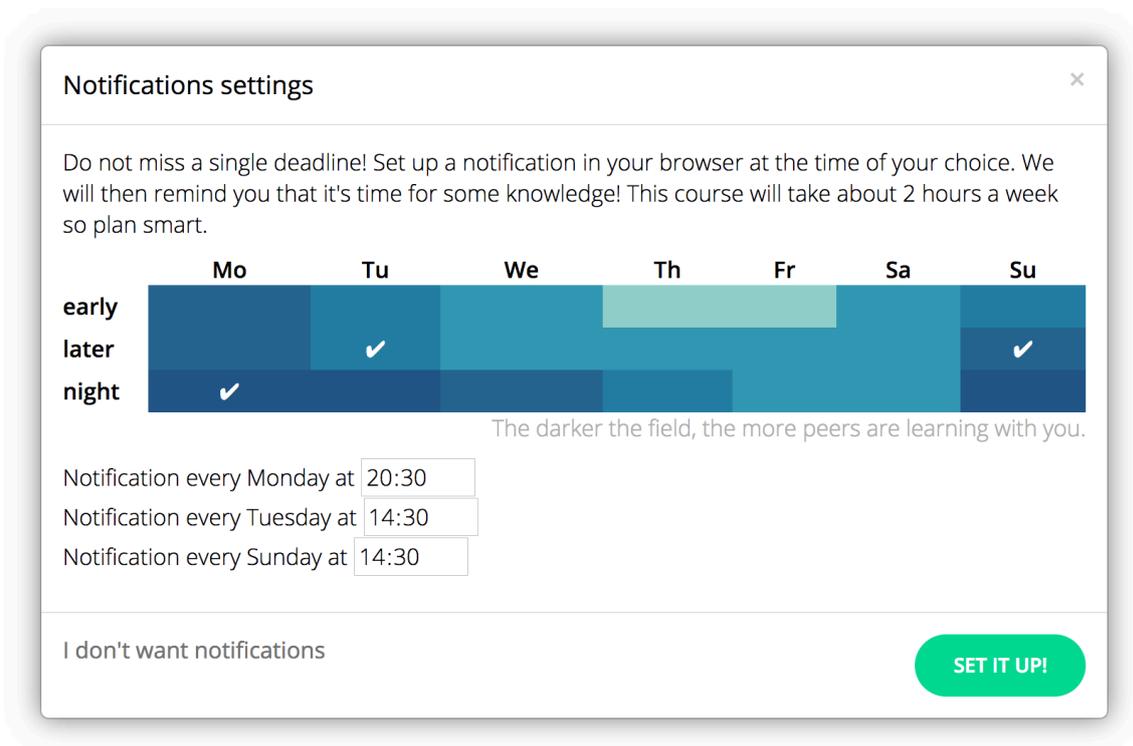


Figure 20: Implementation of the Motivation Helper.

Another powerful aspect is sense of commitment to oneself. With the tool, the participant commits that she is going to learn at the planned time. And a human brain likes to stick to planned goals and stay consistent. This is a remote part of one type of extrinsic motivation, but much deeper explanation and elaboration on this topic can be found in a book Influence by Robert B. Cialdini (2009). This commitment should also help me in differentiating the participants, who want to finish the course the classical way, and other behavior groups. Although this approach of calculating retention rate has other flaws, in combination with other measures, it can show interesting patterns in disengagement.

The motivation helper was greatly inspired by Duolingo and their mobile app notifications that you get, if you do not practice during a day. But because Nostis does not have nor need to have a mobile application, I opted for a browser notifications. This way, the user is reminded while just browsing the internet and if he is offline and the browser is closed, the notification is not so relevant anyway.

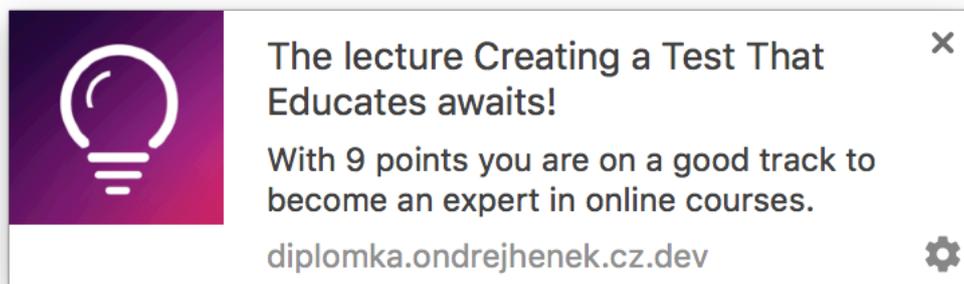


Figure 21: An example of notification persuading a user to come back to the course and learn.

The notification itself is trying to amplify the user's engagement by displaying a message relevant to the selected course. The text gives the user reassurance, that what she is about to do is good for her. To take this to a next level, the user could first specify, what is the reason behind taking the course and what is her motivation. Then the message could be truly personalized. But that would add another step to the setup making it probably overly complicated.

Testing this tool showed interest in the concept with some users, other requested additional features which would resemble a calendar. But those people are already quite organized and they already use some time management tools so building a new one for them is not the right way to go. A wider test would be needed to see, whether there is also a big group of less organized users for who this tool was designed for.

The Nostis motivation helper summary:

- One of the biggest MOOC problems is users' lack of time and low motivation.
- The motivation helper uses motivation theory and gamification to enhance user's motivation: autonomy, relatedness, commitment, activity loops...
- User sets up notifications at specific time reminding her to learn.
- Rated positively in qualitative tests, but quantitative test needed to prove, that the concept is useful for a wider audience.

Discussion

As in every work, there are aspects that could not be covered mostly due to time constraints and my capabilities. This chapter discusses some other perspectives, challenges, directions and next steps of my work.

The research reflection

I have encountered a criticism of my work regarding only explorative research focused on proving or disproving hypotheses, rather than getting exact numbers and percentages. I found approximations and hints from qualitative research as sufficient to make a conclusion. But in the circles of MOOC creators, lecturers and university stakeholders, a direct numbers and precise measurements would make much bigger impact. For example, while exploring the population of rushers among Nostis users, I did not know how to come up with a precise number. How to identify these people. Those, who unlocked a course? Those, who unlocked and got a certificate? Those, who watched lectures from different blocks in one session?

In order to get better arguments, I should have set up some Key Performance Indicators (KPI) and then measure those. But then I would fall into the same problems as the retention rate metric I criticize. Therefore, I hope that this thesis will be understood as a work broadening the view of MOOCs, not one describing the reality of MOOCs.

Other concepts worth exploring

To come up with a concept to work on, I invited the second Nostis co-creator, the platform manager and 3 MOOC creators for an ideation workshop. In this 4-hour session, we went through current obstacles for course participants and ideated about possible approaches to take in order to enhance user motivation. We had three main ideas from which I chose to work on the Motivation Helper. The others were:

A **discussion platform** for Nostis, where users could ask questions to one another collaborate and socialize. Although often considered an essential part of MOOCs, Nostis does not yet have any discussion platform whatsoever. In our first course, users could put comments under every lecture, but this feature was barely used and we stopped supporting it. The feeling of being socially connected and part of a group is a powerful motivation tool in the theory of Extrinsic and Intrinsic Motivation and in Gamification and in addition a participants' discussion could give us a valuable feedback on our MOOCs.

On the other hand, current research shows that discussion forums are also a source of frustration, when there are old unanswered questions (Oakley, Poole, and Nestor 2016). Therefore, for a discussion platform to works properly, it requires maintenance from moderators and lecturers, the resources Nostis dos not have. Another study points out, that only 3% of all participants engaged in a discussion.

Another idea was an **auto-play feature** with ... It was built on a hypothesis, that most of the people watch a whole block of lectures in a row. In my research, I analyzed this behavior and because it was not majority of users, I discarded this idea. But as this group of users is still a considerable percentage suggesting this feature is worth to keep in mind. In the end, I chose the notification tool also because I was interested in the technology, not because it would be objectively the best choice.

The motivation helper's next step

Unfortunately, I could not test the notification function of the Motivation Helper prototype in a long-term experiment, because the current technology in web browsers does not support timing of notifications. There is a workaround, where at the selected time, the server would send a push notification to the browser, which then displays the notification. But this way is much more demanding on infrastructure and out of my possibilities.

From the few tests, I can see that there is a potential in this tool to help some users in planning their time and finishing a course. But I do not know if potential users are in majority or minority. Therefore, I suggest as a next step a fake-door test⁷ – sending new users an email with a link to the prototype. But since the functionality is not there yet, as they click “save notifications”, they would be presented with an apology, that this feature is just a test. In this way, I could observe how much would this tool be used and how do people interact with the interface.

⁷ A way to test whether a service is wanted or not. We describe the service to a user (in email or on webpage) and measure how many clicked on an action button (like register, sign up or set up notifications).

Conclusion

MOOC users have various motivations to enroll into a MOOC and different behavior once they do. From 19 interviews and a survey study, I found that some users want to go through all lectures and tests and finish the whole course with a certificate, some don't want to bother with assignments and only watch lectures, and some are only looking for a certain information and then they leave. But retention rate, which is understood as a user success rate, is calculated as number of certificates divided by number of users enrolled. The problem is, that this measurement is focused only on a subpopulation of MOOC users, who want to complete the course. Although a user might see a sample of MOOC, get the information needed and then leave satisfied, the retention rate represents this user as failure. Therefore, the whole retention rate is flawed.

My design is focused on improving retention rate on Nostis using motivation theories and gamification. The goal was to make a feasible prototype which could be then deployed directly to the live server as a new functionality. I designed three improvements to Nostis: An optimization for rushers and samplers, a redesigned course main page and the Motivation Helper.

Rushers are the people who want to finish a course in few days, instead of weeks, rushing towards the certificate. So far it was impossible due to gradual unlocking of a new content every week. I created an experiment, where the whole content of a course is shown and by a quick interaction users can unlock all the content of a course. This experiment proved to be successful showing that there is a subpopulation of users who unlocked the course and finished sooner than usual. The samplers optimization is based on making all lectures accessible and searchable through search engines. But due to a poor set up of this experiment, I could not conclude existence or nonexistence of samplers nor make their user experience better.

My research showed that the course main page is the point where people decide whether to enroll into a course, but often the page lacks necessary information which is discovered after enrollment and leads to dropping out. I synthesized the reasons why people leave MOOCs and the key information they need to make an informed decision and redesigned the course main page. User tests proved, that the wireframe is on the right track. Furthermore, if a person knows from the start, that the course is not what they need, they do not have time for it, or it is too difficult, they will not enroll. This goes against the idea to get as many users as possible, but what is the benefit of attracting a user which gets frustrated later on and leaves anyway?

The Motivation Helper is a new feature offering notifications to users to help them stay on track. A user can set up notifications at chosen times forcing her to think about her weekly schedule and making a commitment to herself. It is built on theory of extrinsic and intrinsic motivation, emphasizing autonomy and relatedness to strengthen the initial motivation. It also uses action loops from the field of gamification and some game elements. Although few qualitative tests proved there is a potential, a full-scale quantitative test is still needed to assess the success of the tool.

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