Minimizing the Number of Dropouts in University Pedagogy Online Courses

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Abstract: Students' engagement and retention in online courses have been found to be in general significantly lower than in contact teaching. Multiple reasons for this exist, but improving student retention is ubiquitously seen as a beneficial improvement. We take a look at student engagement in online courses aimed specifically for university teachers and doctoral students, and use a mixed methods approach to obtain a holistic understanding of student engagement in our domain. We analyse quantitative data from two cases (n=346 and n=271) collected from students of three university pedagogy online modules over the course of years 2016-2017. We identify key moments in our modules where students drop out and, for example, differences in dropout rates between various demographics (i.e. faculty and whether the student is a university staff member or not). The main moment where students drop out is found to be in the very beginning of the courses, and the introduction of a pre- and post-test to the courses improved retention. This study suggests that when all other factors affecting student engagement are in order, additional focus should be paid to the very beginning of the course and get as many students to do the first couple tasks as possible in order to reduce the dropout rate.

1 INTRODUCTION

Online courses have become notorious for their high dropout rates in comparison to contact teaching (Lee and Choi, 2011; Murhpy and Stewart, 2017). A 2014 study reports most Massively Open Online Courses (MOOC's) have a dropout rate higher than 87% (Onah et al., 2014) or even 90% (Gütl et al., 2014). The situation is arguably better with Small Private Online Courses (SPOC's), but as there is too much variance in the way SPOC's are organised, it is impossible to make an accurate general comparison between the two. This can be seen in the statistics, as research in online course engagement and student retention heavily favors MOOC's over SPOC's. For example, a search on Google Scholar on articles published in 2017-2018 with the term "SPOC dropout rates" yields 152 search results, whereas a search on the same years with "MOOC dropout rates" yields 1430 results. Both types of online courses are still present in recently published papers of all levels.

Multiple reasons exist why SPOC organisers want to enhance students' engagement in their courses. Not only do more engaged student learn better (Kuh, 2003), but engagement also reduces course dropout rates and increases retention. Due to the causal relationship between student's retention and engagement, dropout rate can be seen as an indicator of general student motivation during online courses. Therefore it is feasible to presume that a MOOC or a SPOC with a high dropout rate is also not the most engaging and motivating course for those students who pass it.

In this study we focus on engagement in online courses, with emphasis on courses aimed for university employers, researchers and doctoral students. As a case study we will use data collected from three SPOC style university pedagogical online modules organised in the University of Turku between 2016-2017 (Laato et al., 2018). In our courses we observed a dropout rate of 55% of students over 346 course enrollments. We then introduced a pre and post -test setup in our modules in order to measure students' learning, and unexpectedly recorded an increase in student retention with the dropout rate falling as low as 34% with 271 enrollments in autumn 2017. This observation prompted us to form the hypothesis that the time consuming "first task" as we named our pretest, actually increases student retention despite it creating additional workload for the students. However, the situation is quite complex and multilayered. Naturally multiple factors affect student retention, and a single statistic of the course dropout

rates was insufficient in creating an understanding of the overall student engagement in our case courses.

In order to gain a holistic understanding of student retention in university pedagogy online courses, using our case study and previous studies as sources, we utilize a mixed methods approach and propose the following research questions to be answered in this study:

1. How well do our online courses take into account the factors influencing student engagement and retention that have been identified in previous studies?

2. When dividing our online module into small segments, in which parts do most students drop out?

3. What then makes the specific segments such which cause students to yield their participation in our courses?

4. Are there any statistically significant differences in student retention between:
   a) Faculties
   b) Doctoral students and University Staff
   c) Student age
   d) Our three case study courses.

First, we go through prominent previous studies in the field, and identify the major factors affecting student retention that the studies bring forth. Second, we compare our course and platform design to these factors, in order to see if and how we have taken them into account. Thirdly, we analyse quantitative data collected from our case courses between the years 2016-2017 to find answers to the rest of the research questions. We finalize this study with a discussion on the current situation of engagement and retention in university pedagogy online courses and propose ideas for future studies.

2 BACKGROUND

Online learning provides flexible studying possibilities that are not time or place dependent. Thus, it can be regarded suitable for educating adults that are already in working life. Online learning is also considered a cost-effective way of organizing education, as the only fixed costs for holding an online course after it is finished are maintenance fees. A popular criticism on online learning has been that it is unsocial and lacks the social presence of contact teaching, but for example Costley and Lange (2018) show that quality collaborative learning situations can occur online. Already in 2004 Zhang et al. stated that

e-learning can supplement classroom learning, and at times be more effective than traditional teaching methods. Since then, online learning studies have become numerous. The research on online learning used to focus on young degree students whereas adult learners received less attention (Ke and Xie 2009) although the amount of adult students in online courses was higher (Kahu et al., 2013). However, recently a broad range of studies on adult learning have emerged, for example (Broadbent and Pool 2015; Deming et al., 2015; Hoffman, 2018).

In the early retention studies the focus was on degree studies (Murphy and Stewart 2017, 4). Some recent studies have focused on long-term engagement in studies with the timeframe varying from one semester to whole degree programme (Yang et al., 2017; Yoo and Huang 2013). Course-specific engagement has been examined in past few years mostly in MOOC courses. The length of these courses vary between 5 to 12 weeks and they are usually open for everyone without prerequisites (Henderikx et al., 2017). Short courses and training have received less attention. MOOC research has, however, produced great amount of information that is applicable to online learning generally.

2.1 Engagement in Online Learning

Engagement can be divided into three types: behavioural, emotional and cognitive engagement (Henrie et al., 2015). Archambault (2009) carried two studies using the three above mentioned indices: behavioural, emotional and cognitive engagement in order to gain insight on which of these three might have a causal relationship with students' high school dropout rates. The findings were, that at least in the high school context, only the behavioural engagement affects students' retention. More specifically, rule compliance, interest in school and willingness to learn were identified as factors that indicate an increased risk for dropping out. Problems with emotional and cognitive engagement did not seem to have an effect, however, this cannot be straightforwardly transferred to the context of online courses for adult students.

Student's possibilities to control his/her studies are also connected to engagement. Control can be divided into instruction related control and control of schedule (Karim and Behrend 2015). The more students can influence teaching (pace, order, content) the more they have to focus on off-task aspects and self-regulation, which might be problematic from engagement and learning perspective. In contrast, control of schedule can promote engagement.

2.2 Adult Learners Engagement in Online Courses

The knowledge obtained from retention and engagement studies with younger demographics might not straightforwardly transfer to adult learners, therefore it is important to take a look at adult learners in online courses specifically (Ke and Xie 2009). Some studies show that for adult learners the relevance of studies for individual and professional needs, possibility to acquire skills and satisfaction with the courses and learning results are central in promoting continuing studies (Yang et al., 2017). Additionally, adult learners can utilize their professional experience in their studies and respectively apply their learning in their work (Kahu et al., 2013). In recent MOOC research the focus has been on motivating factors of the courses (Watted and Barak, 2018). Watted and Barak (2018) compared the perceptions of higher education students and other course participants in a STEM MOOC regarding the benefits of MOOC course. They discovered that for students with higher education background studying is based on personal and education related reasons, whereas other participants, e.g. academic researchers' motives were work and career related in addition to personal reasons. Studies on SPOC courses have identified a direct correlation between engagement and performance (Liu et al., 2018).

For adult learners environmental or external factors, such as family or organizational support or lack thereof, are significant reasons for quitting online learning (Park and Choi, 2009). According to Vayre and Vonthron (2017), of different types of social support only teacher's support has a crucial role in online learners' engagement in studies. Nevertheless, they also stress the importance of a sense of community and presence for engagement. The sense of community promotes the development of academic self-efficacy (ibid.). Creating sense of social presence in online settings depends both on the interaction between instructor and students and between students (Shelton et al., 2017). Interaction with peers does not necessarily exist in an online course, even though it has been identified as a major component in improving student retention (Shelton, et al., 2017; Costley and Lange 2018; Hew et al., 2016).

2.3 Dropout Rates in Online Courses

High dropout rates in online courses have been paired with a low level of engagement (Willging, 2009). SPOC courses generally record significantly lower dropout rates in comparison (Kaplan and Haenlein, 2016), but the results are hard to objectively generalize as there is a large variance in the way SPOC's are organized. Some, for example, contain elements of blended learning (Martínez-Muñoz and Pulido, 2015) and the dropout rate can also be influenced by SPOC's often being compulsory to educational degrees whereas MOOC's are not. The dropout rate in MOOC's has been recorded to be so staggeringly high, that it has sparked a numerous amount of research from various angles trying to discover the reasons behind students dropping out. Onah et al., (2014) found 8 reasons in their study of why people drop out of MOOC courses:

1. No intention to complete.
2. Lack of time.
3. Course difficulty and lack of support.
4. Lack of digital skills or learning skills.
5. Bad experiences.
6. Expectations
7. Starting late
8. Peer review

These reasons have all been explored in further detail. For example, Stracke (2017) argues that the high dropout rates in MOOC's are a natural phenomenon that we should not attempt to fix. Because enrolling to online courses gives students access to all the study materials and because the barriers for entry are so low, many students join MOOC's with no real intention to complete them, or to take a look if the course seems good enough for them to complete at a later time. This, however, is not the case in our case study, as the course material in our case study is open for everyone at all times regardless of enrolment.

In addition to the 8 reasons listed by Onah et al. (2014), at least the demographic can have an impact to student retention and motivation. Cochran et al., (2014) analyse the effect of student characteristics on retention and form a model predicting the probability of a student withdrawing from an online course based on their prior study record. Hew et al., (2016) takes a look at why some MOOC courses were rated better by students than others, and found out that if the course is built so that most learning is problem-centred, students have access to a passionate instructor, the course utilizes active learning methods and peer interaction and provides helpful course resources, then it is much more likely to be found engaging by students. There is much additional evidence that certain types of tasks and a certain kind of a course design is effective than the alternatives in online courses in general (Fournier, 2015). Fournier

(2015) highlights participant focused and learner driven processes as the most important factor in making a MOOC engaging and motivating. These findings and the motivation to create better online courses has led to the development of strategies and frameworks which assist in developing and implementing an online course in a way that is more likely to result in high levels of engagement in course participants.

Fidalgo-Blanco et al., (2016) explored the role of the course participants profile and the pedagogical model in attrition from MOOC courses. They developed a model which combines MOOCs based on traditional online learning platforms (xMOOC) and connectivist MOOCs (xMOOC) based on collaboration and utilization of social media applications. Their findings were that the model had stronger impact on course completion rate than factors related to the learning platform, participants profile or course theme. In addition, student centred teaching and collaborative learning were found to have a positive effect on engagement (Herrmann, 2013; Fidalgo-Blanco et al., 2016). Another example of an online course design approach is the ELED framework (Czerkawski, 2016) but as Czekawski et al., write in their paper: "Student engagement in online learning environments is a relatively new problem for instructional designers and requires more empirical research to advance the knowledge base." A previous study by Leeds et al., (2014) show that many of the attempted and currently used retention strategies in online courses are on their own insufficient, or at least the results and effects on student retention are inconclusive. The call for more empirical evidence by Czerkawski (2016), is something this study will answer.

2.4 Case Study: The UNIPS Environment

Our case study platform is called UNIPS, which is an acronym from the words University Pedagogical Support. Since the site launch in autumn 2015 until spring 2017, the three first courses were completed all together over 334 times. All courses can be accessed from the front page https://unips.fi, which is shown in Figure 1. The courses, or modules as we often refer to them, are called *Lecturing & Expertise*, *Becoming a Teacher* and *How to Plan my Teaching*. Each of the three above mentioned modules consists of an individual task period and a group study period. In the individual task period, students are tasked with studying all the course material, which consist of videos, scientific articles and small exercises, and

then write an essay of 1000-1500 words on a topic related to the course. The estimated time required to complete the first task is 12-14 hours. All students who return an acceptable essay are then added to the group study period, where they comment and reflect on each other's essays, and embark on discussions. The teamwork period is moderated by the course instructor, but the instructor does not participate in the conversations unless necessary. The time reserved for the teamwork period is 16 hours, but in reality we have estimated that students spend no more than 4 hours on average on the discussions.
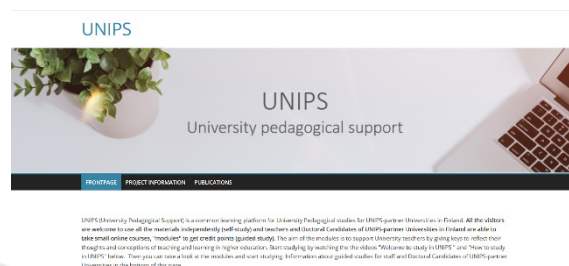

Figure 1: The frontpage of the UNIPS environment.

In the group work period of the UNIPS modules the students study collaboratively on Google Drive where they introduce themselves and attach their essays for peer feedback and discussion. Sense of presence affects the way students interact with each other. According to Meyer (2014) it allows individuals to speak freely and comfortably in a discussion, and they are more willing to reveal their personality. This contributes to increased student engagement based on previous studies (Herrmann, 2013).

We gathered data on how many students enrolled to the courses and how many students finally completed the courses. During pilot testing in 2015 we noticed that adding small and easy tasks had a positive effect on students' retention. To test this further, in autumn 2017 we introduced a pre-course task called "the first task" to the beginning of the courses before the individual task, and also a "final task" to the end of all three courses after the group study period. We wanted to figure out if this change had an effect on the numbers on how many of the enrolled students passed the courses. Our hypothesis was, that dropout rates were higher in the beginning, and much lower towards the end of the course. We suspected that besides students who are initially more motivated to complete the course, students who successfully complete tasks during the course are more engaged.

3 METHOD

This study uses a mixed method approach in order to obtain a holistic understanding on adult student motivation and engagement in online courses. Firstly we summarize the key factors affecting student engagement from previous studies, and glance through how well these are taken into account in our course design. Due to the fact that even our initial student dropout rate of 55% was significantly lower than the over 87% from most popular MOOCS (Onah et al. 2014), our hypothesis is that the case online courses should be designed quite well according to the suggestions from literature.

Next we go through quantitative data collected from three UNIPS modules Lecturing & Expertise, Becoming a Teacher and How to Plan my Teaching over the years 2015-2017 to see how student dropout rates evolved after adding a pre-and post-test to our courses. Additionally we take a look at differences between faculties, student age and if the student is a doctoral student or a member of university staff.

3.1 Case Study Platform Design

Based on our hypothesis that low student retention indicates lower engagement and hence lower motivation, we explore how to improve student retention, as it is the most clearly observable quantitative statistic. We conclude from previous studies the following four factors to focus on:

1. Instructors role (Ma et al. 2015; Goh et al., 2017)
2. Technical aspects: usability of the platform, quality of the study materials. (Onah et al., 2014; Swan, 2001)
3. Perceived relevance of the course (Park and Choi, 2009)
4. Support the learner gets from peers (Costley and Lange, 2018, 69; Hew et al., 2016)

Using the information we have on our course design, derived from the existing UNIPS solution https://unips.fi and previous work (Laato et al., 2018) we go through each of the four factors and evaluate how they are present in the actual course implementation, and also evaluate if and how they could be improved upon.

3.2 Quantitative Analysis

For the quantitative data collection we create five checkpoints between course enrolment and course passing to figure out the instances where students drop out. These checkpoints are unevenly scattered across the course in all our three case modules, and are situations where students are given a strict deadline to return a task, otherwise they are marked as dropouts. The five checkpoints are the following:

1. Students who enroll to the course, but never complete the first task.
2. Students who complete the first task (pre-course survey), but never sign in to the course Moodle page.
3. Students who have signed in to Moodle, but who never return the individual task.
4. Students who have returned the individual task, but don't participate in the first part of the teamwork period.
5. Students who successfully complete the teamwork period, but who do not complete the final task.

Students who successfully manage to go through all five checkpoints passed the course. Data with the checkpoints was gathered from two instances in autumn 2017 and spring 2018.

4 RESULTS

From autumn 2016 until spring 2017 our UNIPS (previous name UTUPS) modules had a cumulative dropout rate of 55% across the three modules. These statistics can be seen in Figure 2. The course clear rates are significantly better than the reported below 13% pass rate of popular MOOC's (Onah et al., 2014). One of the reasons for this is that the courses are open and visible for everyone to observe, so there is no need to enrol just to be able to look at the materials. As for the other reasons, we will now proceed to presenting our findings on our course design based on the 4 key factors identified and listed in the Method-section.
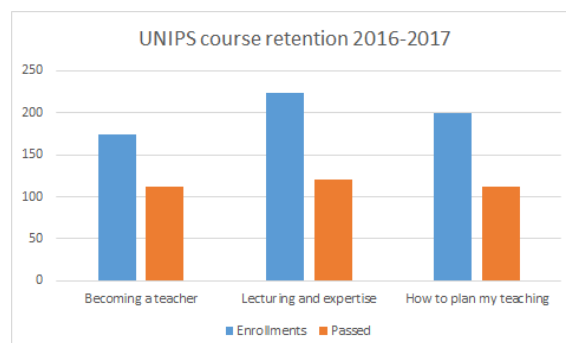

Figure 2: The dropout rates of three UNIPS modules during the years 2016-2017.

4.1 Course Design Evaluation

(1) The instructors' role in our modules is always the same. To accept enrolments, to welcome students to the course via email, to inform of them how to enter Moodle, and then use Moodle to communicate deadlines for each task and to remind students of approaching deadlines. Hew et al., (2016) stress the point that the instructor should be passionate about the course, as the enthusiasm will show through to the students and encourage them. The enthusiasm, however, is very difficult to objectively measure or evaluate. One approach is to measure the frequency of communication between the instructor and the students. In our case over the observed period (2016-2018) the fixed amount of emails sent to students during the one month course was six without pre-test and eight with the pre-test. In addition the instructor contacted students through the Moodle discussion forums and occasionally reminded students who failed to meet deadlines that they had been given a few extra days to complete a task. The instructor also always replied within a day to all inquiries students sent regarding the course.

(2) The platform usability and design are discussed more in depth in our previous work (Laato et al., 2018). The basic pedagogical principles aimed to make the user experience as smooth and as engaging as possible are the following:

- Concise design
- Use of multimedia resources
- Short snippets of information
- Clear categorisation of materials

(3) How the students perceive the relevance of the course can be measured in multiple stages: the first impression, during studies and after completing the course. In our case example the courses were directly aimed at our university employers and doctoral students with teaching duties, and also marketed as such. This probably increased the perceived relevance.

(4) In our case a teamwork period was included in all three modules to answer the demand of feeling social presence during studies. In the realm of higher education, where students are quite familiar with the used learning methods, the role of the instructor does not necessarily have to be a big one in facilitating the conversations among students.

We can conclude that all the four key factors identified in previous studies as indicators of a successful online course are present in our case. In order to extend our understanding of students' engagement and motivation, we now continue to the quantitative analysis of student retention.

4.2 Quantitative Data on Student Retention

To find out whether the pre- and post-test affect student retention, we have two data groups. First, we have data from autumn 2016 until spring 2017 collected from our modules without the pre-and post-tests. Overall we had 346 students registering to our courses with 156 students completing them. Figure 3 demonstrates the individual phases where students forfeited their participation to the courses.
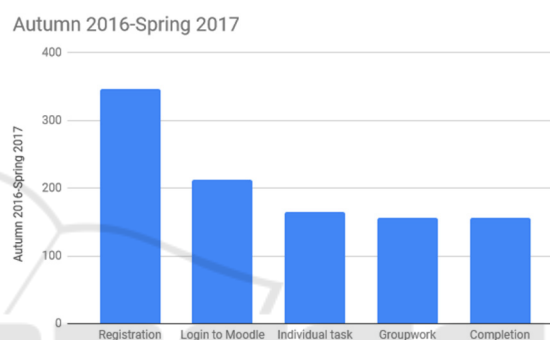

Figure 3: Phases where students withdraw from university pedagogy online courses.

We observe the clearest spike right after registration, as from 346 registered students only 213, roughly 62% came to Moodle. This contradicts our hypothesis that the most time consuming task (individual task period) would be the one where majority of students would leave the course. Instead, what seems likely in light of this data is that the longer students participate in the course, the more likely they are to retain their participation.
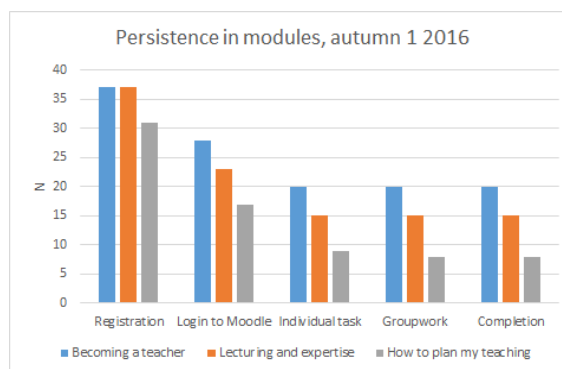

Figure 4: Breakdown of student persistence by module in autumn 1 module of 2016.

Another phenomenon we wanted to take a look at was if there is an observable difference in students' engagement between our three modules. Figure 4 shows the case of autumn 2016 modules. The only difference in student retention can be observed between the first two phases: registration and signing up to Moodle. 37 students signed up for both Becoming a teacher and Lecturing and Expertise, but 28 and 23 students registered in Moodle respectively. Adding to this data we have Figure 5 showing student participation in the three modules from autumn 2017, which is also our first instance with the pre- and post-tests present. Based on the data presented in Figure 5, we can conclude that there is no notable difference in student retention between our three case modules.

Comparing the graphs Figure 3 and Figure 5 we see a clear difference in the student dropout pattern. Instead of a huge spike between registration and joining Moodle, we now observe a much smoother curve. This is also seen clearly on the overall course clear rate, as in our first case the clear rate was only 45%, after the introduction of the pre-and post-tests the clear rate climbed all the way up to 66%! These results indicate that the very beginning of the course is extremely important in order to engage students and increase overall course retention.
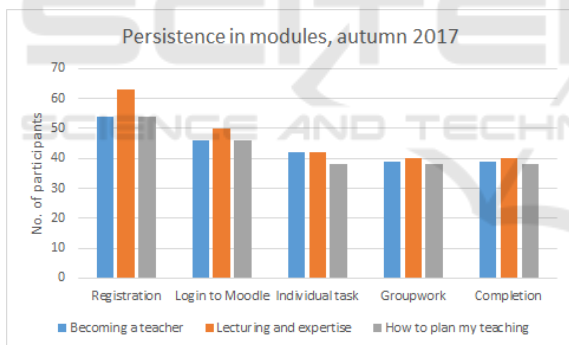

Figure 5: Showing student persistence in the three case modules in autumn 2017 with the pre-and post-tests enabled.

Next we take a look at the demographics. Each of our case course participants is either a university employee or a doctoral student. As we offer the online courses to all faculties, we had the unique opportunity of measuring which faculties inside our university were the most active in participating in the pedagogical studies. It turns out as we can see from Figure 6 that Humanities, Science & Engineering and Medicine were the most active out of the seven main faculties in our university. The faculty of Law on the other hand had the fewest participants to the UNIPS courses, which can partially be explained by the fact

that if measured by the number of employees, it is also the smallest out of the seven faculties.
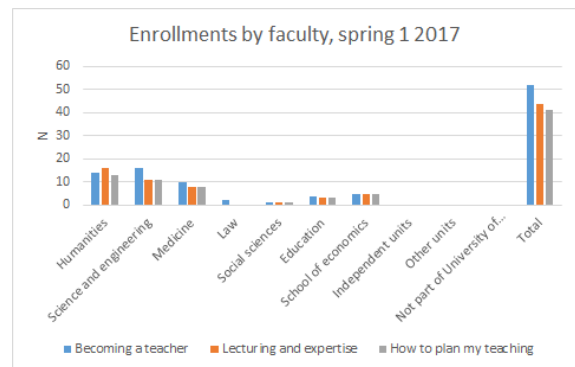

Figure 6: Students who enrolled to the UNIPS courses in spring1, 2017 sorted by faculty.

Finally we take a look at the role of the students to see sorted by module. No single module seemed to be significantly popular over others among any group of students. We could not either see any notable differences in engagement or dropout rate based on whether a student was a staff member or a doctoral student. The role or status of the students is displayed in Figure 7.
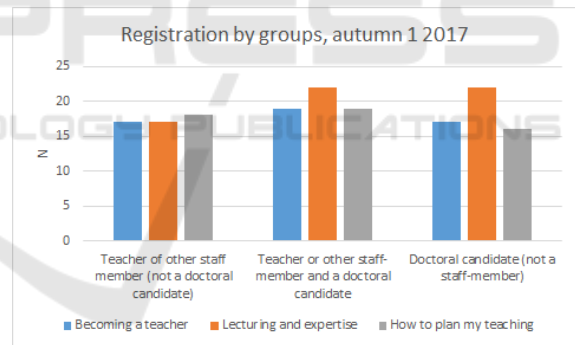

Figure 7: The current status of students who registered to the UNIPS modules.

5 DISCUSSION

Perhaps the most interesting part in our results was the improvement observed in student retention after introducing pre-and post-tests to our courses. This finding is in line with Evans et al., (2016, 209) finding that students are more likely to complete a MOOC course if they have completed a pre-course survey. According to Evans et al., early engagement in courses provides a strong predictor of sustained engagement that leads to course completion. This study confirms this observation in the realm of

university pedagogy online courses where students are all either doctoral students or university staff members.

Other factors like huge tasks, home faculty or the status of the student did not have an observable impact on retention. Course design most likely plays a big role in general as previous studies suggest (Fournier, 2015; Czerkawski, 2016), but as our 3 case courses were constructed according to best practises found in previous studies and were similar to each other, no notable differences were found in retention rates among the three case courses. Yang et al., (2013) show that at least in some cases social factors within a MOOC and outside it affect student retention rates, but in our case we observed only a few rogue student quitting in the teamwork period with the outstanding majority completing the course after passing the individual task period and the half way mark.

6 CONCLUSIONS AND FUTURE WORK

In this study we looked up previous studies to find out factors influencing student engagement and retention in online courses. We found four key factors and compared our case course design to these. We then analysed student persistence during three online courses and identified the stages when students withdraw from the course. We did not examine the possible extrinsic or intrinsic motivations students have to continue studying the modules. Instead, the focus was on online behaviour that can be traced in the UNIPS platform and Moodle. The main contribution of this study is that it provides empirical evidence to support the previously stated theory that the early stages of an online course are the most crucial to the overall student engagement (Evans et al., 2016).

In light of findings from this study, the next step for us to improve our existing courses is to focus on the beginning of our modules. How can we welcome all students in a way they feel motivated and engaged from the very beginning? What factors are there in the very beginning of an online course that turn some students away? In addition we are going to expand our SPOC style courses to MOOC's, and offer them to a much larger audience. This will allow us see if the findings of this case study are transferable to outside our context. One final aspect that could be explored in further research is why students decide to study online. University pedagogy courses are also available as synchronous, face-to-face teaching at the University of Turku. However, online modules that allow complete distance learning are popular among students.

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