

Innovation in an entrepreneurship course according to class structure and design

Entrepreneurship lecturing and student engagement in large classes of university students are a constant challenge for lecturers. The purpose of our paper is to present the validation of a student segmentation method that has become very successful. We present methodological novelties applied in a Launch of Innovative Businesses course and the connecting multiple cross-sectional research. The course can be completed in three ways, meeting the needs of three student segments identified in the classes. The quantitative primary research is based on hierarchical clustering that was applied to questionnaire data of five semesters' student responses. Results confirm the existence of these segments and that most of the students signed up on entrepreneurship courses have clear preliminary expectations of the course. The presented design framework can be generally applied in large and small classroom environments, and can also be reused as a proven case.¹

Keywords: *entrepreneurship course design, student entrepreneurs, entrepreneurial approach of lecturing, student engagement*

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1. Introduction

University-level entrepreneurship education (EE) is a constant challenge for lecturers. This is also a general international challenge that is touched on by many academic research papers and practical cases these days, as was pointed out in the Danube Cup Conference presentations (Jáki and Huszák 2022). Recent books on EE (Volkman and Audretsch 2017; Fayolle 2018) demonstrate that educational methods are very dependent on the culture of students and that the best approach is experimentation with teaching techniques. Going into detail, a huge number of studies have been published on the different methods that lecturers apply in their EE. Mwasalwiba (2010) gathered 26 different methods from 21 articles and found that lectures, case studies and group discussions are the most important ones. However, Bennett (2006) argues that there is no consensus on the best teaching methods and practices. He lists 24 different approaches to teaching and learning but, interestingly, with no focus on how the course is designed or how fulfilment requirement may impact the applicable teaching methods. Sirelkhatim and Gangi (2015), in their systematic literature review, apply a keyword mapping approach to list the most relevant teaching methods and content elements of entrepreneurship programmes. Their list of 18 phrases also lacks class structuring, which is why this approach is unique among the mainstream EE methods.

The challenge is even greater when entrepreneurship lectures are delivered to large audiences (more than 100 students) and interactivity is limited. Carpenter (2006) summarises the effective teaching methods for large classes and finds that the lecture/discussion method is the most favoured by students. To resolve this issue, our approach is segmenting students based on their personal needs. This paper can also be considered as a case study, based on empirical and documented experience of more than a decade in EE. Student engagement also has a large literature. Knox (2022) defines four student engagement types – ‘active’, ‘middle of the road’, ‘passive’ and ‘detached’ interaction levels – based on his experiments in virtual EE. In addition, the characteristics of entrepreneurship programmes offered specifically to engineers can vary widely from those of general classes, as pointed out by Duval-Couetil et al. (2011). In this paper we argue that EE teaching methods should be chosen according to student engagement types, also taking into account class structure and design, especially at engineering schools.

The Launch of Innovative Businesses course was first offered to BSc students in 2010 at the Budapest University of Technology and Economics (BME). Since then the course has been a constant success. In the past 13 years, more than 6000 students have been taught with an average of more than 200 students per semester. This course was unprecedented; no general entrepreneurship class was offered at the university before it. As a result, the subject is considered an introductory ‘101’ course for a large audience. The most important aim is to motivate students to start businesses either today or further down the line. Because the majority of students are from engineering faculties, the focus is not just on small and medium-sized enterprises (SMEs) but also on corporate entrepreneurship. The course directors set the following more-detailed goals:

- Introduction to the world of startups and entrepreneurs: we present a possible career path for students. To demonstrate the diversity of businesses and the types of enterprises, famous Hungarian entrepreneurs are regularly invited as guest speakers.
- Theoretical knowledge on entrepreneurship: here we define concepts and demonstrate them via cases. Important notions such as business concept mapping, value proposition, marketing, market research, Minimum Viable Product (MVP), pivoting, venture capital, etc. are explained with many examples.
- Practical experience of launching an enterprise: an optional, practice-oriented extra class (titled *Startup VIP Programme*) is offered to those students who are really engaged and motivated to start their own businesses. Here we help students solve the emerging business challenges of entrepreneurship.
- Guidance to career planning: we help students learn to answer relevant questions for themselves such as ‘Is this a job for me?’ or ‘Is it worth launching a startup for my idea?’.

The entrepreneurship curriculum of the course primarily follows János Vecsenyi’s approach. His 12-step framework is specified in his book (Vecsenyi and Petheő 2017) and supplemented with digital materials of the vallalkozasindito.hu (in English: StartMyBusiness123.com) site (Vecsenyi n.d.). The course focuses on the first six steps of this framework. The extra hands-on class (see goal c. above) is organised according to the StartupVIP incubator methodology, also developed by Vecsenyi, and implemented at two universities in Hungary (BME and Budapest Corvinus University). In addition, Bill Aulet’s (MIT) 24-step Disciplined Entrepreneurship framework is used, especially the ‘Who is your customer?’ and ‘How do you make money off your product?’ themes (Aulet 2013).

2. Students as customers

We, as lecturers, view our students as ‘customers’ with different needs. It is clearly understood that students with different backgrounds and experiences have different expectations regarding the course outcome. There is no one universally accepted categorisation for students, but different schools identify different ‘personas’. The MIT Martin Trust Center for Entrepreneurship, for example, suggests five personas: ‘The Curious Entrepreneur, The Ready-To-Go, The Joiner, The Amplifier, and The Corporate Entrepreneur’ (Wymer 2021, 6). Our approach is different. The two most important criteria for distinguishing students are *experience* and *eagerness to start a business*. Based on our 10-year empirical experience, the students can be categorised according to these two dimensions. The most important goals of these student personas differ, as Figure 1 shows.

Students who have no previous entrepreneurship experience form the majority of the class. Some are eager to start a business straight away; they are definitely committed. However, others are less certain or do not want to start a business immediately; they want to become an entrepreneur later, after school or after gaining several years of professional experience. Nevertheless, for students in both these

categories, their typical attitude towards the class is that they get a no-risk test environment where they can practise the business launching process while learning from the lecturers and mentors and from the mistakes of others.

Every semester there are also a significant number of students, though they are still in the minority, who have previous entrepreneurial experience, in most cases picked up from their family environment where one or both of the parents or the larger family is or was an entrepreneur or family business owner. For them, the basic notions are not new, but they want to learn the details and the precise meaning of concepts and phrases, as well as getting familiar with up-to-date international and professional wording. The fourth category is the set of students who are committed entrepreneurs. They typically have a business idea and they want to launch their startups as soon as possible. Most of them already have some experience, but they are aware of the fact that they have to learn more and want to get practical guidance from lecturers, mentors and others in the startup ecosystem.

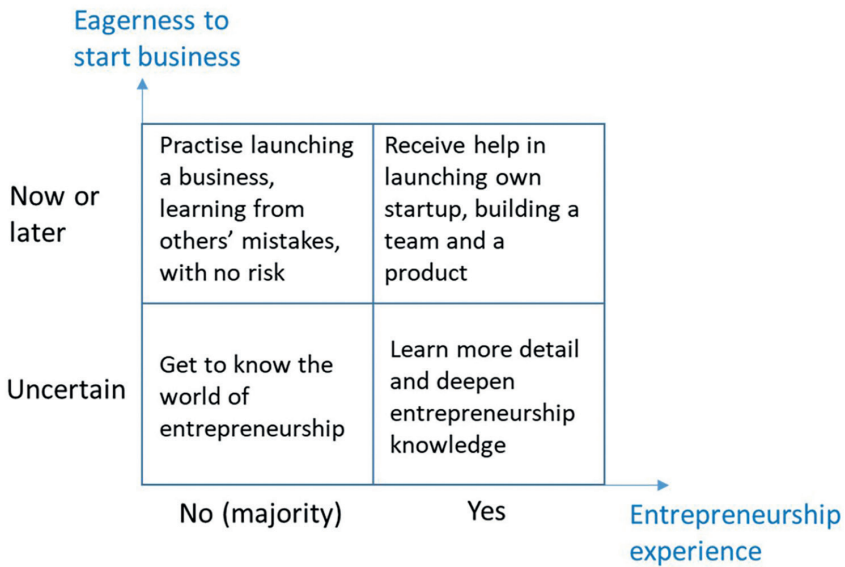


Figure 1. Student personas and their goals based on our 10-year empirical experience (own editing)

2.1. Levels of student engagement

It would be an easy and obvious choice to offer the course differently to the four different student categories summarised in Figure 1. However, four categories would be too many; it would be difficult to manage the class according to the different needs. Originally, back in 2010, the course founder Professor Vecsenyi defined an easier model of three student categories, based on the different levels of student engagement. He recognised that students can be categorised into three levels ac-

According to their commitment, enthusiasm and eagerness, that is, their engagement. The original three-level differentiation scheme has stayed the same for more than a decade because it is

- easy for students to categorise themselves
- easy to differentiate the forms of education
- easy to set different fulfilment requirements for different groups.

Table 1 summarises the three levels, named Sunday hiker, Easy rider and Startup driver.

Level of student engagement	Name of student category	Form of education	Topics covered	Time required per week	Fulfilment of course(s)
Basic	Sunday hiker	Only lectures	Entrepreneurship basics	3–4 hours	One end-of-semester test
Advanced	Easy rider	Lectures + consultation	Problem–solution fit + concept mapping	5–6 hours	Business concept map + 2-minute video
Full	Startup driver	Lectures + practice + mentoring (StartupVIP Programme)	Problem–solution fit + product–market fit (market validation)	Min. 10–12 hours	Validated business concept + pitching

Table 1. Three ways of completing the course (own editing)

Based on 12 years’ experience, we can confirm that students like this separation of requirements. It gives them certain freedom and control over how to accomplish the subject. Our marketing communication wants to make clear to the students that what they want is *their* decision: ‘What will YOU get if you take this class? It depends on YOU, on what YOU want. This is YOUR class, YOU chose it. What do you want to get?’

What do YOU want to get?



Figure 2. A flyer explaining the different student segments (own editing)

Thus, the Launch of Innovative Businesses course currently can be completed in the following three ways based on the original hypotheses: **Sunday hiker** students have the goal of gaining a general understanding of the startup world. They want to hear about entrepreneurs and entrepreneurship, so that they can write a test at the end of the semester to show how much they have learnt during the course. The **Easy riders** want to summarise their enterprise concept and receive feedback on their ideas. They want to learn about concepts and tools to use the later in their career; thus, they create a business concept and a video pitch, usually in pairs. The **Startup driver** students want to apply knowledge in practice, to be involved in a practical startup development process and to experience the live environment of chasing a startup dream. They have to work on their own ideas in a team in order to validate them, and this work requires active participation during the whole semester.

The majority of students, about 80%, select the easiest Sunday hiker completion of the course; approximately 12% select the Easy rider way; and only about 8% select the most demanding Startup driver completion and the extra requirements. Of course, it would be more preferable to shift Sunday hiker students to the other two categories. To understand the reasons why Sunday hikers are reluctant to make efforts towards more engagements, in 2018 we initiated a quantitative research project to span several years.

3. Methodology of the primary research

In the primary research, a questionnaire survey was used to examine the university students' attitudes towards starting a business and the Launch of Innovative Businesses course. The questionnaire was based on the experiences of previous semesters of the subject: in addition to mentioning a number of entrepreneurial and learning objectives, it also analysed the possibilities for completing the course. The aim of the questionnaire research was to validate the need for the three different methods of completing the subject, since our preliminary hypothesis was that the students of a course of several hundred participants are so heterogeneous and their needs for knowledge about entrepreneurship are so varied that we need to offer several ways to fulfil the requirement of the subject.

We conducted a multiple cross-sectional research (Malhotra et al. 2017). The questionnaire was surveyed in five consecutive semesters, in each case in the week preceding the semester. The questionnaire was identical across the five terms, allowing for comparisons between semesters regarding the statements, as well as for a combined, aggregated examination of several semesters. Convenient sampling method was used whereby the sampling frame was the total number of students in the course in a given semester. The questionnaire was completed online, and semantic scales were applied for most questions, which were used, among others, to compare means and for hierarchical clustering. Statistical analyses were performed using IBM SPSS version v28 following the methods described by Sajtos and Mitev (2007).

4. Results of the primary research

4.1. Demographic data

A total of 809 evaluable responses were collected in the sample over the five semesters. Figure 3 shows the number of students enrolled in the course for the five semesters and the number of students who completed the questionnaire. It can be seen that more than 50% of the students in the sampling frame database completed the questionnaire at the start of each semester. This is a very good percentage, considering that the students did not receive any reward and that participation was entirely voluntary. The high completion rate also reduced the limitations of the questionnaire, which allowed us to get a more accurate idea of the expectations of our students when they arrive for their first lecture.

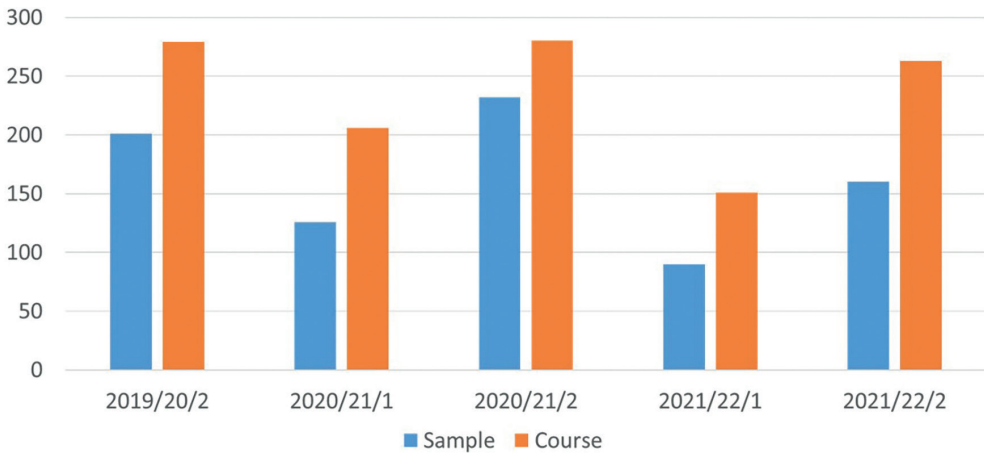
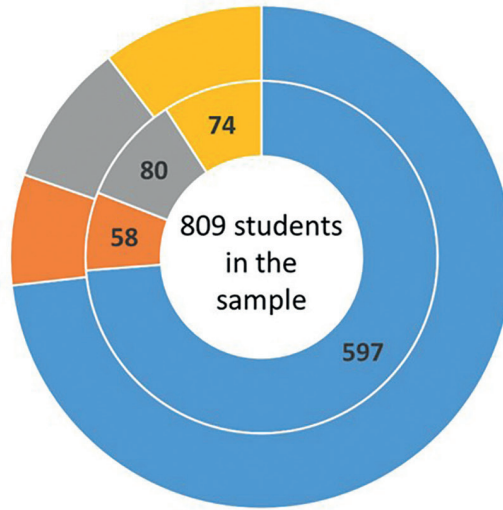


Figure 3. Sizes of the samples and the sampling frames in each semester (own editing)

The course can be attended by students from several faculties of the university. The proportions of students from different faculties are shown in Figure 4, where the outer pie chart shows the students who enrolled in the course and the inner pie chart shows the distribution of the sample. There is no significant difference between the two distributions, so the sample can be considered fairly representative of the course students in terms of faculties and thus of expected prior knowledge. Figure 4 also shows that only a very small percentage of the students study economics at a higher level during their undergraduate programme, but that they may come to the course with a number of innovative entrepreneurial ideas thanks to the engineering approach they have gained.



- Faculty of Electrical Engineering and Informatics
- Faculty of Mechanical Engineering
- Faculty of Economic and Social Sciences
- Other faculties

Figure 4. Distribution of the students from different faculties of the university in the sample and the sampling frame (own editing)

4.2. Students' general needs in relation to the course

Figure 5 shows the answers to the semantic scale of six questions for the whole sample, broken down by semesters. In all cases, the questions were related to the students' needs in relation to the fulfilment of the course and the content of the lectures and exercises. In the figure, the average values of the semantic scales have been transformed into percentages.

In general, students prefer practical education and want to learn about starting a knowledge-based business. There is a more significant difference between semesters in terms of whether students prefer to complete assignments during the semester or at the end of the semester. For the three questions in the bottom row of Figure 5, there were greater variations, with both extremes receiving a high number of responses. Thus, there was no homogeneity at all in the student population regarding teamwork, active or passive participation in classes and acquisition of a valuable knowledge. There were many responses showing that the enrolled students want to fulfil the course easily, prefer to work on their own and do not participate actively in the lectures.

2019/20/2	Practice		Theory	Knowledge-based enterprises		Conventional enterprises	Practical tasks during the semester		Test at the end of the semester
2020/21/1									
2020/21/2									
2021/22/1									
2021/22/2									
2019/20/2	Teamwork		Work individually	Active participation		Passive participation	Easily obtainable mark		Value of the knowledge
2020/21/1									
2020/21/2									
2021/22/1									
2021/22/2									

Figure 5. Students' needs concerning the lectures broken down by semesters (own editing)

4.3. Comparison of the created clusters

The results presented in Subsection 4.2 also suggest the identification of different student groups; the experience of the previous semesters of the subject confirms this. In the questionnaire, after a brief description of the three different options for fulfilment, the students were asked to select the way they expected to obtain a grade for the subject (Sunday hiker, Easy rider or Startup driver).

Figure 6 breaks down the responses to the six questions presented in Subsection 4.2 by the groups of answers indicated by the students. The values represent the average values between the extremes of 1 and 7 in the figure. The Sunday hiker group, which writes the test, typically prefers a more easily obtainable grade, passive participation and individual preparation, while the other two groups differ in most values from the test-taking group. The only agreement among the three clusters is that they prefer to learn about knowledge-based enterprises and there is a relatively strong similarity in their preference for practice-oriented training.

Original classification by the students									
Sunday hiker	Practice		Theory	Knowledge-based enterprises		Conventional enterprises	Practical tasks during the semester		Test at the end of the semester
Easy rider									
Startup VIP									
Sunday hiker	Teamwork		Work individually	Active participation		Passive participation	Easily obtainable mark		Value of the knowledge
Easy rider									
Startup VIP									

Figure 6. Differences for the semantic scale questions based on the original classification by the students (own editing)

Using the data from the six questions, we also created the three groups using a two-step hierarchical clustering technique (based on Hair et al. 2019). In the first step, the outliers were filtered out using the single linkage method, and in the second step, the three groups were created using the Ward algorithm. Figure 7 shows the differences between the three clusters (with the same names as in the original concept) formed by the Ward method. Furthermore, Figure 8 highlights the differences between the averages of the clusters formed by the students and the clusters formed by the Ward approach. The following can be highlighted for the clusters that were created by the Ward method:

Sunday hikers:

- Knowledge is less important
- Less participation during lectures
- No need of teamwork
- Practice is less important

Easy riders:

- Knowledge is valuable
- Less participation during lectures
- No need of teamwork
- Looking for practice
-

Startup drivers:

- Knowledge is valuable
- Want to participate in lectures
- Need teamwork
- Looking for practice

Ward method classification									
Sunday hiker	Practice	Theory	Knowledge-based enterprises	Conventional enterprises	Practical tasks during the semester	Test at the end of the semester	3,28	3,41	5,68
Easy rider							2,19	3,03	2,08
Startup VIP							2,59	3,13	2,69
Sunday hiker	Teamwork	Work individually	Active participation	Passive participation	Easily obtainable mark	Value of the knowledge	5,89	5,55	3,55
Easy rider							6,33	4,24	4,76
Startup VIP							1,91	3,86	4,68

Figure 7. Differences for the semantic scale questions based on the clusters by Ward method (own editing)

Differences of the two classifications (Ward - original)								
Sunday hiker	Practice	0,25	Theory	Knowledge-based enterprises	0,21	Conventional enterprises	Practical tasks during the semester	0,8
Easy rider		-0,32			-0,13			-0,08
Startup VIP		0,65			-0,22			0,34
Sunday hiker	Teamwork	1,11	Work individually	Active participation	0,61	Passive participation	Easily obtainable mark	-0,19
Easy rider		3,26			0,16			-0,03
Startup VIP		-1,63			0,67			-1,04

Factors of differentiating

Figure 8. Differences for the average values base on the two types of classifications (own editing)

Figure 8 shows that the three factors in the bottom row are very important elements in students’ understanding of how the subject can be completed and are the most likely components to put students on the right track. There is a significant difference in terms of attitude towards teamwork, which also highlights a more emphasised difference between the Easy rider and Startup driver approaches. As for active participation in lectures and ease of obtaining a grade, we found a difference for those who chose Startup driver, which suggests that, on the one hand, the extra work of the Startup driver Programme should be reflected in the credits and grades obtained, and that, on the other hand, the exercises could be better adapted to the students’ need for activity in the classroom.

		Ward method classification		
		Sunday hiker	Easy rider	Startup driver
Chosen by the students	Sunday hiker	189	67	120
	Easy rider	38	73	268
	Startup driver	7	13	34

Choose a less complex way to finish the course

56%

Choose according to their needs

37%

Choose a more complex way to finish the course

7%

Figure 9. Comparison of the two grouping methods (own editing)

A cross-tabulation that compares the two groupings is shown in Figure 9, which also highlights the proportion of students who choose the programme that is really intended for them, and the percentage of students who prefer a weaker or stronger way of fulfilling their requirements compared to their needs at the beginning of the semester. There is a significant proportion of students (56%) who choose a weaker option relative to their needs, with a particularly high number of students who (presumably based on the difference between teamwork and individual work) choose Easy rider over Startup driver. The proportion of those choosing a more complex solution compared to their needs is very low for the five semesters taken together. This result also draws our attention to the need to be more precise and transparent in communicating the characteristics of each fulfilment mode at the beginning of the semester. Looking at the columns in Figure 9, it is also clear that, based on the Ward method, Sunday hikers have the highest proportion of students who can predict their preferred fulfilment mode, but for students who choose Easy rider and Startup driver, there is much more uncertainty about the fulfilment mode.

Figure 10 shows, by semester, the proportion of students who choose to meet their needs and the proportion who choose to perform less or more strongly than their needs. Although there are small differences between semesters and the figure shows which semester presented which educational problems and situations during COVID, the Chi-square test did not show significant differences between the semesters ($p = 0.354$).

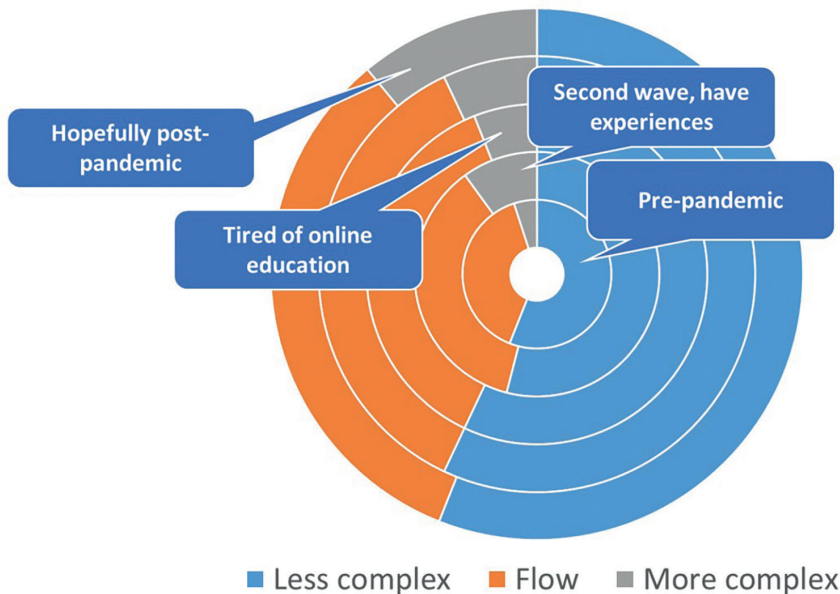


Figure 10. Students' chosen methods compared to their needs, by semesters (own editing)

5. Conclusion

For large classes, EE is a challenge, primarily because of the heterogeneous student needs and expectations. For more than 12 years, a simple three-tier student segmentation has been used based on intuitive recognition of categorising student engagement into three levels. The goal of our primary research was validating the hypothesis that these three categories mean a proper segmentation of students.

The results show that segmenting the students based on their divergent needs and attitudes is a very important and effective way to improve student satisfaction. As Figure 8 shows, the most diverse needs can be detected regarding the following three decision points of students:

- teamwork vs individual work
- active vs passive participation in classes
- easily obtainable marks vs. value of knowledge, that is, level of effort required to complete the course.

This outcome also means that these factors must be emphasised and clearly explained to the students before asking them to group themselves into one of the three segments.

Based on our results, we strongly recommend that university lecturers consider structuring the class based on student engagement levels, especially for large classes. Our three-level segmentation proved successful for courses with more than 100 students each semester; therefore, as a limitation it should be noted that this type of segmentation is not validated for smaller courses and courses without classic lectures (like laboratories and courses with only practice). Usually, in such a large class as Launch of Innovative Businesses, mentoring and checking of groupwork are not manageable; there are also a lot of students who are not interested in groupwork. Our segmentation proved to be a usable solution for both problems. Based on this limitation, we recommend further research on segmentation aimed at smaller courses.

It was also demonstrated by the results that a large majority of students would like to see a practical curriculum vs theoretical knowledge, which strengthens the practice of involving successful entrepreneurs who present the critical success factors of entrepreneurship in many business areas.

Finally, it was concluded that more detailed and accurate communication is needed for students before they choose categories. It is important that students understand more clearly the fulfilment requirement and the lecturers' expectations. Following this guidance, the number (and therefore the ratio) of Easy rider and Startup driver students could be increased, which would raise the added value of the course.

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