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Comparative analyses of the educational methods in the leading business development masters programmes in Hungary

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ABSTRACT

Entrepreneurship education is a rapidly growing research field, emphasizing the role of education institutions in developing entrepreneurial skills and attitudes. We examined the leading Hungarian business development programmes to explore the prominent educational and technological trends of the programmes from four perspectives: (1) usage of practice-oriented and experimental teaching methods, (2) how the COVID-19 pandemic accelerated the digitalization of education, (3) preparation of future entrepreneurs for the digital economy and (4) fostering entrepreneurship through extracurricular offers. We carried out 36 questionnaire-based interviews with professors of the investigated universities, comparing the results to a student survey covering more than 60% of active business development students in master programmes. The results suggest that the investigated programmes are practice-oriented, using practical examples. During COVID-19, different online platforms have been introduced at all three universities, widely used and adopted by both teachers and students and positive changes have been incorporated in teaching after the return to face-to-face. New digital trends and skills are already present in the curriculum, but students are less aware of them, so further development is needed in this area. Also, developments in terms of providing infrastructural, networking and financing-related services would be highly valued by students with entrepreneurial intent.

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1. INTRODUCTION

Entrepreneurship education is a rapidly growing research field (Ratten – Usmanij 2021), emphasizing the role of formal – mostly higher – education institutions in developing vocational skills and attitudes (Tuegeh et al. 2021). Entrepreneurship is an innovative activity that aims to improve the quality of life in society while generating income (Ranjan 2019). The innovative ability of an enterprise is fundamentally determined by the knowledge of the entrepreneurs, which places a great responsibility on entrepreneurship education. Digitalization is transforming not only the form and role of entrepreneurship but also entrepreneurship education (Gubik – Farkas 2022; Gubik 2021). At the same time, COVID-19 and reliance on information technology in education and in career planning forced changes on a scale that were previously unimaginable (Krishnamurthy 2020). The effects of these global tendencies – such as the COVID-19 pandemic, digitalization, Industry 4.0, changing entrepreneurial ecosystems – on higher education is discussed widely in the literature (Tuegeh et al. 2021); however, complex analyses of multiple trends and evaluation of the transformation of the education system are scarce. This is the research gap we intend to cover, looking at entrepreneurship education at Hungarian universities. While most of the entrepreneurship education research stream focuses on outputs, and education's importance in influencing entrepreneurial intent and success (Nasra – Yassin 2021), this study explores the input side, methods, and content of entrepreneurship education. For this, four important contextual trends serve as pillars for our investigation – two of them influencing methods of education, while the other two have an impact on content.

- According to the Training Output Requirement issued by the Hungarian government, Business Development master programmes are expected to develop leadership skills and competences for middle and senior management roles. It is crucial that students acquire theoretical and methodological knowledge, practiced through complex analysis and development exercises. Moreover, they must gain deeper analytical skills to be able to continue their studies in a doctoral program, so the usage of practice-oriented and experimental teaching methods is our investigation's first pillar.
- This strong contextual trend cannot be ignored when we examine the present and future of Hungarian entrepreneurship and business development education: so, digitalization of teaching methods accelerated by the pandemic is the second important pillar of our investigation.
- While global digitalization trends influence how future entrepreneurs are trained, this ubiquitous phenomenon also influences the content of education programs. Ratten and Ujmanij (2021) argue that entrepreneurship education research must consider the emerging trends of digital transformation, including the fact that technology related skills are becoming more important for entrepreneurs. That is why our research explicitly considers how business development curricula incorporate ICT related knowledge and skills.

- Finally, research shows that extracurricular activities have a significant positive effect on learning outcomes in general (Cordea 2014) and in entrepreneurship education as well (Premand et al. 2016). This suggests that extracurricular programmes and services could serve as a fertile ground for universities promoting entrepreneurship among students. Also, the ecosystem view of entrepreneurship (Stam 2015) suggests that higher education institutions can play multiple roles in the entrepreneurial ecosystem, and not only serve as a fountain of knowledge and talent. As a fourth pillar, we explore these potential extra roles of the entrepreneurial university as well.

The purpose of this article is to contribute to a better understanding of the complex role of entrepreneurship education in the changed environment and analyze the complex effects of COVID-19, Industry 4.0 and digitalization on the entrepreneurial higher education system. Following the literature review, results of a survey targeting the intersection of the aforementioned pillars is discussed and analyzed.

2. LITERATURE REVIEW

The first pillar of our research focuses on the different forms of practice-oriented and experiential teaching methods. Many argue that entrepreneurship education should inherently be practice-oriented and experience based (Fayolle 2013; Lei et al. 2021), although methods of channelling practice into the curriculum are diverse (Fischer et al., 2021) and not equally widespread among business schools. In the changing conditions of the environment, cooperation with enterprises in university programmes is increasing, to deliver personalized education (Paravizo et al. 2019), open access to knowledge (Himmetoglu et al. 2020), to establish teaching communities (Hasitschka et al. 2017), develop practice-based skills through the newly developed method of education - dual education (Fenyves et al. 2020) – and utilize virtual reality simulations in industry (Mourtzis et al. 2018). Furthermore, it has been argued for decades that traditional teaching methods – teacher and knowledge transfer-based teaching education dependent on textbooks and lectures – mainly used in HEI business programs are insufficient to gain skills such as creative thinking and problem-solving (Ceyhun – Uygun 2022). The teaching of business has rapidly developed and progressed in recent decades and experimental teaching methods have become increasingly widespread (Raja 2018). Experiential learning can be defined as a process by which students learn by being actively involved in their own experiences (Wehbi 2011) or as the process of transforming experiences into knowledge; however, it defines knowledge as the combination of understanding and transforming experience (Kolb 2015). Ruben (1999) states that experiential learning creates more complex and diverse learning outcomes and encourages active learning, collaboration, and interaction, while Ceyhun and Uygun (2022) argue that experimental teaching methodologies bring different perspectives to the teaching process which encourages students to acquire important skills needed in business life. While the aforementioned literature demonstrates the importance of experimental teaching, COVID-19 has posed another challenge for both professors and students, namely how to apply these techniques in the online space (Kang – Zhang 2020). These question takes us to the next pillars of our research.

The second pillar of our study is the effect of the pandemic, which had an accelerating impact on the digitalization of education, opening new perspectives. The COVID-19 pandemic

has accelerated the shift towards online or hybrid education methods, and educators argue that embracing technology, even in the form of virtual campuses might be the future of business education (Mullins 2022). The necessary ICT tools which made higher education possible throughout lockdowns in 2020–2021 might be changing business education standards and methods alike (Bogomolova et al. 2021). According to Fűzi et al. (2022), digitalization was initiated in higher education before the pandemic, enabling a fast switch to online education. Even with this preparedness, the COVID-19 pandemic served as a significant disruptor in HEI, starting from March 2020. Selection of proper online platforms for education and exams was as important as applying new teaching methods and techniques. The digital education platforms became widespread not only in education but also in the corporate sector and the competition in this field has also accelerated. On the other hand, future entrepreneurs had to be prepared for a new business reality changed by the pandemic. According to Szepesi and Pogácsás (2021), Hungarian entrepreneurs' thinking was transformed most in terms of the ability to adapt, flexibility, cost saving and prudence. The pandemic has accelerated digitalization as it became an indicator of success, shopping and business relationships were transferred to online platforms and home-office became widespread. As a result of the pandemic, Hungarian enterprises have become more resilient, and their strategic thinking has improved; this is, however, dependent on factors such as company location, government subsidies, industry characteristics and firm size (Nyikos et al. 2021).

The third pillar of our investigation is the effect of digitalization. Digitalization on the one hand is a pillar of long-term economic growth and technological innovation in developed countries (Yuan et al. 2021) and it accelerates the transformation from traditional to new professions as well (Tumiwa et al. 2022; PWC 2018). Real-time connection among buyers and sellers by digital tools (marketplace thinking) has been appreciated during the economic recession caused by COVID-19 (Nagy et al. 2022), enabling the sharing of data and information regarding personal opinions and experiences beyond transactions (Linhoff-Popien et al. 2018; Jablonski – Jablonski 2019). In recent years, in line with the industry 4.0 revolution, new concepts have also emerged in the field of education: Education 4.0, Learning 4.0, and Teaching 4.0 (Lopez-Garcia et al. 2019; Hussin 2018).

Technological innovation establishes new connections among business sectors for which higher education should prepare students. Fintech enhances the availability of financial resources and return on investment (Vardomatskya et al. 2021) and offers new payment methods (Natarajan et al. 2017). Insurtech is a phenomenon used to describe technological changes on the insurance market, including innovations that improve the efficiency of insurance products and services by offering new platforms (PWC 2019). "Big-techs" are pioneer financial companies providing a novel approach by complex services and big data management while new business risks are emerging (Bains et al. 2022). Artificial intelligence-based systems and block-chain encryption are applied to manage these risks. Innovations emerge along the borderlines of different business sectors, establishing new connections among information technology, economy, society and culture in the form of novel software or applications using visuals, graphic presentation and data analysis to support users.

Recent research results confirm and emphasize the strong influence of education – and even specifically: higher education – on students' entrepreneurial skills, motivation and intent (Gubik – Farkas 2016). The fresh Hungarian results of the Global Entrepreneurship Monitor (Csákné Filep et al. 2022) show that a higher level of education is associated with: (1) a higher level of

perceived availability of knowledge, skills and experience to start a new business, (2) a more personal relationship with entrepreneurs, (3) more optimism regarding entrepreneurial opportunities and (4) the ease of starting a business in Hungary and (5) less fear of failure. A more positive, entrepreneurship-friendly atmosphere at the universities is shown to have a positive effect on entrepreneurial career plans (Gubik 2021). International studies highlighting the role of higher education also suggest that extracurricular knowledge transfer programs – coaching, workshops, training sessions – may also encourage entrepreneurship (Maresch et al. 2016; Premand et al. 2016) and complete entrepreneurial knowledge and skills development (Nowiński et al. 2019). Szerb and Márkus (2007) also found that fields of studies can significantly influence the entrepreneurial intentions of students: participants in business and economics programmes think more about starting their own business than their peers in other programmes. Part of this effect might be caused by the curricular and extracurricular experiences students acquire during their university studies. The research of Szerb and Lukovski (2013) showed a positive relationship between participation in entrepreneurial courses offered by the university and students' entrepreneurial intentions, which suggests that besides subjects and courses developing specific professional knowledge areas, it is also worth developing entrepreneurial skills specifically. On the other hand, the Hungarian higher educational supply of innovative, practice-oriented courses seemed to be weak a decade ago (Imreh-Tóth et al. 2013; Gubik – Farkas 2013). Since then, numerous reforms and programme development efforts have focused on entrepreneurship education in Hungary, making renewed inquiry into the topic relevant and interesting. This is the fourth pillar of our research.

Looking at the issue even more broadly, we see that universities might have a multifaceted role in society in general (Toarniczky et al. 2019) and the entrepreneurial ecosystem specifically: while knowledge transfer and talent management are what universities can primarily influence among the system and framework conditions of the ecosystem (Stam 2015), they can also contribute to other elements:

- support services: university services that influence entrepreneurial aspirations may include the provision of consulting, coaching or workshops (Premand et al. 2016);
- physical infrastructure: university incubators might provide a workplace or digital infrastructure for students with an entrepreneurial spirit (Pittaway et al. 2019);
- finance: funding elements of university incubation programs or alumni investment funds (Aranyossy 2019; Farkas et al. 2022);
- networks and demand: universities' corporate and institutional partnerships, and their networks can be used to support start-ups in a mutually beneficial way (Maritz et al. 2022);
- culture: influencing the entrepreneurial spirit, thinking and values of students, which affects the utilization of the knowledge gained and activities carried out within the framework of the university (Kuti – Bedő 2018).

3. RESEARCH QUESTIONS

As we explore the four environmental and developmental trends influencing the state of entrepreneurship and business development education in Hungary, our investigations are led by four research questions. First, we focus on the practice-orientation of the teaching methods, serving efficiency and effectiveness in entrepreneurial competency and skill building.

RQ1: In what form and frequency are practice-oriented and experimental teaching methods applied on business development master programmes, according to lecturers and students, comparing three major universities?

Technological innovation is providing us new tools which offer the possibility to raise the effectiveness of education. A complex and widescale analysis of the transformation of education is best performed during pandemics such as COVID-19. A relevant research question is:

RQ2: To what extent are information technology tools and digital solutions used to support entrepreneurial higher education? What are the commonalities and differences in the development of teaching methods between the major HEIs in this regard?

Digitalization is becoming more and more prevalent in everyday life and increasingly important in business relationships. HEIs need to keep pace with the spread of digital innovations and ensure their incorporation into educational materials.

RQ3: To what extent do new trends of digitalization and the development of related new skills appear in entrepreneurial education?

Finally, we examine the universities' options to foster entrepreneurship more directly, while also widening the focus from the business development master programme curricula to extracurricular activities and services.

RQ4: Based on the perceptions of students and professors, what are the most common services offered by the focal universities in support of entrepreneurial students?

4. DATA AND METHODOLOGY

Data collection for this research covered three Hungarian universities: Corvinus University of Budapest, the University of Debrecen, and the University of Szeged. To explain this choice of focus, Table 1 summarizes the admission statistics of all the Hungarian universities offering a Business Development MSc in 2021. The table – and similarly, our analysis – focuses only on relevant data for the full-time Hungarian programmes, as (1) the English programme is currently a niche segment, offered only by a couple of universities and (2) the part time programme is very different from the full-time in terms of educational methods (partly because of the 50% fewer contact hours) and also in terms of the additional services utilized by the students. Table 1 shows that our research analyzing the practices of the three universities covers 80–90% of the admitted students, efficiently representing the Hungarian market.

First, through a mini focus group research with four faculty members, we explored (1) the forms of digitalization, platforms and technical solutions used during the COVID-19 online teaching period, (2) the practice-oriented or experimental teaching methods in use and (3) the potential offers and services of universities to foster entrepreneurship. Based on the results we compiled a questionnaire and conducted a questionnaire-based interview survey (also including open questions and inviting comments) among 36 lecturers from the three universities, covering almost 100% of the core subjects. This database was than analyzed by descriptive statistical tools, while the interpretation of the results was also supported by the synthesis of the free-text comments.

After evaluating the results of the lecturer-survey, a similarly structured online questionnaire was created for the student-survey, which was completed by a total of 93 students, 40 men and

Table 1. Student application statistics to Hungarian business development masters programmes

application statistics for the full-time Hungarian master programmes		Corvinus University of Budapest CUB	University of Debrecen UD	University of Szeged USZ	Kodolányi János University KJU	University of Miskolc ME	Budapest Metropolitan University METU	Óbuda University OE	University of Sopron US	Hungarian University of Agriculture and Life Sciences MATE	Proportion of students covered in this research
Year	Data										
2021	number of applicants	**572**	**44**	**57**	9	15	27	54	11	9	**84%**
2021	first choice applications	**186**	**11**	**22**	3	4	5	15	3	3	**87%**
2021	admitted	**104**	**10**	**19**	3	3	0	14	3	1	**85%**
2020	number of applicants	**534**	**68**	**66**	12	28	15	64	7		**84%**
2020	first choice applications	**160**	**19**	**30**	3	2	1	27	2		**86%**
2020	admitted	**128**	**14**	**21**	4	2	0	25	1		**84%**
2019	number of applicants	**643**	**68**	**76**	1	33	13	60	6		**87%**
2019	first choice applications	**193**	**19**	**31**	0	3	1	21	2		**90%**
2019	admitted	**151**	**13**	**22**	1	2	0	17	2		**89%**
2018	number of applicants	**676**	**65**	**82**		34	9	67	8		**87%**
2018	first choice applications	**198**	**23**	**20**		7	3	22	7		**86%**
2018	admitted	**134**	**16**	**16**		7	0	18	5		**85%**

Source: authors, based on the national database of felvi.hu. With bold: the three universities in the focus of this paper.

53 women, covering 60% of active students of the business development master programs of the three universities. This allowed us to carry out a comparative analysis, examining the four intertwining research topics from the lecturers' and the students' perspectives at the same time. Interviews and questionnaire-based surveys were carried out between March and May 2022.

5. RESULTS

First, it is important to highlight that the students' survey also created the opportunity to validate the assumption that business development master students have a tendency to choose an entrepreneurial career path. While in the first five years of their career our respondents are likely to opt for employment in large companies or SMEs, Fig. 1 also demonstrates that in the long run, the majority (57%) of students favour the entrepreneurial career path. This level of entrepreneurial enthusiasm significantly exceeds the degree of entrepreneurial inclinations measured among Hungarian higher education students in general (36%, Gubik – Farkas 2022; see also Fig. 1). Thus, we can conclude that business development master programmes are indeed the alma maters of future entrepreneurs and we can move forward to analyse our key research questions.

5.1. Usage of practice-oriented and experimental teaching methods

Based on the focus group interviews, we defined four main practice-oriented or experimental teaching methodologies, broken down into subcategories:

I. Learning from a hands-on practitioner: People who have developed expertise in particular areas are, by definition, able to think effectively about problems in those areas. The key principles of experts' knowledge for learning are that they can explain theoretical knowledge with practical relevance and are able to flexibly retrieve important practical aspects of knowledge concerning the teaching material. However, there is a serious risk that even though an expert may have a thorough knowledge of the subject, this does not guarantee that they will be able to teach others. This is a risk that can be mitigated by a professor with practical experience. We defined the following forms of implementing this teaching approach:

1. The professor is a hands-on practitioner.
2. Involving other professors with practical experience.
3. Meeting company managers as guest lecturers.
4. Meeting hands-on entrepreneurs.
5. Factory or site visit.

As can be seen from Table 2, almost 100% of the professors at the three universities consider themselves hands-on practitioners, but they also involve other professors with practical experience (25%), entrepreneurs (39%) and company managers (47%) in the teaching of their subjects. Our student feedback confirms (~80%) that they can learn from hands-on professionals, adding that students are not necessarily able to distinguishing them regarding their professional background. Factory or site visits were mentioned in two universities in one or more subjects, which was confirmed by the student survey, too. Overall, feedback from both professors and students confirms that students can learn from practitioners and typically get to

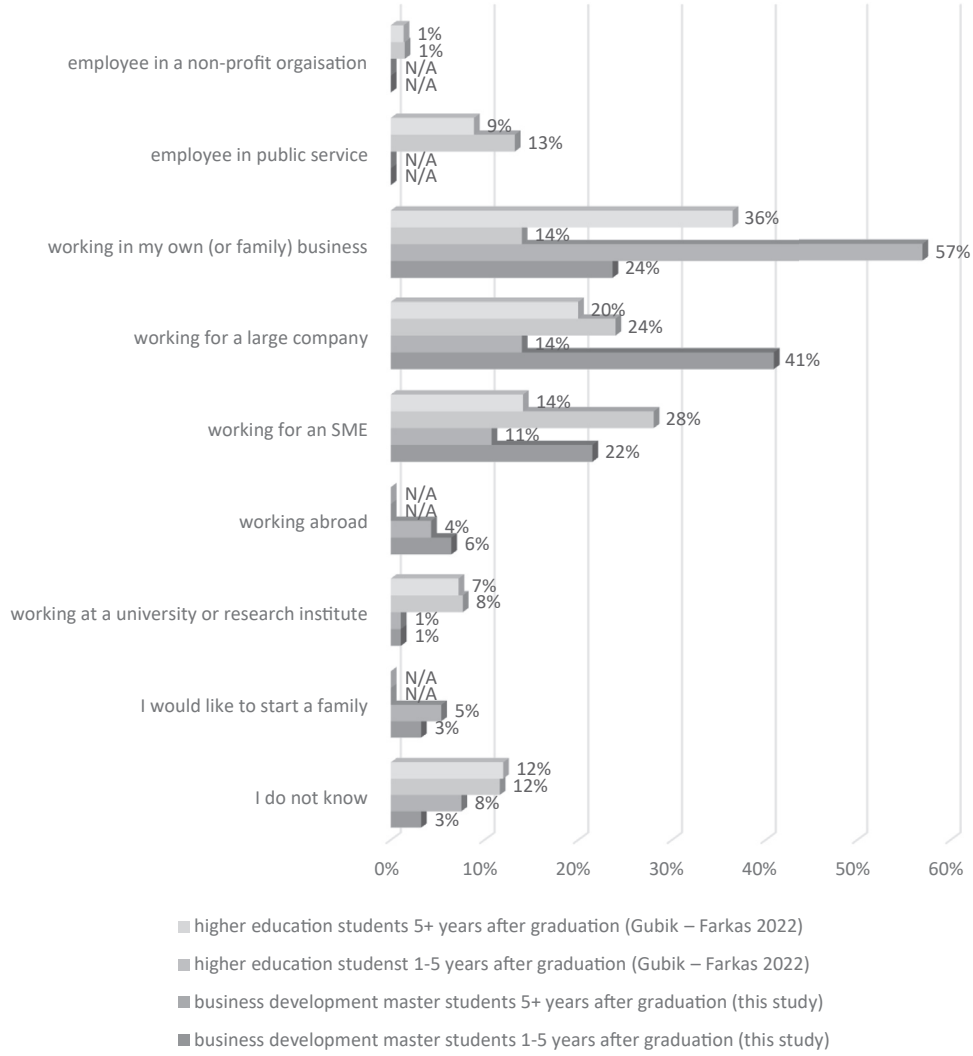

Fig. 1. Students' career aspiration after graduation – relative frequencies of the different answers. *Source*: authors

visit a factory or site at least once during the programme. In that sense, we see almost no difference between the three universities investigated.

Comparing the three universities we can see that the University of Szeged lags behind the other two universities mainly in the three categories which refer to involving managers, entrepreneurs or other teachers with practical experience and, based on the professors' opinions, they do not organize factory or site visits. However, 50% of the students reported that they took part in such visits. The reason could be that not all the professors of USZ were asked and

Table 2. Practice oriented education methods

Main methodologies	Forms of teaching methods	Professors' evaluation				Students' evaluation on a 9-point scale in %			
		CUB	UD	USZ	TOTAL	CUB	UD	USZ	TOTAL
Learning from hands-on practitioner	The teacher is a hands-on practitioner	100%	100%	67%	**89%**	76%	79%	87%	**79%**
	Meeting company manager as guest lecturer	64%	69%	8%	**47%**	77%	63%	72%	**73%**
	Meeting hands-on entrepreneurs	55%	54%	8%	**39%**				
	Involving other teachers with practical experience	27%	46%	8%	**25%**				
	Factory or site visit	9%	31%	0%	**14%**	Based on the answer of the students, more than 50% took part at least once in a factory or site visit.			
Solving real business problem	Small case studies	91%	85%	58%	**78%**	85%	63%	68%	**77%**
	Real data analyses	73%	69%	33%	**58%**	71%	77%	70%	**72%**
	Project task	45%	46%	50%	**47%**	84%	79%	86%	**83%**
	Project task collaborating with business partner	18%	8%	8%	**11%**	60%	66%	67%	**62%**
Solving simulated business issues	"Start a business" exercise	27%	23%	8%	**19%**	66%	72%	80%	**70%**
	Business simulation exercises	18%	31%	0%	**17%**	64%	77%	86%	**71%**
Involving students in research projects	Involvement in an academic survey project (regularly or ad-hoc)	18%	15%	17%	**17%**	53%	60%	53%	**54%**
	Involvement in institutional survey of enterprises	0%	8%	17%	**8%**				

Source: authors.

perhaps those who were not asked organize factory and site visits. The other reason could be that the university itself organizes the programme but not within the programme we are investigating, and the students cannot make a distinction.

II. Solving real business problem. Students must find or create new solutions for the problem and apply the new theories (Dogru 2008), improving students' problem solving, complex

thinking and academic capabilities. We defined the following forms of solving real business problems:

1. Small case studies (to be solved in one lecture)
2. Real data analyses
3. Project tasks (complex, multi-phase, larger-scale, typically group assignments)
4. Project tasks collaborating with business partner

Table 2 shows that the most widespread problem-solving teaching method is the small case study and real data analyses. Students confirm that small case studies (77%) and real data analyses (72%) characterized the teaching method of the program, in harmony with the professors' evaluation. Based on the professors' answers, project tasks are less widespread, but about 50% of the subjects used this teaching method, while in only a few subjects do students have the opportunity to solve a project task with a business partner. Students confirm that they had the opportunity to participate in project tasks or solve a project task by collaborating with a business partner during the program.

Comparing the three universities, we can state that the professors of Corvinus University reported most frequently that they use real business solving methods, and again the professors of USZ reported using this method less frequently than the other two. However, project tasks are more typical at USZ than at CUB or UD. Interestingly, students feel very similarly at the three universities regarding the frequency of solving a real business problem. The reason for the difference is that the students cannot make such fine distinctions as were used to distinguish the tasks in our research.

III. Solving simulated business issues, which means that students must formulate problems, discuss solutions, and make decisions during the exercise. We defined two forms:

1. "Starting a business" exercise
2. Business simulation exercises

In the case of solving simulated business issues, based on the answers of the lecturers the "starting a business" exercise is more common, while business simulation exercises are less common. Student feedback suggests that 70% of students have encountered both tasks at least once during their program. Here again we can see that professors believe that at USZ they do not use business simulation exercises, while students from USZ think they have taken part in at least one. We suppose that the students may not understand the terminology. Interestingly, the proportion of USZ students (80%) reporting that they had encountered "starting a business" and business simulation exercises was higher than in CUB and UD. The lower scores of USZ are partly explained by a university level program available to all students. Factory or site visits, however, score lower because of the weakness of the local economy.

IV. Involving students in research projects: It is also the aim of the programme to give students the opportunity to get involved in research projects:

1. Involvement in academic survey projects (regularly or ad-hoc)
2. Involvement in institutional surveys of enterprises

According to the lecturers, it is rare that a student is involved in a research project, while 50% of students reported that they had been involved in at least one research project during the

programme. We believe that the definition of research projects was understood differently by the students and professors. In this respect the three universities are quite similar.

5.2. COVID-19 pandemic accelerating the digitalization of education

At the beginning of the pandemic, when the government instituted online education from one day to the next, many creative solutions appeared immediately to bridge the problem. After a short time when several teaching and assessment methods were used on various platforms, even those that were developed for gamers, the institutions started to standardize the methods by making contracts with platform providers and creating new regulations for online education. This can be confirmed through the faculty and student questionnaires' results summarized in Table 3. At Corvinus University, the suggested platform for teaching was Microsoft Teams, and for sharing teaching materials and organizing exams Moodle was the prescribed platform. In Debrecen Moodle and Moodle-based e-learning was the central solution for sharing tasks and materials and organizing exams, but Webex had a new contract with the university to provide the general virtual platform for teaching. In Szeged BigBlue Button, Co-space and e-mails were the most frequent ways of online teaching and examining students. The answers of the students generally confirmed these points of view, with some small differences. Students from Debrecen University did not mention Moodle as frequently, because they probably did not know that the e-learning system they used was Moodle-based. According to the data, it can be stated that teaching, examining and sharing content with students through – usually centrally chosen – online platforms have become widespread, well-known and generally used by both professors and students.

The most important improvement that has had a long-term effect even after the pandemic is the practice of sharing educational materials through the given e-learning platforms which has become uniformed and widespread. It is a clear and simple way of informing students and collecting materials in the same place. Hundreds of previously printed materials have become digitalized and shared with the students in a cost-effective and environmentally friendly manner.

Next, we examined what kind of teaching methods were used during the pandemic through online platforms and what has remained after the pandemic. We tried to investigate whether the period of the pandemic was a one-time only situation, or the developing progress of online education managed to reach a milestone that had an irreversible effect on the future. Table 4 shows the relative frequency of professors mentioning different online teaching and assessment methods during and after the COVID-19 lockdowns. We can state that online live streaming on digital platforms was the key tool in all universities examined, but this nearly disappeared after the pandemic, which is understandable as they returned to ordinary teaching. The case of hybrid live classes is different, as that still occurs at two universities. Pre-recorded presentations did not become generally widespread but as it was successful among the students it remained – occasionally – part of the universities' practices.

Regarding exams, online tests were the most common at all three universities, but assignments were also a popular way of grading students. The students' perception was that the number of assignments had increased, which took a lot of time for them to prepare. The online platforms were frequently used for oral exams or presentations as well, but after the pandemic they nearly disappeared. On the other hand, professors who made huge efforts to create test-banks on the e-learning platform will be willing to use it also in the future, making use of automatic grading functions and saving time.

Table 3. Online teaching platforms

Online teaching platforms	Relative frequency of professors mentioning the tool (for teaching/for examinations)			Overall assessment	Students' perception of the frequency of usage (averages on a 4-point scale) (for teaching/for examinations)			
	CUB	UD	USZ		CUB	UD	USZ	Total
Microsoft Teams	100%/36%	38%/15%	0%/0%	used by everyone at 1 university for teaching, rarely for exams	3.51/2.24	1.77/1.59	1.4/1.07	**2.75/1.89**
Webex	0%/0%	100%/100%	0%/0%	used by everyone at 1 university for teaching, never at others	1.05/1.00	3.68/3.27	1/1.07	**1.67/1.55**
Moodle	100%/ 100%	100%/100%	0%/0%	used by everyone at 2 universities for teaching and exams, never at 1	3.42/3.56	1.41/1.23	1.07/1.07	**2.55/2.6**
E-learning	0%/0%	100%/100%	17%/0%	used by everyone at 1 university for teaching and exams, never at others	1.31/1.04	3.59/3.77	1.07/1.20	**1.82/1.72**
BigBlueButton	0%/0%	15%/0%	83%/67%	used mainly at 1 university for teaching and exams, never at others	1.00/1.00	1.09/1.05	3.80/3.80	**1.48/1.47**
Co-space	0%/0%	0%/0%	83%/50%	used mainly at 1 university for teaching and exams, never at others	1.16/1.15	1.00/1.00	3.73/2.80	**1.54/1.38**
E-mail	0%/0%	0%/0%	42%/8%	used occasionally at 1 university for teaching and exams, never at others	1.84/1.20	2.27/1.18	1.60/1.40	**1.9/1.23**
Zoom	9%/0%	0%/0%	17%/8%	used occasionally at 1 university for teaching and exams, never at others	1.38/1.09	1.59/1.27	2.00/1.60	**1.53/1.22**
Google Classroom	0%/0%	0%/0%	0%/0%	not used	1.07/1.02	1.09/1.00	1.13/1.07	**1.09/1.02**
Other (Discord, YouTube)	0%/0%	0%/0%	25%/25%	used occasionally at 1 university for teaching and exams, never at others				

Source: authors.

Table 4. Teaching and learning during the pandemic

Online teaching and assessment methods	Relative frequency of professors mentioning the tool (online teaching period /back to the classrooms period)			Overall assessment	Students' perception of the frequency of usage (averages on a 4-point scale) (online teaching period /back to the classrooms period)			
	CUB	UD	USZ		CUB	UD	USZ	Total
online live streaming on the digital platform	81%/18%	100%/0%	75%/8%	key tool during the lockdowns, but rare afterwards	2.93/1.55	3.73/1.86	3.07/1.73	**3.14/1.65**
hybrid live on platform	54%/36%	62%/54%	25%/8%	became and stayed common at 2 universities	2.29/1.82	2.18/2.45	2.13/1.60	**2.24/1.93**
pre-recorded presentation shared	36%/18%	15%/8%	42%/42%	became and stayed an occasional tool at all universities	2.49/1.82	1.32/1.14	2.93/2.20	**2.28/1.72**
shared educational materials, links	73%/72%	69%/31%	67%/67%	became and remained common at all universities	2.49/2.29	1.91/2.00	2.33/2.33	**2.33/2.23**
online teamwork	73%/9%	46%/8%	42%/8%	important tool during the lockdowns, but rare afterwards	2.95/1.60	2.59/1.45	2.40/1.53	**2.77/1.55**
online test	91%/45%	77%/31%	50%/33%	key tool during the lockdowns, remained common afterwards	3.49/2.47	3.68/3.00	3.20/2.60	**3.49/2.62**
assignment on platform	81%/72%	69%/46%	50%/25%	key tool during the lockdowns, remained common afterwards	3.33/2.85	3.32/3.05	2.87/2.67	**3.25/2.87**
presentation on platform	45%/0%	69%/15%	33%/8%	common tool during the lockdowns, especially at 1 university, but rare afterwards	2.51/1.35	2.73/1.45	2.80/1.53	**2.61/1.40**
oral exam on platform	15%/0%	46%/8%	50%/17%	common tool during the lockdowns at 2 universities, but rare afterwards	2.00/1.13	2.18/1.27	3.40/1.40	**2.27/1.21**

Source: authors.

In the last section of the questionnaire under personnel comments and reflections, we could find some opinions expressing that it was much better to learn online than in live teaching, saving a lot of time, but others said that they would never like to turn back to it. It shows that people's preferences are different, so in the long run it will be decided through market conditions what kind of methods are successful and what kind of education with what kind of tools is the most effective. It is certain that professors and students became more open-minded, and the pandemic experiences made it natural to provide online education if an obstacle to personal attendance arises.

5.3. Preparing future entrepreneurs for a digital economy

We have defined 14 new trends, notions and 7 new skills connected to digitalization, and have surveyed their appearance in the business development programmes of the 3 universities. Based on our study, new digital trends and skills are part of the teaching material at all three universities and were partly mentioned during the programme, based on student responses.

Table 5 reveals that the perceptions of students and professors have both conformities and non-conformities. Trends and skills mentioned by 25–50% of professors received a score from students of 1.68–2.72, considering TOTAL evaluations. This means that even if professors indicated a slight appearance of the trends and put emphasis on the development on new skills, this was evaluated as "partly mentioned" or "discussed in general" by students. Trends and skills mentioned by more than 50% of professors appeared only in the case of "digitalization" at UD, also receiving high scores from students. One of the most interesting points to emerge from the data analysis is that trends and skills mentioned by 0–25% of professors received relatively high scores from students. Regarding the TOTAL value "metaverse", "internet of things", "virtual project management" and "digital product management" are outstanding. In that sense at CUB the "gig economy", "digital financial skills", at UD "digital marketing" and at USZ "fintech", "marketplace thinking" and "artificial intelligence" are outstanding. This suggests that there are some hot topics in the technological ecosystem that professors should focus their attention on: even if a certain topic is hardly mentioned, students tend to attach higher importance to it.

The differences in the perceptions of professors and students about the teaching of digital trends revealed by the research suggest that the new digital trends, notions and new skills should receive more emphasis in the curriculum, as it is currently less perceived by students.

5.4. Fostering entrepreneurship – the universities' role in the ecosystem

The main role of higher education institutions in the entrepreneurial ecosystem is undoubtedly providing and nurturing knowledge and talent. As Table 6 shows, entrepreneurship-focused elective subjects are offered at all three universities, and the majority of students are aware of these options and find them important for their development. They can study, for example, "Local business development in practice" at Szeged or take a "Design thinking" or a "Startup management" course at Corvinus. Also, in the case of core courses, students can meet entrepreneurial role models in the classrooms, and work on some exercises (like business model planning or analysis with a business model canvas) which directly prepare them for entrepreneurial activities.

Regarding the cultural environment, we can state that all three universities promote the value of innovation, and two of the three seem to stress the value of entrepreneurship as well. The students' perception of the value of innovation and entrepreneurship is even higher: around 75%

Table 5. Preparing students for digitalization

New trends & skills	Professors' evaluation %				Students' evaluation on a 4-point scale (average)			
	CUB	UD	USZ	TOTAL	CUB	UD	USZ	TOTAL
New trends								
Digitalization	36%	69%	42%	**50%**	2.93	3.18	3.27	**3.04**
Robotic Process Automation	45%	46%	33%	**42%**	1.64	1.59	1.6	**1.62**
4th industrial revolution	45%	46%	25%	**39%**	2.89	2.23	2.8	**2.72**
Crowdfunding	36%	38%	25%	**33%**	2.23	1.95	2.47	**2.2**
Supply chain	27%	46%	25%	**33%**	2.82	2.59	2.4	**2.7**
Fintech	27%	46%	17%	**31%**	2.18	1.73	1.6	**1.98**
Blockchain	27%	38%	17%	**28%**	2.14	1.5	1.67	**1.91**
Artificial intelligence	27%	31%	17%	**25%**	2.32	2.5	2.73	**2.43**
Marketplace thinking	18%	31%	8%	**19%**	1.73	1.82	1.53	**1.72**
Internet of Things	36%	23%	0%	**19%**	2.46	2.05	1.8	**2.26**
BigTech	9%	23%	17%	**17%**	1.48	1.59	1.33	**1.48**
Gig economy (platform economy)	9%	15%	17%	**14%**	1.68	1.77	1.33	**1.65**
Metaverse	9%	8%	0%	**6%**	1.71	1.64	1.6	**1.68**
Insurtech	9%	0%	0%	**3%**	1.29	1.32	1.13	**1.27**
New skills								
Data visualisation (Infographics, Pivot) Digital design, Visualisation	55%	23%	25%	**33%**	1.7	2.68	2.73	**2.1**
Data science, Data analytics (e.g.: Big data, client data, social media analysis)	27%	38%	17%	**28%**	1.7	2.73	2	**1.99**
Virtual project management	18%	15%	0%	**11%**	1.96	2.18	1.8	**1.99**
Digital marketing, social media communication	18%	8%	8%	**11%**	1.86	2.68	2.33	**2.13**
Digital product management	18%	8%	0%	**8%**	1.57	1.91	1.27	**1.6**
Digital financial skills (use of applications)	0%	23%	0%	**8%**	1.77	2.14	1.53	**1.82**
Programming, web- and application development	0%	0%	8%	**3%**	1.25	1.18	1.13	**1.22**

Note: Explanation of 4-point scale: 1 = Was not mentioned in the course, 2 = Was mentioned partly in the course, 3 = It was discussed in general, 4 = It was the main focus in the course.
Source: authors.

Table 6. Fostering entrepreneurship

Universities' roles in the entrepreneurial ecosystem based on the categories proposed by Stam (2015)	Service portfolio elements	Relative frequency of professors mentioning the availability (bold: ≥50%)			Overall availability	Perceived importance by students on a 4-point scale; (bold: >average)		Relative frequency students mentioning the availability		
		CUB	UD	USZ		with no entr. career plans ($N = 36$)	with entr. career plans ($N = 57$)	CUB	UD	USZ
knowledge and talent	entrepreneurship-related elective subject	**100%**	**89%**	**50%**	available & well-known at 3 universities	**3.58**	**3.51**	86%	76%	80%
	entrepreneurial role models in the classroom	**60%**	**78%**	10%	widely available & known at 2 universities, rare at 1			77%	63%	72%
	entrepreneurial exercises	30%	33%	10%	available, but not widely at 3 universities			66%	72%	80%
supporting services	consulting	**67%**	10%	34%	available at 2 universities, but widely known only at 1	**3.64**	**3.44**	68%	81%	87%
	mentoring	**78%**	**50%**	**69%**	available & well-known at 3 universities	**3.44**	**3.23**	61%	81%	80%
	coaching	**78%**	20%	38%	available at 3 universities, but widely known only at 1	2.86	2.88	41%	81%	67%
	workshops	**78%**	**50%**	**52%**	available & well-known at 3 universities	3.08	2.95	61%	90%	73%
	student organizations dedicated to entrepreneurship	**67%**	20%	**62%**	available at 3 universities, but widely known only at 2	2.81	2.84	95%	76%	53%

(continued)

Table 6. Continued

Universities' roles in the entrepreneurial ecosystem based on the categories proposed by Stam (2015)	Service portfolio elements	Relative frequency of professors mentioning the availability (bold: ≥50%)			Overall availability	Perceived importance by students on a 4-point scale; (bold: >average)		Relative frequency students mentioning the availability		
		CUB	UD	USZ		with no entr. career plans ($N = 36$)	with entr. career plans ($N = 57$)	CUB	UD	USZ
	idea generation, pitch contests	**67%**	40%	**55%**	available at 3 universities, but widely known only at 2	3.14	3.14	82%	71%	73%
physical infrastructure	providing a physical workplace	33%	0%	21%	available, but not widely known at 2 universities	2.83	3.02	39%	76%	20%
	providing digital infrastructure	**67%**	10%	34%	available at 2 universities, but widely known only at 1	3.11	**3.25**	44%	86%	60%
finance	scholarships dedicated to entrepreneurship	22%	10%	21%	available, but not widely known at 2 universities	**3.47**	**3.46**	50%	81%	60%
	incubation with financing	44%	10%	24%	available, but not widely known at 2 universities	3.08	**3.30**	58%	52%	60%
	angel investment on campus	33%	30%	21%	available, but not widely known at 2 universities	3.08	**3.21**	44%	43%	40%
networks and demand	connecting startups with university corporate partners	67%	20%	38%	available at 3 universities, but widely known only at 1	3.42	3.39	63%	57%	72%

(continued)

Table 6. Continued

Universities' roles in the entrepreneurial ecosystem based on the categories proposed by Stam (2015)	Service portfolio elements	Relative frequency of professors mentioning the availability (bold: ≥50%)			Overall availability	Perceived importance by students on a 4-point scale; (bold: >average)		Relative frequency students mentioning the availability		
		CUB	UD	USZ		with no entr. career plans ($N = 36$)	with entr. career plans ($N = 57$)	CUB	UD	USZ
	cooperation with external incubators	**67%**	20%	48%	available at 3 universities, but widely known only at 1	3.19	**3.25**	55%	71%	67%
culture	promoting innovation as a value	**60%**	**78%**	**50%**	mostly supportive at 3 universities	*average level of the universities promoting innovation: 73.4%*				
	promoting entrepreneurship as a value	**80%**	**78%**	30%	mostly supportive at 2 universities	*average level of the universities promoting entrepreneurship: 75.4%*				

Source: authors.

in all three universities. This suggests that the students of the focal Business Development MSc have an above average sensitivity towards these elements of the universities' value systems, or they live and study in very supportive microenvironments at the university.

Mentoring and workshops are the most common extracurricular services universities offer to support entrepreneurial students, while they can also take part in pitch competitions (even international ones like the Danube Cup) which help them in idea generation and validation. The more committed students can also join student organizations dedicated to entrepreneurship – at some campuses they will even find more than one of these student clubs. While the three universities have financial and legal expertise readily available among faculty members, they rarely harness this power in the form of startup consulting services. Also, it is interesting to see that in the case of the Universities of Debrecen and Szeged, students are much more optimistic regarding the availability of these services than the institution itself, which again suggests a very entrepreneurship-friendly microclimate for these programmes, but might also signal a lower level of educators' involvement. In the case of CUB, it is the other way around: opportunities for mentoring, coaching or workshops are less well known among students – maybe information flow regarding some services is less effective in this larger programme.

On the other hand, many students have heard of some infrastructural, financing and networking services provided by the universities – but the fact that these are usually provided by some central and/or dedicated organizational unit is probably the reason why the professors are less involved in and less aware of these opportunities. A physical workspace dedicated to startups is rarely available on campus, universities mostly focus on providing digital infrastructure (like the SAP NextGen Lab) to foster nascent entrepreneurship. While some universities utilize their own corporate network to help university startups, and also HSUP is available at some campuses (this is what we can see in Table 6 concerning students' perception of the availability of scholarships and incubation), they can rarely help unipreneurs in financing terms. As difficulties in accessing financing is one of the most important deterrents to students with entrepreneurial ambitions (Aranyossy et al. 2021), if universities could step in and provide some direct or indirect support – whether this be through a stronger cooperation with incubators(s) or even their own investment fund (like ESADE or some American universities do) – this might have a strong positive impact.

Looking at the general perceived importance of the entrepreneurship-related extracurricular options, universities could improve their value proposition toward utilizing their professional network better. This could mean offering consulting and mentoring services provided by faculty, alumni or corporate partners, but also, cooperation with business partners and incubators seems to be useful, based on the students' perspective. If we look at the differences in perception between the students with different career aspirations (see also Table 6), students with entrepreneurial intentions seem to have statistically similar priorities to their peers. This suggests that universities' diverse entrepreneurship-related services might also be valuable for a more general population of business school students. On the other hand, as entrepreneurial students seem to find on-campus workplace infrastructure and funding slightly more important, these could be services offered selectively to students with special interests and dedication.

6. CONCLUSIONS AND DISCUSSION

The aim of our research was to compare entrepreneurial educational methods and practices applied in the leading Hungarian Business Development MSc programmes, analyzing the

complex effects of COVID-19, Industry 4.0 and digitalization. The novelty of the analysis lies not only in the multiple aspects examined in parallel but also in the fact that our data reflects the professors' and students' perspectives at the same time.

Our research confirmed that students could learn from practitioners, they can typically practice the acquired knowledge solving real business problem (case studies, real data) and work on larger projects. We highlighted some differences between the three universities, such as the trend that professors at CUB and UD see their education methods as more practice-oriented than those at USZ. On the other hand, students have very similar feelings in the three universities regarding the practice-related methodologies investigated, which might reflect the fact that some of the notions were understood differently by students and professors.

The world, including Hungary, was already technologically prepared for the digitalization of education, but because of COVID 19, the adaptation had to happen almost from one day to the next. The use of online platforms for teaching and examinations has become widespread and familiar to both students and teachers because of the online education demanded by the COVID-19 pandemic. Documents previously submitted on paper are now submitted digitally, e-learning platforms help to organize assignments, and online test banks have been developed which are marked automatically. These changes have become widespread and part of the basic procedures, which is a huge achievement of digitalization during the pandemic. People have become more open to using online applications and it has become natural to provide online teaching and examination methods when there are barriers to face-to-face encounters. A common criticism is that professors can have less, or no, control over online tests.

Both professors and students realized the importance of new digital tools, and digitalization-related knowledge elements and skills appear more frequently in the curriculum at all three universities. The most important new trends appearing in entrepreneurial education are fintech, crowdfunding, digitalization, blockchain, artificial intelligence and robotic process automation. Concerning the development of digital skills, the emphasis is on data visualisation, virtual project management and data science.

Regarding extracurricular opportunities, helping students towards entrepreneurial success, we see that universities take on certain roles more often than others. On the one hand, the three universities have a strong offer in terms of knowledge transfer and supporting services, such as mentoring, workshops, and student organizations – and these services seem to be valued by business development students with every kind of career plan. On the other hand, in line with the traditional mission of universities, the role of infrastructure-, network- or funding provider is assumed less often or less systematically. However, these services would be highly appreciated by entrepreneurial students, which provides some room for further improvement for university planning to increase the level of entrepreneurial intention and skills of their students.

While we cannot state that we have reached the end of COVID-19, face-to-face encounters have been reinstated at the universities for several semesters now. In line with this, we also looked at what remains of the online teaching frameworks of the pandemic era. The focus group and the questionnaire survey showed that certain lectures (e.g., above 100 students) are being taught online in the form of streaming or sharing lecture videos. Online materials produced during online education are typically available to students even after the return to classrooms. Many professors still use so-called "hybrid" classes, where classroom instruction is shared online via a camera and the opportunity is given for students who are sick or studying abroad or in rural areas to participate. Absence or sickness of teachers is no longer a problem, since the class

can be held online. It has also become easier to guest lecture at universities abroad or to involve colleagues from abroad in a course through online platforms. The use of online tools is already covered by the regulations of the universities and the use of these tools is more easy and convenient for both teachers and students.

The limitation of our research is that it gives an overview focusing on the courses of full-time Business Development Master programmes at leading Hungarian universities. It does not cover all Hungarian Business Development MSc programmes, and also excludes part-time programmes. From a student perspective, given that the programmes last two years, current first- or second-year students are not aware of these programmes' pre-COVID methodology. They can only evaluate the programs by comparing them to their previous experience.

We have discovered some challenges for the future as well. The efficiency of education has changed moderately, but absorption of knowledge requires further analysis. Major changes occurred in education methods, making it a necessity to reform online tests and to develop new measurement tools to get a real picture of students' knowledge. Also, we found interesting differences between the perceptions of professors and students concerning teaching methods and effectiveness, and entrepreneurial support on campus – the root causes of these might be explored in the future to help further programme development efforts.

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