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THE ROLE OF UNIVERSITIES IN EDUCATIONAL DEVELOPMENT IN CONNECTION WITH DIGITALIZATION AND ENTREPRENEURSHIP IN HUNGARY

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Abstract

Universities can promote the development of entrepreneurial skills and innovation including digital technologies and startup courses. The startups are the drivers of digital development in technological innovation and ICT (OECD 2017). The study attempts to discover that which cooperations are among universities, research institutions and enterprises in Hungary. It is important to examine that what steps have been taken to increase digital and entrepreneurial skills. I made expert interviews, and I carried out a national questionnaire survey involving university students.

62.8 % of students said that there are entrepreneurship courses. In the future 58 students would participate in online entrepreneurship courses. 31.4 % of students consider entrepreneurship education very important (on a scale of 1-10). 32.6 % of the students think that their digital competences are moderate, which would be necessary to launch a startup enterprise.

I felt important to talk with teachers to give a more accurate picture about practical trainings for innovation, digital and entrepreneurial skills at the selected universities. According to the interviews making with teachers, the practical tasks are the important parts of entrepreneurial, startup courses everywhere. Students can work in teams on different project ideas.

Keyword: *innovation, educational development, digitalization, entrepreneurship*
JEL Classification: *I20, O35*
LCC: *LA173-186, T58.5-58.64*

Introduction

Increasing of entrepreneurship represents a special place in the European Union, including Hungary and it has a positive impact on employment, economic growth and competitiveness of the country. A few years ago, in 2014, 47.4 % in Hungary thought that business creation is a good decision and life goal. However, many people do not start their own business, because they are afraid of failure. Different skills, competencies and knowledge are needed to start a business (Illés et al. 2015, Ács et al. 2015).

Higher education institutions play a key role in encouragement of entrepreneurial activities of students. It is essential to strengthen the university relationships with external experts in developing of the educational curriculum enhancing the practical skills (Gubik-Farkas 2017).

Cooperations among universities, research institutions and enterprises (Vilmányi 2011, Inzelt 2004) have an important role in the entrepreneurial ecosystem, in which the student can work creatively (Karpov 2017). The stronger the attitude of the individual is and the bigger the entrepreneurial intention will be (Gubik-Farkas 2017).

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Universities can promote the development of entrepreneurial skills and innovation including digital technologies and startup courses. The startups are the drivers of digital development in technological innovation and ICT (OECD 2017).

The study attempts to discover that which cooperations are among universities, research institutions and enterprises in Hungary. I have looked for universities, where these practices and methods was integrated into the curriculums.

I formulated the following research question as sub-objective: which practices can contribute to the transformation into the digital economy of Hungary? and what steps have been taken in innovation and educational development in Hungary to increase entrepreneurship knowledge?

Conceptual background

Many people have dealt with it to define innovation. During the *educational innovation*, new technological innovations are created by new educational methods, which often are the results of research (Foray – Raffo 2014, p 3). Innovation is a complex process, which does not mean only technological changes. When a company engaged in an innovative activity, it also generates new knowledge, which is „manifested" in technological opportunities. New product, technology or service come into existence from an innovative idea creating added value in society (Buzás – Lukovics 2015, pp 438-440).

The *digital competence* can also be defined as the confident, critical and creative use of ICT (information and communication technologies), which appears in the area of work, employment, learning, recreation, social inclusion and/ or participation (Cseh et al. 2017, p 5).

Startup has many definitions in domestic and international literatures. Startup can be identified by an early-stage enterprise, with the following characteristics:

- „it does not exceed three years",
- its annual net income is less than HUF 100 million,
- the enterprise or startup employs maximum 20 people,
- venture capital has not been invested in the startup,
- the startup or enterprise has no share in other business entities.

According to Entrepreneurship Foundation Hungary, *startups* are „newly established high-growth enterprises" or a team on the way to becoming enterprise in order to return the project to the market (Magyarország Kormánya 2016, p 21, p 25).

Kollmann and his colleagues emphasize that startups are younger than 10 years, which are characterized by a significant innovative technology and a business model, they can achieve high sales growth (Kollmann et al. 2016).

In addition, Primay et al highlight that the objective of „knowledge, technology or research" created in the university environment is commercial sale (Makra 2012, pp 5-6). University patented inventions generated at university spin-off companies are channeled into industry through licensing agreements (Veugelers – Del Rey 2014).

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Material and method

I formulated the following research question as sub-objective:

- Which practices can contribute to the transformation into the digital economy of Hungary?
- What steps have been taken in innovation and educational development in Hungary to increase entrepreneurship knowledge?

Research hypotheses are:

H1: The number of student entrepreneurs is lower in Hungary.
H2: The university students are less motivated to set up their own startups.

I made expert interviews, and I carried out a national questionnaire survey involving university students to verify the hypotheses.

I visited several universities. I started StartUP VIP and the starting and operating of innovative enterprises courses at Budapest University of Technology and Economics to get experience and knowledge and take part in a team work in DEMOLA. I had an insight into from Idea to business course at Széchenyi István University.

During the methodology of compilation, I put special emphasis both on empirical and applied research. I used both primary and secondary data sources to research.

I felt important to talk with teachers to give a more accurate picture about practical trainings for innovation, digital and entrepreneurial skills at the selected universities.

I carried out a national questionnaire survey involving university students to examine their digital competences and entrepreneurship between 2-26 April 2018.

Some literatures and Internet sources helped me to some questions of the questionnaire (Czeglédi et al. 2016, European Commission 2015, Magyarország Digitális Startup Stratégiája 2016, ec.europa.eu/jrc/en/digcomp/). I applied online and personal self-completion methods for the national survey. I used „snowball" and targeted methods.

The essence of the "snowball method" was to send the questionnaire to 12 universities, 3 institutions linked to universities, 2 Knowledge Center, 25 acquaintances via email, and asked the facebook group and a acquaintance to share the questionnaire. University of Miskolc made available a questionnaire in a newsletter.

Innovation and educational development

Member States of the European Union, including Hungary will be able to maintain their competitiveness if professionals are trained in the country. Technology is continuously changing, for this reason the enterprise will only be able to survive the competition if the enterprises are managed by e-Leaders, who have a high level of "digital" skills, "business" sense and "strategic" management skills. The following core competencies are expected from an e-Leader: „big data analysis, the development of mobile applications ", software development, web development and knowledge of programming languages and environments, „communication skills", „understanding of consumers and markets", business development, sales and marketing ". Fundamental differences are between the e-Leaders, which depends on whether we talk about SMEs or startups. Different competences are needed in a smaller company than a larger company. Research also found that e-Leadership competencies should

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be expanded "industrial and entrepreneurial" sectors. On the one hand, educational institutions collaborate in enhancing expertise, on the other hand enterprises collaborate in it. 200 000-250 000 e-Leaders would be necessary in Europe until 2020 (European Commission 2015).

Empirica – german private company engaged in research and consultancy (empirica.com) (empirica Gesellschaft für Kommunikationsund Technologieforschung mbH) carried out researches at 118 SMEs in 2015 to determine that how the following methods contribute to e-Leaders' professional competence development. It was concluded that 118 enterprises primarily consider the "ad hoc" self-education (70%) effective to increase the competencies. Furthermore, the high level of knowledge is facilitated by:

- „industry or professional academies: 56%,
- online courses, e-learning: 56%,
- learning from consultancies: 55%,
- professional coaching, mentoring: 50%,
- universities/HEI single courses: 49%".

According to the respondent companies, the full training programmes fitted to e-Leadership appear slightly at universities and higher educational institutions. The specific needs required by industry and the changes in technologies should be taken into account in planning education and training modules. In summary, the university should take a greater part in that more practical training in digital drive will be in the syllabus (European Commission 2015).

The „e-Leadership Scoreboard" created the e-Leadership Index at level 4 („e-leadership skilling", „e-leadership workforce potential", „e-leadership skills exploitation", „e-leadership skills promoters") with 24 indicators, which evaluates the leadership skills and give an overview of the education offer and the potential labor force with a comparison of EU Member States. The "digital entrepreneurs and fast-growing SMEs" can be found in the target groups.

The dimension of e-leadership skill development is related to education and training. According to a 2015 study, Austria ranked second in the ranking of the Member States in connection with ICT and business masters degree programmes among 20-59 year olds, while Hungary ranked only on 20th place. Austrian enterprises ranked on the 9th place in trainings provided to ICT professionals in European Union, Hungary ranked only on 20th place.

In the second dimension it was concluded based on „e-leadership workforce potential" that very few young leaders got degree in Austria (20th place) and Hungary (22th place) (aged 20-24). The „e-leadership skills exploitation" consists of three building blocks: the "business environment", "innovation potential" and "technology trends". 31 % of enterprises in Austria employed ICT and IT professionals in 2015 and Austria was ranked on the fifth place in the EU Member States. The situation of our country developed positively, because 30 % of enterprises employed ICT and IT professionals.

The innovation skills of leaders developed differently in the two countries in favor of Austria. The innovation skills of Austrian leaders exceeded the EU average, with which the country was the eighth among the Member States. The Hungarian digital Leaders are less receptive to innovative ideas, consequently they have significant disadvantages compared to most EU countries (24th place). One further problem that arose in Hungary in 2015 was that e-Leaders had less access to the latest technologies (20th place), than in Austria (9th place). This was due to the lower level of e-Leadership education and training, as well as initiatives bringing together relevant parties focusing on digital entrepreneurship. In contrast, the Austrian government

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placed more emphasis on the development of digital entrepreneurial and ICT skills of e-Leaders (Dashja et al. 2015/a, Dashja et al. 2015/b).

As a result of technological development and changed manufacturing process, considerable social upheaval happens in all EU Member States. I think that a company can function effectively in that case if employees also have sufficient digital knowledge in technological innovations. Based on forecasts, more than 50 % of the current jobs will become computerized. More and more competence needs arise in the field of automation, artificial intelligence, "machine" learning and robotics from the side of industrial companies and car manufacturers. The future is moving towards that leaders and workers with „high-tech skills" will be needed. Consequently, the technical and business universities should develop or create syllabus, which puts knowledge into the hands of students meeting the expectations of the market, the industry and enterprise.

New knowledge related to digital skills and e-leadership requires school systems that the courses' curriculum would be continuously fresh and timely (Olle Vogel, KK Stiftelsen (Knowledge Foundation) programme coordinator)).

As a consequence of technological developments, 65 % of the current jobs will change for 2020. It is important for everyone to acquire those skills, with which they can remain competitive in the digital economy. In particular, the European industrial leaders must acquire to start and access to digital innovation promoting technical, business and strategic leadership skills (Európai Bizottság 2017, p 3, p 5, p 22).

Innovation and educational development in Hungary

Judit Cseh et al the labour market appearance of the digitization been reviewed supported by "Together for the Future Employment Foundation". Different generations were included in research. In today's society the digital competence of a person covers a wide range from knowledge related to digitalization, a variety of skills, behaviors, to expertise in ICT. Research and development (R & D), technological progress and innovation are behind the changes. Instead of the previous industry-driven society, knowledge society is increasingly the model of economic development. They conducted a questionnaire survey of 300 employers. Furthermore, 401 respondents filled out the questionnaire including students, educational institutions, workers and unemployed. The respondents believe that digital competences can be acquired in educational institutions in 56 %, as well as in self-learning. Only 26 % of respondents think that the development of digital competence of students is appropriate in public education. According to them, the problem is caused that little IT education is in syllabus of primary school and secondary school students laying the necessary knowledge for higher education. According to experts, the educational institutions are responsible for labour shortage. Another problem relates to the fact that the digital expertise of SMEs is low. The authors consider it important to develop the „digital competences" of SMEs based on the National Information and Communication Strategy (Cseh et al. 2017, pp 5-6, p 9, p 11, p 18, p 26).

This is particularly evident when the digital skill level of students dropping out of education institutions does not reach the required level. All in all, change is required in education related to line with the expectations of employers. In the past one or two years, the transport and infocommunication developed rapidly. This is closely related to the development of communication technologies of vehicle to vehicle and vehicle to infrastructure. We have to get used to the idea of self-driving vehicles (capable of movement without drivers), and related services. According to the forecast of Internet Research, Strategy & Analysis company, 20 %

of the newly bought cars will be partially or „fully automated" by 2025 (Tettamanti – Varga 2016). A high level of expertise is required for the development of self-driving vehicles. Budapest University of Technology and Economics will train students in Autonomous Vehicle Control Engineer Programme from autumn 2018. In the frame of RECAR (Research Center for Autonomous Road vehicles) Budapest University of Technology and Economics and Eötvös Loránd University blend the university education and the practical experience (recar.bme.hu/).

Practices in the field of startups in Hungary

More steps, stages are required to create a startup starting from an idea, the seed and startup stage, to growth stage. Startups can have a positive effect on the development of a country, contributing its competitiveness, when new products or services are introduced (Müller – Rammer 2012). The Digital Startup Strategy of Hungary divides the life cycle of early stage startups into 4 parts: "'Idea, validation, efficiency and business model". Problems are formulated in *idea* phase and proposals are drawn up for solutions. After that, one or more persons prepare the business concept. At this stage customer needs are measured, and the first product or service becomes available. The team forms at the end of idea phase. Mentors and business angels also contribute to start a startup and strengthen the cooperation. In validation phase it is important to decide that your product or service is ability to market.

Furthermore, whether the team have a chance to achieve a growth in the startup. At this stage, the prototype is prepared, which is brought to the market. In addition to the former investors, accelerators and incubators also appears in the seed phase of validation and they contribute to exposure of sources. In the phase of efficiency and business model, the enterprise becomes market mature and it is replaced by growth ahead. The revenues remain in the enterprise, which is invested in new developments. In the stage of real growth the enterprise has a profit and it gets to the „scale-up level" (a late startup, growth phase).

Besides the venture capital, the enterprise can receive support similar to JEREMIE (Magyarország Kormánya 2016, pp 27-30). 28 JEREMIE venture capital fund has been established in Hungary after 2011 to provide a reimbursable aid (partly private, partly public funds) for enterprises in early (seed and startup) or growth stage (Pressonline Kommunikációs Tanácsadó Kft. 2015). In recent years and nowadays, the angel investors and Hiventures supported with significant resources the starting, operating, growth and development of startups. Hiventures is one of the largest venture capital fund manager of the Central and Eastern European region (with with HUF 100 billion capital). Its mission is the development of domestic innovation ecosystem. It is committed in strengthening entrepreneurial culture, in support of operated company and to encourage the young generation to become entrepreneurs. Hiventures offers „incubation, seed or growth investment" programmes for enterprises, which are younger than 5 years. At incubation stage they provide support to the realization of the idea for startups and micro-enterprises with HUF 9 million, in exchange they claim 9 % of share. The enterprise may take HUF 30 million membership loan as the next step to get to the next level. *At the validation, seed stage* SMEs can receive HUF 150 million from Hiventures.

At *the growth stage* the size of venture capital investment can reach HUF 500 million (mailchi.mp).

Cooperations among universities, research institutions and enterprises

OECD research in 2016 found that despite the high level of university education in Hungary, a gap can be experienced in the entrepreneurial competencies of students compared to the average

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of all EU member states. It is also partly due to lower student capacity for innovation and entrepreneurship, as well as they are afraid to face the challenges, because they are fear of failure. Consequently, they aim to strengthen the entrepreneurial spirit in Hungarian education from the digital competences to communications (Magyarország Kormánya 2016).

Within the framework of the Industry 4.0 National Technology Platform, cooperation among universities, research institutions, domestic enterprises and SMEs is a key priority. They pay attention to the development of the „production design and management systems", „smart" model implementations, the development of "energy-efficient and sustainable" production concepts related to R & D & I (research, development and innovation).

The results of innovative technology solutions are utilized both in industry and university education (ipar40kutatas.hu/node/71). The „knowledge centers" also appear in the field of digital (smart) enterprises (Bakonyi et al. 2016, pp 26).

Budapest University of Technology and Economics, Eötvös Loránd University, Széchenyi István University, University of Pécs, University of Miskolc, University of Pannonia, Óbuda University, IVSZ – ICT Association of Hungary, IFKA Public Benefit Non-Profit Ltd. for the Development of Industry, Association of the Hungarian Industrial Parks, Hungarian Academy of Sciences at Institute for Computer Science and Control, Hungarian Association for Innovation, Bosch Ltd., Continental Automotive Hungary Ltd. and Festo Ltd. can be found among the members of Platform Alliance.

The Technology and Knowledge Transfer Office of Budapest University of Technology and Economics operates the Innovation Lab, where DEMOLA Budapest also can be found.

DEMOLA deals with the utilization of intellectual property generated within the university including an idea, research and development (R & D) and their exploitation possibilities (László Bacsa), where students, entrepreneurs and large companies can work together to create new startups (Magyarország Kormánya 2016).

In the frame of RECAR (Research Center for Autonomous Road vehicles) the Faculty of Transportation Engineering and Vehicle Engineering at Budapest University of Technology and Economics will start „Autonomous Vehicle Control Engineering MSc and Computer Science for Autonomous Driving MSc from September 2018 (recar.bme.hu/) to train students, who will have knowledge and skills in the development of self-driving cars. The founding members of RECAR still are: Faculty of Electrical Engineering and Informatics at Budapest University of Technology and Economics, Faculty of Informatics at Eötvös Loránd University, Hungarian Academy of Sciences at Institute for Computer Science and Control and industrial cooperative partners, such as Bosch Ltd., Continental Automotive Hungary Ltd.

One of the Knowledge Center of Faculty of Informatics at Eötvös Loránd University is EIT Digital. The mission of EIT Digital is to achieve breakthroughs in digital innovation market and support the entrepreneurial talents.

The following strategic objectives were identified:

- innovation and entrepreneurial investments, which will accelerate the market penetration of digital technologies,
- investments to education related to related to entrepreneurial knowledge, promoting the entrepreneurial spirit and digital leadership skills,
- supporting pan-ecosystem, through cooperation with partner institutions.

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EIT Digital Budapest promotes the development of innovative ICT ecosystem not only in Hungary but also in Central and Eastern Europe (EIT Digital 2016), because it has international cooperations with 8 Nodes (Berlin, Eindhoven, Helsinki, London, Madrid, Párizs, Stockholm, Trento) and Silicon Valley hub (eit.europa.eu/). Nodes provide the opportunity to be knowledge transfer among Budapest and other cities, within double degree programme and/or traineeship programmes.

Results

The results of the questionnaire survey

I applied online and personal questionnaire survey from 2 April 2018 to 26 April 2018. I had to excluded five respondents from 91 respondents, because they gave contradictory answers for two questions, for this reason 86 respondents remained in the sample. The results of the survey may not be considered representative, because I received less answers related to the questionnaire. It can be said that the most respondents live in the capital city (32.6 %). More answers arrived from Csongrád (14 %), Győr-Moson-Sopron (14 %) and Pest counties (11.6 %), linked to University of Szeged, Széchenyi István University and Szent István University. Less answers arrived from Békés (3.5 %), Bács-Kiskun (4.7 %), Borsod-Abaúj-Zemplén (3.5 %), Tolna (2.3 %), Komárom-Esztergom (4.7 %) and Veszprém (3.5 %) counties. Very few students have the residence in other counties (Hajdú-Bihar, Jász-Nagykun-Szolnok, Vas, Zala and Fejér counties). Five counties were not included in the sample, because students do not live in these counties.

Figure 1 shows the response rates of university students, according to the higher education institutions. The most students is stduying at Szent István University (47.7 %). Besides this, higher response rate was at University of Szeged (20.9 %) and Széchenyi István University (19.8 %). 3.5-3.5 % response rate was at Budapest University of Technology and Economics, and Eötvös Loránd University. Students also were from University of Miskolc, National University of Public Service and Budapest Metropolitan University, but very few studenst filled out the questionnaire from this universities (Figure 1).

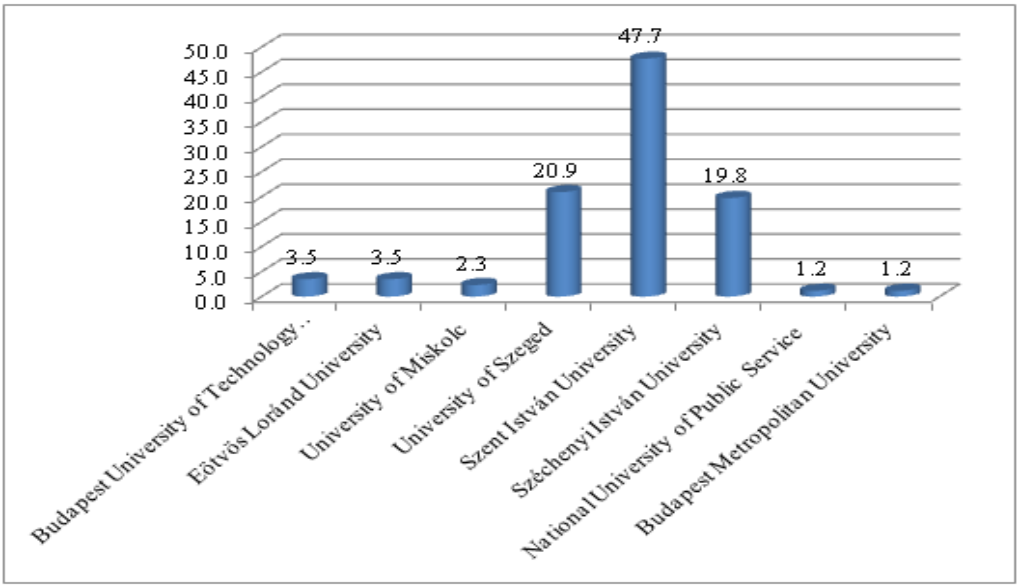

Figure 1: The rates of university students, according to the higher education institutions (%)

Source: own edition

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53.5 % of the respondents is studying in BSc or BA, 36 % in MSc or MA, 7 % in higher vocational education and 3.5 % in a Doctoral Programme. The most students is studying in full-time (62.5 %), less students in correspondence programmes (33.7 %). However, some participate in distance learning programme (2.3 %) or night school (1.2 %). Most of them is 20-26 year olds. 61.6 % of students are female and 38.4 % of them are male.

It is important to examine that how the entrepreneurial courses are common. 62.8 % of students said that there are entrepreneurship courses. 43 % of students attended entrepreneurship course and at present 27.9 % of them attends these courses (Figure 2).

More students have not entrepreneurial skills, because they are not integrated to the syllabus of their field.

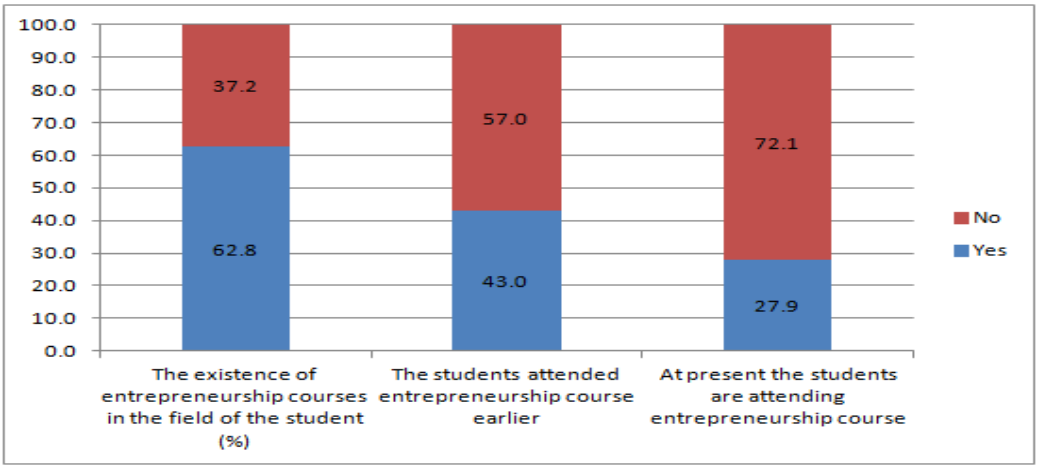

Figure 2: The rate of the university students related to entrepreneurship courses (%)

Source: own calculation

31.4 % of 86 students consider entrepreneurship education very important (on all the 10 numbers of the scale). 36.1 % of students (23.3 % + 12.8 %) think that it is important to study entrepreneurship (Figure 3).

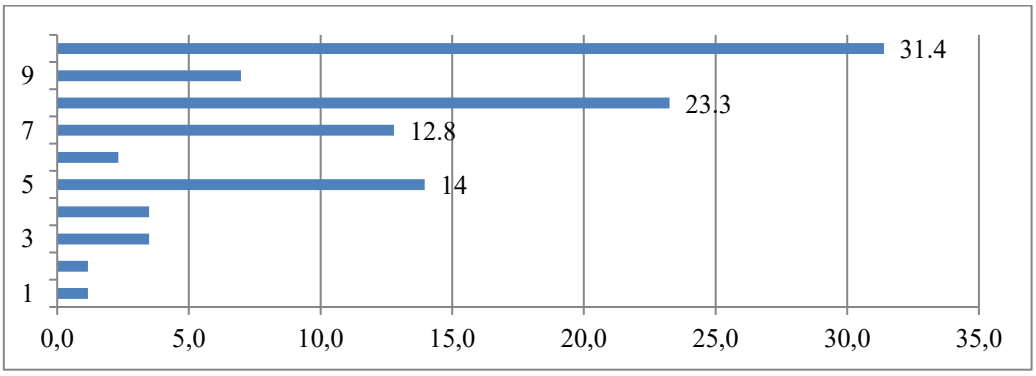

Figure 3: A The necessity of entrepreneurship education (%)

Source: own edition

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Students can acquire entrepreneurial skills outside the university in many ways. In the future 58 students would participate in online entrepreneurship courses. Most of them would prefer the free courses in the following areas:

- courses based on the measurement of free basic and digital skills: 21.6 % of students,
- free basic trainings: 20 % of them,
- free one-month startup training: 18.4 % of them,
- free three-month training in basic software development: 12.8 % of them.

Furthermore, some students would also participate in in paying online courses:

- 2-month business development training: 2.4 % of them,
- 3-month enterprise development and business development training: 6.4 % of them,
- 6-month comprehensive training, including domestic investors: 5.6 % of them,
- 6-month comprehensive training, including domestic and international investors: 3.2%
- 6-month comprehensive training, also including software development training, domestic and international investors: 8 % of them.

50 % of students (43 persons) would take part in in corporate internship programme.

24.4 % students already work in enterprise. 14.3 % of them work as enterprise founder, specialist or consultant. Some of them as capital owners contribute to the operation of the enterprise.

65 students do not work in enterprises, but 16.9 % of them want to start a startup in the near future. 61.5 % of them think about it they will may launch a startup later (Figure 4).

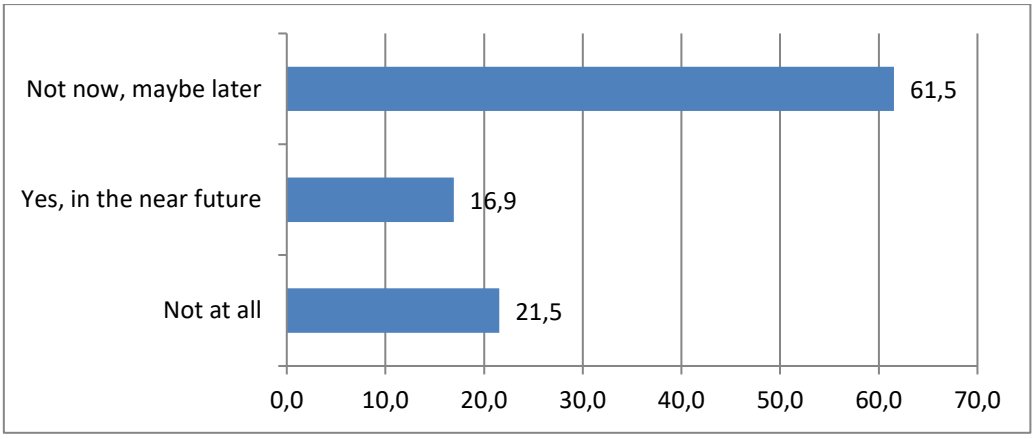

Figure 4: The startup readiness of students (%)

Source: own edition

However, the students also need sufficient motivation and professional digital knowledge.

21.05 % of students thinking of launching their own business feel very strong motivation (on a scale of 1-10). 13.16 % of them are moderately motivated to start their own startup (Figure 5).

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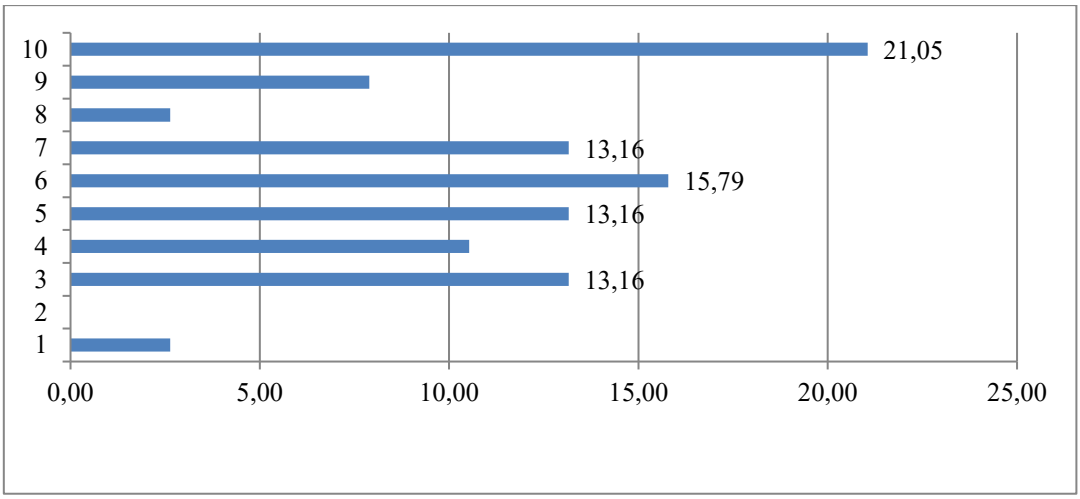

Figure 5: A The strength of startup motivation (%)

Source: own edition

I tried to measure the digital competences of the students on the one hand, through the knowledge of programming languages, on the other hand, through the digital tasks, content, tools and developments, thirdly, based on the students' perception. Digital skills are important to launch a startup, but not everyone has to be a programmer or software developer. It is more important that the workers have more competencies in an enterprise.

The most students have a general digital competences (they can collect, store and manage digital data and information; they can edit digital content; they can share digital content). The systems approach, creativity and the expanding knowledge are moderately typical of the students (they can analyze digital data and information; they can give instructions to a computer system; they can creatively use digital tools). The students have lower digital literacy related to innovation, development and entrepreneurship (they can develop digital content, they can use digital tools to create innovative products and services, they can take part in software development) (ec.europa.eu/jrc/en/digcomp/).

I asked the students how they evaluate their digital competences. 32.6 % of the students think that their competences are moderate. 19.8 % of them said that they have a little bit stronger competences. Only 7 % of the students they take the view that their digital competence level is very strong.

I got 279 answers for the following question: which programming languages students studied. More students can also use more programming languages. The most students can use Excel (27.6 %). The second most commonly used computer programming language is HTML (8.2 %). Android is on the third place (5.4 %). It occurs in more than 3% in MATLAB (3.9 %), SAP (3.6 %), AutoCAD (3.6 %) and MySQL (3.2 %). Some students studied C, C++, C#, Python, VisualBasic.Net, Turbo Pascal, JavaScript, CISCO and Solid Edge programming languages (individual each over 2 %).

I received 620 responses from 86 students to the question that in their opinion, which competences and factors are important to a successful enterprise.

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They marked the following as the most 5 important human competences:

- problem solving skills (7.7 %),
- motivation (7.1 %),
- creativity (6.8 %),
- cooperation (6.5 %) and
- entrepreneurship (6 %).

According to students, the contact network also is essential to the success of an enterprise (6 %). On the other hand, in addition to the human competences, any enterprise does not work without financial resources (5.5 %).

Only 67 students from 86 answered that which competences are mostly required for a e-leader (those person, who can identify and exploit opportunities for innovation with ICT, design business models, has adequate practice in the following fields: „strategic leadership", „digital savvy" and „business savvy" (European Commission 2015, p. 6)).

The lower number of the filling is due to the fact that more students could find the necessary time, too much to this question, for this reason some did not fill out it or finis hit. I gave 45 elements, from which 5-5-5 competences, skills and proficiency could be classified in three groups. In the three groups I highlighted those that received the five most signs. In the dimension of „strategic leadership" (European Commission 2015, p. 6) the most students (44 persons) think that the strategic leadership skills are the most important. Besides this, more students marked the „enterprise political commitment" (20 persons), „monitoring and benchmarking", work distribution (18-18 persons), the management of workers (17 person), „creativity" and marketing (14-14 persons) as needed leader expectations (Figure 6) (European Commission 2015, p. 15, p. 25).

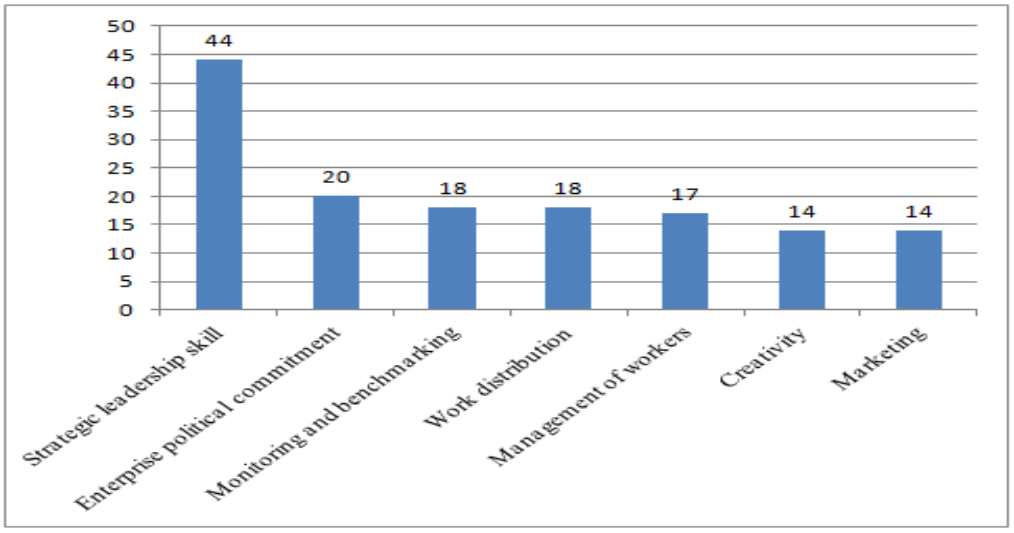

Figure 6: The most important competences and skills required from e-Leader in connection with the strategic leadership

Source: own edition

The respondents consider that the digital approach is the most important related to „digital savvy" (42 persons). E-leader must also have digital (34 persons), „cloud computing" and „big data analysis" (23-23 persons), software development (18) skills, as well as skills to vizualization and „mobile app design and development" (13-13).

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The respondents think that a digital leader can manage effectively the enterprise with „business savvy" (37 persons), sales skill (29 persons), experience in marketing (24), „business development" (20), „market analysis" and cost planning skills (17-17 persons).

45.3 % of the students (39 persons) think that teachers have common digital competences on the first place. 38.4 % of the total respondents put the digital pedagogical readiness of teachers in the second place. 38.4 % of students can find that teachers are lagging behind in professional digital competencies.

I wondered with which competences the university students characterize the teachers from the given competences, because it has been found in literature that many teachers have to develop their competences and innovation skills. However, other competences are also required to be more effective education. 32 students think that the teachers have a high level of critical thinking. More students found that besides critical thinking, the teachers can understand the students. The students highlighted the problem solving ability of teachers (22.4 %) in the third place. According to the students, the innovation capacity and digital skills of teachers do not reach the required levels.

The results of the research interviews

The main topic of my research is innovation and educational development including entrepreneurship, digitization, ICT, startup, university-enterprise cooperations, for this reason I had been looking for universities, where these practices and methods were integrated into the syllabus. I made interviews at Budapest University of Technology and Economics („BME"), Eötvös Loránd University, Széchenyi István University and University of Szeged.

It is established based on personal experience (taking part in a course at „BME" and in practical work at DEMOLA) and the interviews making with teachers that the practical tasks are the important parts of entrepreneurial, startup courses everywhere. Students can work in teams on different project ideas. It is important both at DEMOLA and Eötvös Loránd University that the students can find solutions for real industrial, corporate problems creating added value. The solutions for industrial problems will be expected to be more pronounced at Széchenyi István University from this autumn.

According to László Bacsa (the leader of DEMOLA and the director of Technology and Knowledge Transfer Office at Budapest University of Technology and Economics), the startups have become very fashionable. There is a great need for that ideas at different stages, levels and their implementations to get appropriate support. The students can achieve success with the use of most efficient resources. There are a lot of research results and technological solutions at Budapest University of Technology and Economics. However, they are not enough for a successful enterprise. The students are much more important to have skills and thinkings, with which can take success at any level. Some projects at DEMOLA have already received investments from Hiventures, but they reached EUR 10 million investment before Hiventures.

How do practical activities take place?

There are student projects and DEMOLA projects. In DEMOLA projects the students are working on solutions, where they can cooperate with the owners of the problems. It also is good, because the students study to create value responsibly. The projects also have an educational role. The greatest strengths of DEMOLA are that projects in various development stages with competences sometimes iterate. The students cooperate with each others. They get

to know experiences, successes and failures of each others and they go together step by step (László Bacsa).

From Idea to Business course help the students to increase their entrepreneurial skills and promote team spirit.

How do education and practical activities take place in from Idea to Business course?

This course has taken place for seven years and I always make a little change on the syllabus. About 40 students participate in this course, but 10 % of them gave up it in the first or second week. Basically, I try to encourage the students to reach to the constructing, the testing and the presenting of the business model. The course is closed by a pitch. They are BSc engineering students. I want to enable them to review their basic idea not only technically, but also from the market side. I can see that half a year is enough to go and watch whether potential customers like your idea. Students continually report their activities, which works very well in my course. They will be aware that what they want. It will also be a great achievement if they can present the results of product testing. I trust that some student teams will be, who are more enthusiastic and realize their ideas. As a result, we get to StartITup, ecosystem building in Győr. It is important that we make this course permeable to the partners. I invite the organizers of StartITup and at the end of the course the students can receive a pulse whether their idea can be adapted to Hiventures investment.

Is there a practice as DEMOLA in Budapest, where students are outsourced?

We also would like to outsource students for corporate problems. It is an important priority of Széchenyi István University. We will want to achieve that the students can find solutions for practical problems and they will take corporate development work in multidisciplinary teams. We try to strengthen it in the frame of our Department and Management Campus.

I wanted to take a deeper look at how the entrepreneurial education work at an university, which has a partnership relationship with European Institute of Innovation & Technology (EIT) and international universities.

The EIT Digital Budapest Node has „three main pillars: education, research and business branch." Zoltán Istenes is the leader of Doctoral School at EIT Digital Budapest Node, as well as an academic coordinator of Master Programmes and a teacher of Eötvös Loránd University.

How do education and practical activities take place?

The students work on a lot of case studies. Besides this, there are online videos. We invite enterprises from time to time and the students have to work on projects focusing on corporate problems. It is not a requirement that every students launch a business. The business creation or startup is only a part of innovation and business knowledge. There is also innovation processes within the enterprise. Besides this, the students encode the tasks, they also know that what solutions are needed. They can invent new ideas, which are economically marketable. Ericsson is our good partner, where serious innovation processes are. Many student teams are at Ericsson.

Conclusion

Within the framework of the Industry 4.0 National Technology Platform, cooperations among universities, research institutions, domestic enterprises and SMEs are key priorities in

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connection with the first question. EIT Digital, Budapest Universtiy of Technology and Economics, Eötvös Loránd University and Széchenyi István University can be found among the members of Platform.

It is established based on personal experience (taking part in a course at „BME" and in practical work at DEMOLA). According to the interviews making with teachers, the practical tasks are the important parts of entrepreneurial, startup courses everywhere. Students can work in teams on different project ideas. It is important both at DEMOLA and Eötvös Loránd University that the students can find solutions for real industrial, corporate problems creating added value based on the second question.

H1: The result of the questionnaire survey may not be considered representative, because I received less answers. More students have not entrepreneurial competences, because they are not integrated to the syllabus.

H2: The following hypothesis has not been confirmed: the university students are less motivated to set up their own startups. However, it turned out to be that 24,4 % of the students already work in enterprises and 16,9 % of them want to start their startup in the near future. Furthermore, 61,5 of the students think about it they will may launch a startup later.

In the last years significant changes have occurred in the technology. More and more startups and technological innovations will be needed to serve the consumers' needs and they provide solutions to industrial problems. Educational syllabus also should be developed involving entrepreneurial online courses and corporate and academic cooperation should be strengthened, in which DEMOLA serve as a model for other universities. The students will have such a knowledge, which can be applied in practice.

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