

The Position of STEM Higher Education Courses in the Labor Market

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Abstract—Research focuses on the challenges that higher education faces in the field of STEM what kind of strategies and programs to launch for meeting the needs of industry and make the engineering career attractive. Using the Hungarian Higher Education Enrolment and Student Statistics, we address the significant higher educational challenges facing STEM education, not only in Hungary but also in the European Union. We include the lack of methodologies for the transition from upper secondary education, the low enrolment rate for STEM programs and the high dropout rates in these programs for various countries, including the presence of 'dropout courses'. Based on enrolment numbers, the research captures the characteristics of STEM undergraduate and graduate courses and training institutions, highlighting the regional differences and the resulting individual interventions.

Keywords—STEM, skills mismatch, technological development, workforce, higher education.

1 Education Policy and the Labour Market in the context of STEM

From the second half of the last decade, digitisation and related Industry 4.0 programs have changed the labour market in Europe. Unemployment rates above 10%, as a result of the global crisis in 2008, have now fallen to around 3-4% in Hungary and to 6.2% in the EU from December 2019, the lowest since 2000 [1].

In addition to labour shortages, companies are also facing a new trend affecting for all segments of the labour market. Unique needs and competencies generated within existing jobs and new types of jobs are also created that require employees to have the right skills and advanced digital competences. Changes now affect all players in the labour market, and as a result, there is constant research for which skills and competencies are existing, and future employees should have. One thing we already see from international research is that transversal skills have come to the forefront [2]. National governments are trying to respond to companies' needs by changing financial, regulatory conditions and reforms at some level of education. Employers are competing for workers with the right skills and competences. They are, therefore, taking on activities, such as career guidance, in-house and in-company training, non-profit science

promotion activities and benefits packages for young workers, such as housing subsidies and flexible working. In the field of education, digitalisation has introduced a new concept which is gaining increasing attention.

Companies and Countries are turning this into STEM (Science, Technology, Engineering and Math) initiatives. The beginning of the process dates back to the millennium when it became clear that technology development, knowledge transfer and innovation will be linked to employees who can properly utilise and integrate their knowledge gained in other fields, leading to a kind of interdisciplinary hands-on STEM education [3,4]. The secondary and higher education training area. New policies are already talking about STEAM, where “A” stands for Art, reinforcing the area's ever-closer relationship with STEM [5]. Two elements of STEM education have been strengthened in Member States' education policies, which are to broaden and deepen science education for young people and adults and for science promotion activities for 10-16-year-old to motivate them to pursue STEM education [6]. As we are talking about global labour shortages in this area, these policies are gaining prominence in the European Union, as well as, in the US, the Middle East and Asia. In addition to the education policies of the EU Member States, science and engineering competences, according to surveys conducted by the European Schoolnet (EIH) and the EU STEM Coalition play an indispensable role in the economy as they are mainly able to respond to societal challenges which can understand the logic of technological development and understand the laws of science [7,8].

According to the EU STEM Coalition, there is a need to seek and share in STEM, the evidence-based solutions needed to provide new approaches to education and skills mismatches. Based on the EIH report, the one million new researchers entering the labour market by 2020, will not be able to secure the EU's growth path and therefore, calls for further intervention. Already in 2015, the European Commission highlighted the importance of strengthening science education in Science Education for Responsible Citizenship study [9]. The research report identifies six areas as priorities:

- Support for scientific thinking and encourage citizens to use evidence-based thinking.
- Provide adequate self-confidence, knowledge and ability to be active citizens in a technologically determined world.
- Develop competencies that support problem-solving, innovation, analytical/critical thinking and support for a responsible lifestyle.
- Teach young people and children to pursue scientific and technological careers, so that they can lead a full life, in a knowledge-based, innovation-intensive society.
- Enable European economic operators to have a duly qualified workforce, thus, creating an economic sphere that will enhance Europe's attractiveness.
- Encourage the active participation of citizens in scientific debates, on the current problems of humanity and their solutions using science.

According to current trends, one in seven students in the European Union is left out of education and training, about half of students in upper secondary education and the share of tertiary education is low [10]. Demand for graduate labour in the several Member States is projected to increase more than the EU average. In Hungary, this number

will increase by 18.3% by 2020, compared to the EU 28 average will increase by only 12.4% over the 10-year period under review for tertiary-level workers [11].

This increase in demand, combined with a decline in higher education applications, will cause serious competitiveness problems in the coming years. In Hungary, in recent years, young people have not applied to the relevant training to the extent required by the domestic labour market, and the shortage of STEM-qualified workers almost endangers the stability of the economy and the possibility of further development. The growing demand for professionals is not followed by the output of higher education. The number of applicants and enrolments is not increasing, instead, stagnating or slightly decreasing. Application rate is low, and there is no real competition for entry and extremely high dropout rates, reduce output.

2 STEM Situation in Higher Education

2.1 The position of science and engineering education in Hungary

The Hungarian higher education based on the three-cycle degree structure from 2006 following the Bologna Declaration which signed in 1999. Defined in the Qualifications Framework of the European Higher Education Area and the European Qualifications Framework for Lifelong Learning (EQF), based on which three primary cycles structure created. At that time in Hungary have three types of higher education institutions, university, university of applied sciences and college. The core activities of these institutions include education, academic research and artistic creation.

The Hungarian higher education institutions authorised to provide a minimum of eight Bachelor and six Master programmes and offer doctoral programmes. At least 60% of teacher and research staff have a doctoral degree, and part of university studies must be published in a foreign language. The University of Applied Sciences offers one of four undergraduate and two Master's degrees, in which two dual pieces of training are combined: technical, IT, agricultural, natural sciences or economics. Compared to the university, here the law has all 45% most critical doctoral degrees. The College can launch in any field of science, and at least one-third lecturers and researchers must achieve a doctoral degree. Universities and Applied Sciences enable universities to sustain public and state foundations. The first cycle of the qualifications system (Bachelor programmes) is regulated by the Higher Education Act and related government and ministerial decrees. There are fifteen BA and BSc programmes in public and private institutions from agriculture to science and art meditation. Most of the program lasting 3 years, but in some fields lasting for three and a half years (180+30 ECTS) or for four years. The second cycle regular Master program lasts for two years which are also regulated by the Higher Education Act and related legal regulations. Any higher education can lunch master program if they fulfil the accreditation requirements. There are 12 branches of study without centrally defined rules on the internal phases of the programmes. Both the MSc and BSc learning requirements and outcomes apply to all higher education institution they can develop the curriculum and programme documentation accordingly. The disciplinary fields of the third cycle doctoral programmes

defined by the Hungarian Academy of Sciences. All of the doctoral schools operating within universities and applied universities. The doctoral studies include two phases, one of doctoral course and individual research work and finally at the end of the program the public defence of a doctoral thesis. The doctoral degree (PhD, DLA) is defined in the Higher Education Act and is awarded by the doctoral councils of universities [12].

Hungarian higher education is undergoing constant changes due to fluctuations in demographic and economic processes. The State Audit Office, in its Hungarian Dual Training Survey (2012-2016), points out that while budget subsidies for publicly supported higher education has increased, albeit modestly, the volume of funds from the business sector has dropped, from HUF 17 billion to 12 HUF billion, as a proportion, from 3.6% to 1.8%. The decrease in the normative subsidies per higher education student provided by law (the state pays a different amount to higher education institutions for each student in each field of study) could only be offset by the subsidies financed by the application and funding the operation. Meanwhile, the number of students decreased significantly by 16%, in the five years under study, and it is still reducing to this day [13]. In the field of higher education, mathematical science and technology (STEM), there is a stagnation or a downward trend. The oversubscription rate is low, so there is no real competition for entry. In 2015, 24.47% of all applicants applied for STEM training. Due to the effects, the increasing demand for specialists in the national economy cannot be met by the output of higher education. The number of STEM students has been steadily declining in recent years, despite many supportive projects and communications. The decrease in the total number of employees was caused by the reduction of the number of students; the proportion of STEM areas was continually moving around 30%. If we look at the relative stability of the ratios, we can see that between 2010 and 2018, the number of STEM students in full-time education fell by approximately 8,500. When we break down the STEM fields and examine them by training, we see a significant increase in the number of IT training staff, while the numbers in the technical and natural sciences have fallen.

The geographical distribution of students in Hungary is determined by the major university centres and the capital. Hungarian higher education is clearly centred in Budapest: 51.8% of the total student population is concentrated in the capital, which is 54.48% in terms of full-time students and 52.1% in the case of undergraduate education (all working schedules) and less than half of the students attend training in the capital. When examining the convergence of STEM disciplines at the regional level, it appears that the number of STEM participants in large university centres is lower than in the smaller specialised training areas serving large local companies. This may explain the differences between counties. In absolute STEM enrolment numbers, the capital ranks first with 53.45%, but in terms of total student enrolment, it is far fewer than other counties. The highest proportions of STEM students in higher education are in the Fejér Bács-Kiskun and Győr-Moson-Sopron counties. In contrast, in three counties (Jász-Nagykun-Szolnok, Somogy and Tolna) there are no STEM students.

2.2 Dual and cooperative training – The labour market participates in training

One of the most important system-level achievements in STEM development is that, following the requirements of the labour market, the possibility of dual training was introduced in higher education in 2015. With this training model, we can reduce the dropout rate in higher education, encourage practice-oriented training and bring the content of higher education closer to the real labour market needs. The dual training is a special practice-oriented higher education training, in cooperation between institutions and economic operators, during which, the student acquires in-depth knowledge of the world of work, during his or her university years, spending much more time on professional competencies, than traditional training. Dual students will receive practical training that will enable them to adapt to the needs of the labour market in a shorter period of time, and consequently, be able to find a job faster and to gain a better understanding of their needs in the workplace. In September 2018, dual tertiary education was launched in 19 higher education institutions within 30 majors, with a total of nearly 200 partner organisations, welcoming over 400 students. The number of students participating in the training, as well as the number of companies joining, is continuously increasing.

Cooperative, practical training is becoming more common in technical higher education institutions due to its implementation in companies and the adaptation of training to European higher education in both its duration and structure. Cooperative training is an optional, complementary internship module related to the university's bachelor's or master's degree program, in which the university and a business company or institution work together to provide university students with an internship as described in the training goal. Students do courses in industrial institutions during the working hours specified in the contract, where they carry out the professional activities prescribed by the company. For the internship, the university gives credit to the student. It is an advantage for companies to learn about students' abilities, workloads, creativity, reliability, willingness to collaborate, responsibility and flexibility. Companies give salaries to students; however, this allowance is much lower than the average starting engineer salary but higher than the average student scholarship. Based on Higher Education Strategy, the government aims to reach 8% of undergraduate students, in the relevant fields of study (BSc, Engineering, Agriculture, Economics, IT and Social Work) by the end 2020, in this specific form of education. Looking at the initial training, approximately 165,000 students participated in full-time correspondence training in 2017/2018, of which 33.4% studied in STEM. This number was close to 175,000 in the 2018/2019 school year. If we see the previous years, their proportion slightly decreased (34.5% in 2015, 33.8% in 2016/2017, 32.05% in 2018/2019), including 9,927 in full-time training, while 6,543 were correspondent students. If we look at the proportion of students enrolled in the disciplines, we can see that interest in economics is still high. In contrast, in engineering and natural sciences (mechanical engineering and electrical engineering), the number of students applying for IT training has slightly increased (In 2018, 10,539 people were recruited, and in 2019, it was 10,861 who majored in engineering informatics). Along with the decrease in the weight of agricultural science, no significant changes took place in other fields. (Fig. 1).

Examining the proportions of international students, program design informatics, and civil engineering training is the most attractive of the STEM programs for foreigners. Of the more significant STEM professions, engineering managers (2.22%), vehicle engineering (2.12%) and transport engineering (1.34%) have the lowest number of international students. Among non-STEM professions, the lowest number of non-Hungarian students (0.48%) is among kindergarten teachers. This means that 41-42,000 students start their full-time studies each year, 31% of whom, enrol in STEM.

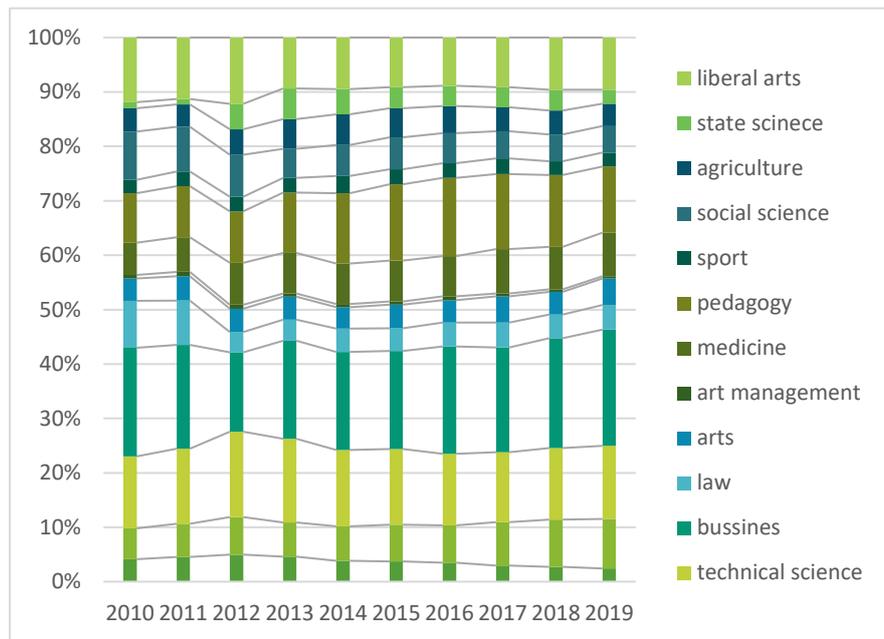


Fig. 1. The proportion of the first application rate in higher education

2.3 Characteristic of STEM bachelor and master programs

Based on the number of students enrolled in the 2015-2018 Bachelor's program, the most significant number of students in the mechanical engineering program in the country, followed by the IT engineer and the electrical engineer. The number of enrolments decreases in all programs, while the number of training places is almost constant, which raises the question of whether the training courses are economically sustainable for higher education institutions. With a low number of students, it is not worth maintaining a program as it draws resources from another area of the university. During the period under review, only four majors were able to achieve headcount growth, none of which (logistics engineering, software engineering, molecular bionics engineering and vehicle engineering) can be considered classical engineering. Other STEM disciplines experienced staff reductions, with the largest reductions being in technical education, environmental science, geography, wood engineering and transport engineering. If we look

at institutions with student numbers in most of the programs, two universities in the countryside, are in contrast, the University of Debrecen (19 courses) and the University of Szeged (18), two Budapest University of Technology and Economics (BME) (17) and the Óbuda University (OE) (10). However, out of the ten largest number of training, the capital (BME, OE) institutions are at the forefront, which in the case of basic technical training is highly concentrated towards the capital. There were 853 MSc courses in Hungary in the 2017/2018 academic year, of which only 67 can be linked to STEM. With a close to 30% headcount, they can increase their headcount by about 200 each year, which is a reason for a national reduction in the total number of MSc. Most of the masters in Budapest are studying at BME (4576), ELTE (4,564) only one rural university, at the University of Debrecen (3136), where they still have a significant number of students. Here too, we can state that the STEM Masters programs are Budapest-centred, with 54.4% of the students studying in the capital city institution. 34.8% of students attend BME and 10.47% of students at ELTE, while the Óbuda University, which performs well in the regular period, lags behind the two major universities. The fastest-growing majors are related to the technical education field, while the number of IT majors is roughly stagnating, while the numbers for science are slightly down. (Fig 2).

Analysing the number of the Masters and undergraduate courses, we find similar training: mechanical engineer, electrical engineer, engineer informatics, technical manager, so most of them continue their studies in the Master's program of the speciality. Looking at the total number of STEM Masters, only 37.2% of the five largest Masters provide the rest with dynamically growing, smaller majors like Biotechnology, Mechatronic Engineering and Info-bionics Engineering.

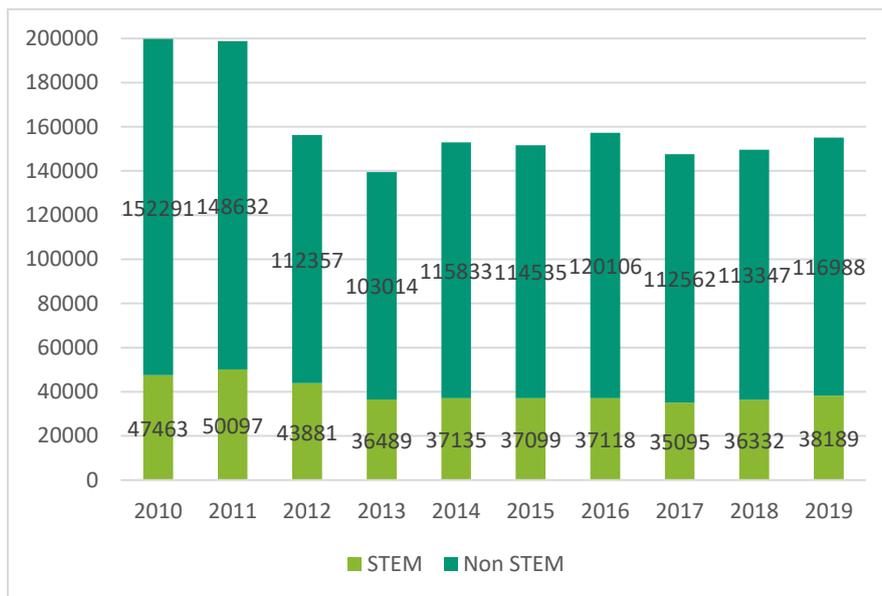


Fig. 2. Application numbers for STEM and Non-STEM courses

3 Labor Market Shortages and Expectations

3.1 STEM students in the labour market

The pace of technological development is so fast that by the time young people graduate from university, some of the jobs will no longer even exist. The changing trend in the skills required by the labour market has accelerated and has two main dimensions. The gap between quantitative skills: the growing shortage of individual occupational profiles (e.g. data scientists, engineers) has a negative impact on economic growth. The difference between quality skills: There is a gap between the skills of graduates in technical education and the needs of employers. In addition to the skills expected in a given job (such as experience with the latest technologies), there are gaps in transversal skills such as entrepreneurship, problem-solving, teamwork, and creativity [14]. The 2016 Euro student survey provides a good insight into the employment characteristics of STEM students [15]. Due to the lack of STEM students, more research has been conducted at an international level, on how to secure supply in this field. This requires obvious knowledge of the personality traits of current students in STEM higher education (if there are such specificities) - for example, it is obvious that the proportion of women in technical training is much lower.

- Back to the several decades, it always arises that it would be necessary to increase the number of women in training that were previously traditionally a masculine profession. This is also important for us because Hungary has the lowest proportion of women in STEM courses among the Visegrad countries (Poland, Hungary, Slovakia, Czech Republic); therefore, they consider it essential to promote science and to present role models.
- Based on experience, partly confirmed by the lecturers of Óbuda University, students (especially in the field of Information Technology) very often fail to graduate because they start working during the training period. If they are successful in the world of work, then very late or no graduation.
- The employment of students in science training is the lowest during the program, which can obviously result from the specifics of the courses. In our country, employment in all areas is lagging behind that of the Visegrád countries. The most exceptional willingness to work is in the IT field. Slovakia is the only V4 country with a higher proportion of non-IT workers than engineering.
- The development and flexibility of the German economy and labour market is shown by the fact that the proportions of most students can be found here in flexible forms of employment next to a university for less than a part-time job [16].
- An important question is how close the learning activity is to the study area. In this respect, IT students are in a good position at the European level, as three-quarters of them have at least some overlap between their studies and their work. As we can see, there is intense pressure on students in the labour market in Hungary, given that both engineers and IT professionals have a high proportion of job-related work. A much smaller percentage of science students can find relevant work during their studies

while in Germany, for example, there is no significant difference from other STEM disciplines.

In the period of graduation of Hungarian higher education, with the decreasing number of institutions, some fields of study and programs are gaining importance, while others become insignificant. Along with the changes and transformations, the number of students is continuously decreasing, which is illustrated by the fact that within three years, 6% of students (15 thousand) disappear from the system of higher education. In the case of STEM majors, we are facing the same reduction in staff numbers, but when we look at the Bachelor's degree programs, there is a clearly visible increase in the number of staff members in IT departments. Economics education could benefit from the general decrease in the number of technical training courses, as they could increase their number in addition to tuition fees. In Hungary, the two leading STEM trainers are the Budapest University of Technology and Economics and the Óbuda University, the OE is the most STEM-specific Hungarian institution, with a small number of Master's programs. Accordingly, Budapest accounts for more than half the number of STEM majors. These represent 1.4% of total STEM higher education in Europe. In the European Union the proportion is 11.6% in France, 12.3% in the United Kingdom and Germany, where almost 21% of the student's study STEM. Looking at the data relative to the population, STEM enrolment rates are highest in Greece, Finland and Austria (2.38%, 1.78% and 1.45%, respectively). The EU is below the average (1.08%) in Luxembourg (0.25%), Slovakia (0.71%), Hungary (0.78%) and Italy (0.76%). (Fig. 3)

According to the above, Germany is by far the most critical higher education source in the field of STEM, at the European level. At the same time, among the states of Central and Eastern Europe, Poland has only a small number of students. If we look at student numbers globally, the outstanding German student numbers in STEM in Europe are not particularly high, compared to the fact that 40% of the total number of university students in China studied in STEM already in 2013, which means millions of graduates. Based on this, it may be useful to find training specialities from EU countries to develop educational and industrial collaborations in areas that provide a prominent place in the European Higher Education Area in a narrow field, such as cyber medicine.

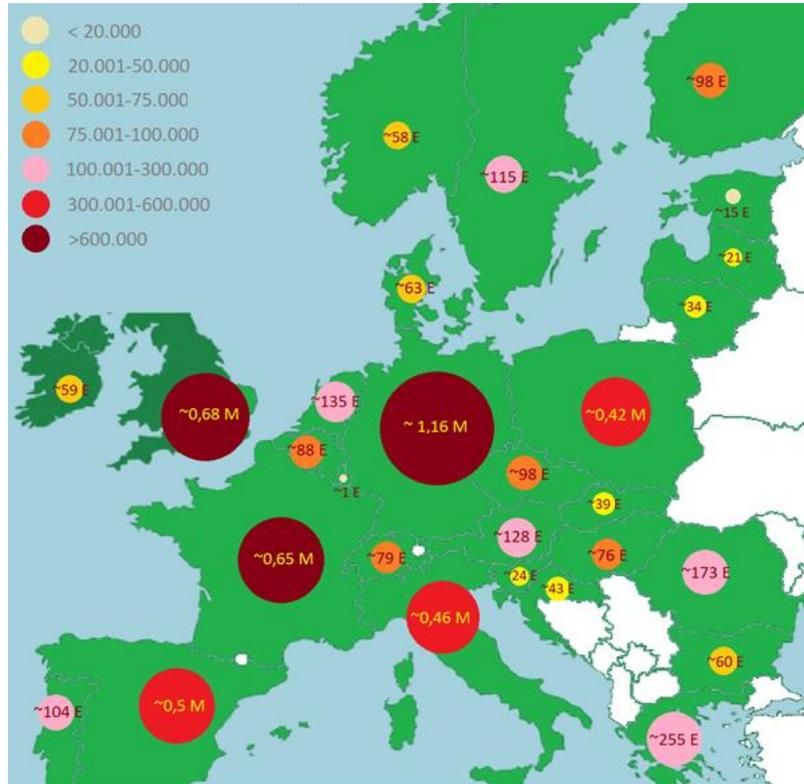


Fig. 3. Based on Eurostat. STEM Higher Education Numbers. All Levels of Education, All Work Schedules, 2017.

3.2 Sectoral recruitment

Increasing the proportion of STEM students in Hungary and meeting the growing demand in the labour market, can be achieved through alternative model programs that target disadvantaged groups and women, towards the STEM field. Increasing the enrolment rate of these two target groups can only be achieved through innovative communication, with a personal appearance, to deliver relevant information to a wide range of students. In the case of disadvantaged groups, the task of scaling up curricula on the domestic and international scene is currently a task that seems difficult to implement in the traditional school system [17]. One such program is Skool, the coding journey, which teaches girls and disadvantaged youngsters programming with the participation of companies [18]. Reducing early school leaving depends on a new foundation, so online STEM orientation and admission programs should be launched, which will enhance students' knowledge of the areas they need and also provide adequate information about what to expect after entering higher education. Online courses should be presented in the form of applications that make STEM competencies and knowledge accessible and exploitable through Gamification [19]. In STEM, a “Lock Room” online

game, developed by the Óbuda University young people use scientific knowledge to meet the challenges of the virtual playground [20]. STEM higher education obviously has the methodological skills to provide teachers with methodological training that supports the renewal of mathematics education. Clearly, the content of the elaborated training may include content that facilitates access to higher education and eliminates the need for "up-to-date" courses that are currently running in many institutions.

3.3 Reinterpreting STEM

In response to years of engineering shortages, the government has introduced the BProf (Bachelor of Profession) degree program. This type of program, like the BSc courses, provides a bachelor's degree. The training is more practice-oriented, with a more significant role in the training of project work and internships, while the number of theoretical hours is lower. In some STEM programs (IT), there is no dropout, but "early employment". There are several ways to alleviate this problem. There must be an alternative "exit" option for the vulnerable at home, leading to even "dropouts", getting a partial diploma or, where appropriate, finding their place in BProf training. This is why, for example, there has been a keen interest in forms of training that are shorter than basic training. It is believed that with better marketing and higher quality graduates, this level of training could generate more customer.

3.4 Training and career guidance

The most influential factors in career guidance and STEM education are the standard of mathematics education in secondary education, the limitations of using new methodologies, and the resulting anxiety in students also distorted career, negative stereotypes, a complete lack of engineering development, creative work information coupled with a false perception of higher education, including fear of high dropout rates [21]. In high school, there is a great influence on the kind of teacher who deals with the subject, and there are still "school-building", high-impact colleagues who can reinforce students' determination to continue their education in science [22]. It was exploiting the opportunities for company involvement in secondary education by developing a professional partnership that helps the university increase its enrolment rate, such as, Factory visits, successful career paths, successful applications, implementation of ideas [23]. A corporate scholarship scheme should be developed for the high school level that virtually secures placement at the end of tertiary education - a reasonable basis for existing industry relationships that can improve the labour market relevance of training. An excellent example of this is the "Together for Future Engineers Association" program, where member representatives provide professional mentors from company to company to assist and support the "JEEP!" program of high school students and students participating in the program, their professional preparation and gaining experience. JEEP! program internships, the link between university, students, students and companies [24]. It should be kept in mind, especially in the IT field, that short-term training provided by for-profit firms, is a real alternative for high school graduates.

Although the purpose of the training is completely different, this problem still needs to be addressed.

At the very least, the curriculum of the most frequently failed subjects should be reoriented in such a way, that it strengthens the students' motivation and focuses on parts of the issue that will help them later on in the workplace. We need to strengthen the link between secondary education and higher education, by activating and expanding the secondary school network of higher education institutions. This type of relationship needs to be redesigned to the benefit of both parties, such as train the trainer training. These relationships will not work effectively in a formalised way, and there is a need to find dedicated science educators who are committed to promoting STEM professions in their school. Alternative career guidance activities are one of the biggest challenges for higher education, as primary and secondary students spend much of their lives online (Instagram, Facebook, YouTube, Tiktok), which is not sufficiently exploited by private higher education. This could include opportunities offered by the Internet, social networking sites or science blogs.

There are "phenomena" on these surfaces that have a severe impact on the younger generations, and some of them are still working on such topics [25]. Winning some of these topics can also send career guidance messages to potential students who may not otherwise have the opportunity to study. One of the successful blogs in Hungary is "Szerár", which is an experimenting workshop and community. In addition to experimenting with scientific phenomena, they convey the complex and difficult-to-understand system of the scientific, technical and mathematical world, to the general public in the most understandable way possible [26]. It is good practice to convey a sense of life, to promote virtual tournaments, online games, sweepstakes, where young people interested will be introduced step by step to the field. But educators should also be involved in this process, as a spectacular experiment or practical knowledge that is presented to them can have a significant impact on young people.

4 Conclusion

Within the overall labour market, the position of STEM disciplines extremely positive for the humanities. Present and future students will most likely be able to find employment if they can utilize their employment, linguistic and social competences. They are expected to be able to find jobs, with high incomes, throughout the European Union, especially those multinational companies, whose affiliates have been able to gain internships at home. Research and reports, so far, have clearly identified the problem of declining STEM courses across Europe, with high drop-out rates, which can be attributed to one or two of the foundational subjects. Labour market expectations do not appear late, or even at all, in the curriculum of higher education institutions. They often fail in developing the basic competences and lack real-world, workplace situations. There is a deficiency of methodologies leading from primary to tertiary education. Related to this is the nonexistence of career paths and career guidance.

One of the most significant problems in Hungary, is the ineffective functioning of the career guidance system and a high drop-out rate among STEM students he higher

education institutions. Hungarian STEM students tend to have a lower mobility willingness than other majors, both because they want to complete their studies on time and remain in the domestic job market or not able to go abroad. The low level of motivation is probably also due to the lack of language skills and unique language background. The figure of „The proportion of the first application rate in higher education” shows well that in the case of the STEM courses the decrease in the number of students appears in the same way as in the case of the other courses, but if we look at the undergraduate courses in the informatics, there is a clear increase in the number of students. This shows well that a targeted promotion of science, with the professionals sought by the market and work tailored to the needs of new generations can make the engineering career attractive.

Examining the statistical evidence behind STEM training, we conclude that Hungarian applicants for higher education do not have sufficient information concerning possible STEM career paths. The Labour market needs are not sufficiently reflected in curriculums, and the development of necessary competencies are not provided. The education is, therefore, typically, far from real-world workplace situations and problem-solving needs. The article points to a need to reinterpret STEM training, to ensure future supply, through training and career guidance, highlighting a more active involvement of women and disadvantaged groups in STEM courses. In the case of multinational companies and SMEs, students are expected to develop not only theoretical, professional and practical knowledge, but also develop labour market competences, that are now essential in Engineering (Communication, Customer Advocacy, Cognitive Skills, Teamwork, Presentation Skills). Changing this requires a methodological refreshing of Educators of the European countries, starting with attitudes and dissemination of known, good practices, within the University along with requiring strong competence development. The study aims to support policy makers and educators involved in engineering education by shedding light on the problems and the answers and solutions given to them.

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