

## The Necessity of Developing Soft Skills in STEM Areas in Higher Education, with Special Focus on Engineering Training

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*One of the challenges of higher education today is to prepare students for the demands of the labour market. A goal becoming ever more important is that, in addition to the so-called hard skills (knowledge obtained from textbooks), the development of soft skills (inter- and intrapersonal skills) also be emphasised. It is a particularly important question in the field of STEM (science, technology, engineering, mathematics), and especially in engineering education, which abilities and skills are essential for new graduates on the labour market. The aim of our questionnaire survey, conducted in 2022, was to map the specifics of soft skills among engineering students. A total of 208 engineering students filled in our online questionnaire. We examined the characteristics of soft skills based on a list of 39 items. The 5 soft skills considered most important were problem-solving, reliability, resilience, communication and independent work. Students regarded themselves as most characterized by reliability, problem solving, independent work, responsibility and cooperation. Our research results drew attention to the importance of developing soft skills, especially social skills.*

**Keywords:** *STEM, soft skills, social skills development*

### Introduction

Since there is an increasing demand on the labour market for employees to possess several soft skills (Deming 2017), one of the objectives of today's higher education is to emphasize the development of inter- and intra-disciplinary skills in addition to high-level professional knowledge (hard skills) (Holik and Sanda 2021).

In the field of STEM (science, technology, engineering, mathematics) (Boon 2019), and especially in engineering education, a particularly important question arises as to which abilities and skills are absolutely necessary on the labour market (Kersánszki and Náday 2020, Molnár 2022, Molnár et al. 2022). Research results draw attention to the fact that newly graduated engineers must meet the requirements in many areas: in addition to professional knowledge, they are expected to be flexible, communicative, open, creative, able to adapt to changes as well as cooperate with their colleagues (Kolmos 2006, Lappalainen 2009, Williamson et al. 2013).

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Our study discusses the need to develop soft skills in STEM fields, primarily in relation to engineering education. Based on the results of a questionnaire survey of 208 engineering students, it gives suggestions as to which soft skills are absolutely necessary to develop in higher education.

## Literature Review

The definition of soft skills is diverse in the pedagogical literature. Among the various approaches and grouping options, only a few are presented below.

Soft skills are often defined in terms of “those skills, abilities, and personal attributes that can be used within the wide range of working environments that graduates operate in throughout their lives” (Fraser 2001, p. 1).

These intra- and interpersonal skills are used in everyday life: at work, at school, in our relationships, for example, when we communicate with each other, when we resolve conflicts, when we work in groups or when we solve different problems.

Soft skills are different from hard skills, i.e. measurable knowledge that can be acquired from textbooks at school. In higher education, soft and hard skills are equally important; they complement each other and their synergy makes the teaching-learning processes more efficient.

Chamorro-Premuzic et al. (2010) 15 identified a system of soft skills comprising 15 components: “self-management, communicational, interpersonal, team-working skills, the ability to work under pressure, imagination/creativity, critical thinking, willingness to learn, attention to detail, taking responsibility, planning and organising skills, insight, maturity, professionalism and emotional intelligence.” (Chamorro-Premuzic et al. 2010, p. 223).

The result of a competency survey with the participation of OECD countries is a list containing a total of 23 competencies, organized into three groups, which are characteristic of employees who can ensure future competitiveness within an organization:

- *Key competencies*: communication; quantification skills; teamwork; problem solving skills; learning and performance development.
- *Work competencies*: flexibility; creativity; initial independent decision; ability to act; foreign language skills; self-confidence; critical approach; exploring possibilities; responsibility.
- *Leadership competencies*: leading; motivating other people; learning from mistakes; building and maintaining relationships; influencing other people; decision making; focusing on results and completing processes; setting up a strategy; ethical attitude (OECD 2001).

The reports of the World Economic Forum draw attention to the fact that the skills required and preferred by the labour market are constantly changing. Based on the ranking of the 2020 report, the following skills will be the most important in the labour market in 2025 (World Economic Forum 2020):

1. Analytical thinking and innovation
2. Active learning and learning strategies
3. Complex problem-solving
4. Critical thinking and analysis
5. Creativity, originality and initiative
6. Leadership and social influence
7. Technology use, monitoring and control
8. Technology design and programming
9. Resilience, stress tolerance and flexibility
10. Reasoning, problem-solving and ideation
11. Emotional intelligence
12. Troubleshooting and user experience
13. Service orientation
14. Systems analysis and evaluation
15. Persuasion and negotiation

Lippmann et al. (2015) highlight the following five skills which are expected by employers and which enhance the success of employees: (1) social skills; (2) communication; (3) higher-order thinking skills (including problem solving, critical thinking, decision-making); (4) self-control; (5) positive self-image.

In Silva's study (2009), it is formulated as a labour market expectation that students and employees should be independent thinkers, problem solvers and decision makers. Therefore, education must not only provide basic professional knowledge, but also important thinking and reasoning skills.

A further challenge posed by our modern, information-based society is for employees to be able "to find and analyse information, often coming from multiple sources, and use this information to make decisions and create new ideas" (Silva 2009, p. 631).

Robles (2012) asked company leaders to list the soft skills they expect from new employees. Those considered the most important were the following: "integrity, communication, courtesy, responsibility, interpersonal skills, professionalism, positive attitude, teamwork skills, flexibility, and work ethic" (Robles 2012, p. 453).

Soft skills can also play an important role on the labour market from an economic aspect. In his study, Balcar points out "that soft skills are statistically significant determinants of an individual's wage and contribute to closing the gender wage gap" (Balcar 2014, p. 3).

Studying the labour market situation in the United States between 1980 and 2012, Deming (2017) found that social skills are increasingly recognized. "Employment and wage growth were particularly strong for jobs requiring high levels of both math skill and social skills" (Deming 2017, p. 1593). His study emphasises that "high-paying jobs increasingly require social skills" (Deming 2017, p. 1595).

In engineering education, it is also an important question what abilities and skills are necessary on the labour market (Kolmos 2006, Markes 2006, Van der Molen et al. 2007, Conlon 2008, Lappalainen 2009, Williamson et al. 2013).

At the international level, it is a fundamental problem that engineering education primarily focuses on the development of professional competencies and technical skills, and does not adequately prepare students for the challenges of the labour market and the demands of the workplace (Schomburg 2007). The feedback received from employers highlights a number of shortcomings in terms of the preparation of young engineers. The lack of social, communicative and personal competences poses a serious problem (Schomburg 2007), and the appropriate development of interpersonal skills would be of paramount importance for the effectiveness of engineering work (Direito et al. 2012, Berglund and Heintz 2014).

Several studies emphasize that, as a result of technical changes, the “traditional ways” of engineering education must be reconsidered and competences that meet the expectations of the labour market must be developed (Direito et al. 2012).

Some literature sources also draw attention to the fact that personality traits play an important role as they are considered key factors in engineering work in terms of work capacity and job satisfaction. In their research, Williamson et al. (2013) concluded that the examined engineers differ from members of other occupations in that they have more internal motivation and are more persistent; however, they are less confident, less conscientious, less extroverted, not particularly emotionally stable and not as optimistic as their peers.

Other studies (Lappalainen 2009, Direito et al. 2012) also draw attention to the shortcomings of engineers, i.e., that they have problems with effective communication, cooperation with others, teamwork, project management and lifelong learning.

In their research among university students, Rasool et al. (2012) found that engineering students had a significantly lower level of empathy than psychology and social work majors. The researchers also found differences among different groups of engineering students: applied physics students achieved worse results than IT engineering students. These research results also drew attention to the need to develop empathy.

In their study, Berglund and Heintz (2014) emphasize the importance of collaboration in engineering work. They highlight the fact that project-based learning implemented in a real workplace environment develops abilities and skills (such as teamwork, communication, problem solving and conflict management) that facilitate the students’ future employment.

Schulz (2008) also draws attention to the importance of soft skills and emphasizes the opportunities of skills development. He stresses that personality development plays an important role in university education in addition to academic and technical knowledge. Therefore, he recommends the inclusion of the development of soft skills (e.g. management skills, communication skills, conflict management) in the curriculum.

He emphasizes the responsibility of university lecturers in this regard, and considers it important that they draw their students’ attention to the relevance of developing soft skills and to the consequences of various deficiencies. He also recommends informal development opportunities to students, e.g. reading dedicated books, attending courses, and joining clubs or societies to broaden their

horizon, such as debating societies or scientific societies that offer presentations and discussions.

Seetha's study points out that "employers prefer to hire and promote those persons who are resourceful, ethical and self-directed with good soft skills" (Seetha 2013, p. 171).

Audibert and James are of a similar opinion: "soft skills such as leadership, communication, teambuilding and entrepreneurial interest have become critical for hiring and promoting employees to keep positions" (Audibert and James 2002, p. 72).

The development of soft skills is not supported by higher education institutions that are dominated by "traditional", i.e., frontal and knowledge-centred education, which works better in homogeneous groups, where the students' pace of work, way of thinking and knowledge level are almost the same. The drawbacks of the frontal work method are that it cannot take into account students' individual abilities and skills, it is not interactive, and therefore it is less suitable for the development of many skills.

In technical higher education, the psychological order of cognition plays a prominent role: sensing, perception, attention, memory, imagination and thinking. Often, however, due to the lack of time, human resources or tools, the greatest emphasis is placed on attention and memory, leaving no time or opportunity to deepen the course material with more complex cognitive operations, such as thinking, which would later be fundamentally important in engineering work.

There are a number of student-centred methods suitable for the development of soft skills, for example, problem-based, cooperative and collaborative methods, as well as gamification, using today's technical achievements. The application of cooperative learning techniques and courses aimed at developing social skills (Holik and Sanda 2020) have a positive effect on cooperation at work and personal relationships (Smith et al. 2005).

In a survey conducted among university students in 2021, two-thirds of respondents felt that the teaching method using gamification enhanced the examined soft skills (information processing, knowledge acquisition and learning skills, thinking, logical and problem-solving skills, communication and presentation skills, cooperation and conflict management skills) to a greater extent than the traditional method based on frontal work that had been used before (Módné Takács et al. 2022).

The development of soft skills has a strong influence on that of hard skills, too, because it is much easier to improve students' thinking skills if they are emotionally balanced and have healthy personalities.

## **Methodology**

The aim of our online questionnaire survey conducted in 2022 was to map the characteristics of soft skills among engineering students at a Hungarian university. Our study was based on the following questions:

- How important do the responding university students regard hard and soft skills with respect to being successful in the world of work?
- Which soft skills do they consider the most important for their success at work?
- To what extent are students characterized by different non-professional skills?

Based on literature sources and our own educational experience, the following hypotheses were formulated:

1. Respondents would emphasize the labour market expectations for problem-solving, practical engineers.
2. The development of stress management and communication skills is highly necessary in higher education.
3. The questionnaire contained both open and closed questions. A 6-point Likert scale was used to examine soft skills.

### **Characteristics of the Research Sample**

Our online questionnaire was primarily sent to university students studying in technical and economic fields within one institution. It was filled in by 208 students altogether, 24.8% of whom were female and 75.2% male (N=202).

Their average age is 27.62 years (N=197). The youngest respondent is 19 and the oldest is 56 years old. 1.5% are under 20 years, 68.5% are 20-29 years old, 19.8% are 30-39 years old, 8.1% are 40-49 years old, and 2% are 50-59 years old.

7.2% of respondents attend higher vocational education, 73.4% attend bachelor's education (BSc), 10.1% attend master's education (MSc), 1.9% attend doctoral education, 5.8% attend specialized further education and 1.5% indicated other training (e.g., BProf – Bachelor of Profession) (N=207).

24% are in IT, 23.1% in electrical engineering, 20.2% in mechanical and safety engineering, 10.6% in construction science, 9.1% in economics and 5.8% in light industry and environmental engineering. 5.8% of them are studying at a technical faculty and 1.5% are studying at a doctoral school (N=208).

57.7% of them participate in full-time, 36.1% in correspondence, 4.8% evening and 1.4% in distance education (N=208).

70.2% of them study in state-financed and 29.8% in self-funded training (N=208).

The respondents have significant work experience: 44.2% work full-time, 18.8% part-time, 13.4% work in other forms (student work, casual work, self-employed, trainee, within the framework of dual training). Only 23.6% do not work alongside their studies (N=208). 93.3% of non-working students are taking part in a BSc training ( $p=0.000$  based on the Chi-square test on the data); 95.7% of them are in their twenties ( $p=0.000$ ) and all of them are studying full-time ( $p=0.000$ ).

## **Results**

Based on a list of 39 items, we examined the characteristics of soft skills as to how important they are for workplace success and to what extent students are characterized by various non-professional skills. The list was compiled on the basis of job advertisements and literature sources (Holik 2019, Roberts et al. 2015). The respondents evaluated each soft skill on a 6-point scale.

The reliability of the measuring tool proved to be excellent (Cronbach's alpha values for the lists were 0.949 and 0.925, respectively).

Responding students regard problem-solving skills as the most important (mean: 5.53). This result confirmed our first hypothesis. Reliability (mean: 5.38), communication skills (mean: 5.28) and resilience, i.e., flexibility, ability to cope (mean: 5.28) are thought to be very important on the labour market. Generosity is believed to be the least necessary (mean: 3.11).

The importance of problem-solving skills on the labour market was also highlighted by a previous research conducted among IT engineering students (Holik 2019).

According to their own assessment, the respondents in this research are most characterized by honesty (mean: 5.50), reliability (mean: 5.38) and problem-solving skills (mean: 5.34). They are least characterised by self-assertion (mean: 3.75), again, according to their assessment of themselves. The surveyed university students also indicated a lack of self-confidence (mean: 4.06) and lack of leadership skills (mean: 4.20).

The biggest gap between the skills required in the world of work and the current skills of our surveyed students were in self-confidence, communication, stress tolerance, self-assertion and resilience. These are the areas in which development is the most necessary. This result verified our second hypothesis. A previous research conducted among engineering students also pointed to the necessity and possibilities of developing communication skills (Holik and Sanda 2020).

However, there are certain areas that the respondents believe to be much better at than is required on the labour market, for example, generosity, honesty and benevolence.

**Table 1.** Means, Standard Deviations (SD) and Differences between the perceived Importance and Self-reported Proficiency Level of Competencies (N=208)

	Importance		Own level		Difference	Wilcoxon test	
	Mean	SD	Mean	SD		Z score	sign.
Reliability	5.38	0.862	5.38	0.903	0	-0.494	0.621
Cooperation	5.11	0.966	5.13	1.055	-0.02	-0.172	0.863
Self-confidence	4.89	1.037	4.06	1.325	0.83	-7.052	0.000
Creativity	4.63	1.097	4.73	1.240	-0.1	-0.656	0.512
Self-assertion	4.06	1.312	3.75	1.472	0.31	-3.044	0.002
Character stability	4.30	1.208	4.73	1.336	-0.43	-4.063	0.000
Collegiality	4.38	1.182	5.02	1.582	-0.64	-3.473	0.001
Stress tolerance	5.16	0.994	4.52	1.332	0.64	-6.282	0.000
Curiosity	4.37	1.273	5.13	1.165	-0.76	-6.149	0.000
Cheerfulness	4.19	1.248	4.64	1.375	-0.45	-3.366	0.001
Orderliness	4.40	1.205	4.35	1.362	0.05	-1.132	0.258
Generosity	3.11	1.270	4.46	1.551	-1.35	-8.399	0.000
Moderation	3.62	1.271	4.33	1.512	-0.71	-4.853	0.000
Global awareness	3.96	1.561	4.73	1.650	-0.77	-4.805	0.000
Communication	5.28	0.873	4.49	1.511	0.79	-6.792	0.000
Persistence	3.96	1.322	4.74	1.876	-0.78	-3.196	0.001
Honesty	4.30	1.456	5.32	0.999	-1.02	-7.868	0.000
Resilience	5.28	0.908	4.99	1.208	0.29	-4.449	0.000
Positive thinking	4.38	1.286	4.50	1.324	-0.12	-0.211	0.833
Friendliness	4.36	1.192	5.10	1.043	-0.74	-6.664	0.000
Planning	4.62	1.149	4.62	1.245	0	-0.636	0.525
Integrity	4.36	1.466	5.50	0.994	-1.14	-7.966	0.000
Self-Consciousness	4.62	1.144	4.99	1.253	-0.37	-2.706	0.007
Imagination	4.20	1.305	4.75	1.280	-0.55	-4.279	0.000
Leadership	4.21	1.308	4.20	1.716	0.01	-1.188	0.235
Punctuality	5.00	1.050	4.81	1.277	0.19	-3.173	0.002
Benevolence	4.14	1.350	5.26	1.047	-1.12	-8.232	0.000
Self-respect	4.43	1.331	4.40	1.555	0.03	-1.271	0.204
Innovation	4.71	1.185	4.84	1.302	-0.13	-0.150	0.881
Dynamism	4.65	1.091	4.92	1.532	-0.27	-3.41	0.733
Responsibility	4.94	1.178	5.30	1.107	-0.36	-2.478	0.013
Authenticity	4.87	1.269	5.28	1.132	-0.41	-2.582	0.010
Self-control	4.77	1.164	4.85	1.233	-0.08	-0.510	0.610
Tolerance	4.58	1.221	4.79	1.267	-0.21	-0.984	0.325
Empathy	4.20	1.328	4.89	1.435	-0.69	-5.058	0.000
Self-knowledge	4.65	1.219	4.67	1.390	-0.02	-0.956	0.339
Openness	4.73	1.152	4.95	1.273	-0.22	-1.249	0.212
Problem-solving	5.53	0.776	5.34	1.080	0.19	-3.822	0.000
Independent work	5.26	1.030	5.31	1.101	-0.05	-0.877	0.380

Closer relationships between the data were examined using correlation analysis. The closest correlation of the soft skills characterising students is between empathy and tolerance (Spearman correlation,  $r=0.622$ ,  $p=0.000$ ), positive thinking and cheerfulness ( $r=0.613$ ,  $p=0.000$ ) and benevolence and empathy ( $r=0.599$ ,  $p=0.000$ ).

Open-ended questions were used to reveal which soft skills the respondents owed their success to – according to their own judgment. The majority believe that they owe their success to their communication and problem-solving skills.



**Table 2.** *Soft Skills to which Respondents owe their Success (N=46)*

<b>Which is the most important non-professional skill (soft skill) to which you owe your success?</b>	<b>Frequency</b>
Communication	34
Problem solving	20
Co-operation	10
Creativity	6
Persistence	6
Teamwork	5
Diligence	5
Empathy	4
Openness	4
Kindness	3
Motivation	3

We also used an open question to examine which soft skills the students feel most lacking during their university studies. In the table below, we noted the soft skills that were mentioned by at least three respondents. Based on the data received, we found that most people feel a lack of communication during their university studies. It is important to pay attention to these areas in higher education, since students often drop out because they cannot manage their time, cannot cooperate and communicate with each other, and the flow of information is not adequate.

**Table 3.** *Soft Skills the Lack of which Students feel most during their University Studies (N=78)*

<b>Which is the most important non-professional skill (soft skill) the lack of which you felt most during your university career?</b>	<b>Frequency</b>
Communication	25
Creativity	7
Co-operation	5
Time management	5
Self-confidence	4
Empathy	4
Openness	3
Teamwork	3

The responding students could indicate which fields they would like to study during their university years. They could choose a maximum of three items from a list of 11 fields. They would most like to learn negotiation and reasoning techniques, time management, stress management and communication skills.

**Table 4.** *Fields that Students would like to Study (N=197) (Respondents could choose a Maximum of Three Options)*

<b>What would you like to study at university?</b>	<b>Frequency</b>
Negotiation and reasoning techniques	82
Time management	61
Stress management	58
Communication	53
Self-knowledge, self-assertion	49
Life path and career building	49
Conflict management	46
Leadership skills	46
Study skills	38
Labour market knowledge and job search techniques	25
Strategic and project management	25

By exploring the significant relationships with the background variables, we found that a higher proportion of female respondents would like to learn conflict management (34%) than males (19.7%) (Chi-square test,  $p=0.039$ ). Likewise, more women (44%) wish to learn self-knowledge and self-assertion than men (18.4%) ( $p=0.000$ ). On the other hand, men would rather learn leadership skills (27.2%); for women, this rate is only 12% ( $p=0.028$ ).

Students who rated their communication skills low show a high willingness to take a communication course ( $p=0.001$ ). The reality of this demand is proven by the fact that our K-MOOC (Carpathian Basin Online) course entitled “Communication in Social Relationships” was taken by 224 students in the fall semester of the 2022/2023 academic year.

### **Areas of Soft Skills Development**

In the following, we provide some suggestions on the possibilities of developing students’ soft skills within a university setting.

#### *Negotiation and Reasoning Techniques*

We consider it important that students learn different negotiation and reasoning techniques; become familiar with the characteristics of negotiation, its three dimensions (content, process, relationship), and its three-stage model (opening, discovery, closing); with different negotiation types (competitive, cooperative); negotiation styles (gentle, tough, principled) and strategies (competitive, problem-solving, compromise-seeking, avoidant, adaptive); with different negotiation problems; with factors influencing the negotiation, and with the role of verbal and non-verbal communication. Students will acquire the cooperative negotiation model; get to know the types of debate: quarrel, court trial, rational debate; the characteristics of effective reasoning, deductive and inductive arguments; the rules of rational debate, and the typical errors in argumentation. They will experience case studies, video analyses and role-play.

### *Time Management*

The time factor is one of the biggest issues in the lives of university students. They must learn to manage their time. The university can help with this. It is important for students to learn techniques for the more efficient use of time and for the organization of their responsibilities; the elements, possibilities and hindering factors of effective time management; scheduling; establishing time balance during their studies, at work and in private life. Various training methods can contribute to this: problem solutions, situational exercises, knowledge-enhancing presentations, worksheets, topic elaborations, situational role-plays, tests, videos, etc.

### *Stress Management*

Stress is increasingly present in the lives of university students as well. It is also possible to teach stress management procedures and develop stress tolerance within the university setting, thus reducing stress and creating a work-life balance. It is essential that students learn about potential stressors at work as well as in their private life; stress reactions and stress management habits; the effects of stress, along with effective procedures and methods for stress reduction (time management, procrastination management, lifestyle, coping strategies and relaxation techniques).

### *Communication*

Both verbal and non-verbal communication must be emphasized in communication courses. Within verbal communication, prominent roles are played by lecturing, explanation and discussion, along with questioning techniques, debate and reasoning. Non-verbal communication includes body movement or kinesics, physical characteristics, contact behaviour, paralanguage (sounds accompanying speech), preparations, the environment, proxemics (spatial relations), chronemics (timing). It is important to examine the factors determining the effectiveness of communication, as well as the characteristics of communication in each communication arena.

Assertive communication is also increasingly important in terms of success at work. In the practical classes following the lectures, our students learn the eight communication steps of assertive behaviour. Furthermore, the course also includes visual communication and illustration, as well as changes in communication due to technical development.

### *Self-Knowledge, Self-Assertion*

Defining and getting to know oneself is important, therefore self-identity, realistic self-evaluation, correct self-knowledge, self-identity, and self-attributions come to the fore during development. Objective self-awareness, the components of human emotions, and the interpretation of one's own and other people's

behaviour play a key role. It is essential that students learn the difference between extroversion and introversion, and that the accuracy of person perception, judgments of person perception, and the perception of personality traits come to the fore.

Stereotyping, the halo effect, covert personality theories, person perception and personality types, person prototypes, the formation of impressions and the creation of a “good impression” should also play an important role in the training. The search for the cause of the behaviour, attribution, attribution of responsibility, self-serving biases and the characteristics of personal relationships are also important. In the practical classes – in the framework of small group sessions – students analyse the variants of self-esteem, attraction, social influence, self-discovery, and conformity in situational situations.

### *Life Path and Career Building*

Career building requires a great deal of self-knowledge. To this end, it is important that students be aware of their strengths and weaknesses (e.g., language skills, numeracy skills, negotiation skills, presentation skills, writing skills, creativity, leadership and organizational skills, problem-solving skills, conflict management skills, time management skills) as well as their personality traits (e.g., extrovert or introvert). In life and career planning, students must be aware of their own internal resources and external factors, their motivation and goals. It is important that students learn about the different career periods, the axioms of career philosophy, different career opportunities, and set realistic goals for themselves.

### *Conflict Management*

Students' lives are accompanied by several conflicts. During their university studies, they can learn how to handle these situations. We consider it necessary for students to become familiar with the characteristics, types, and causes of conflicts, as well as methods of conflict management (using power, authority, leniency or the no-defeat method). They learn the techniques of conflict management (avoidance, independent decision, negotiation, mediation, involvement of an arbitrator, legal action), conflict resolution styles (competition, avoidance, problem solving, adaptation, compromise), constructive conflict management, and the possibilities of building better human and professional relationships. Analyses of case studies, trainings and role-plays in the framework of small group sessions can help understand the games behind the conflicts and arrive at satisfactory solutions.

### *Leadership Skills*

Since some of our graduates will later acquire management positions, they must be prepared for this role during their university studies. In this area, leadership and leadership styles (autocratic, democratic, laissez faire) come to the fore. During the trainings, emphasis is placed on the leader's emotional stability,

belonging to the group(s) and interactions in the given group, the stages of group development, intergroup conflicts, and the concepts and phenomena of cooperation. Group decision and “group thinking”, the issue of role conflict, polarization effects in the group, roles, compliance, prejudices, common stereotypes and the biased personality are key concepts during development.

### *Study Skills*

Study skills enhance to the students’ ability to complete their university studies more successfully and effectively. It is important that they get from mastering simple studying habits and techniques through trying efficient and effective studying methods to building a consciously designed studying strategy. Their university education can contribute to finding and applying the most effective, personalized learning methods and developing their own learning styles. From a methodological point of view, it is important to use mind maps, learn speed-reading techniques, raise the level of awareness through metacognition, develop self-motivation, self-regulated learning, learn cooperative learning techniques and explore learning difficulties. These techniques contribute to students’ academic success by increasing the efficiency of exam preparations.

### *Labour Market Knowledge and Job-Searching Techniques*

University education can prepare students for the challenges of the labour market. It is important for students to get to know the characteristics of the labour market, where practicality is expected in contrast to the theoretical predominance of university education. Furthermore, students must gain an insight into the different job opportunities and the challenges that arise there. Our courses can also help students learn to write a resume and cover letter, and prepare for a job interview by practicing a situation that is still unknown to them. The graphological analysis of handwritten resumes and motivation letters also provides personal lessons for the given student.

### *Strategic and Project Management*

We believe it is important that university studies also focus on strategic and project management, as it is possible that graduates will work in projects on the labour market and later hold managerial positions. It is necessary for them to learn the concept and characteristics of projects, the actors involved in the project, the organizational forms of the project, the characteristics and efficiency factors of teamwork, the methodology of project analysis and project planning (problem analysis, definition of goals, SWOT analysis, Gantt diagram, cost planning, risk analysis), project management functions and areas, project cycle management, project management characteristics and documents.

## Conclusions

In the labour market, there is an increasing demand for employees to have a number of soft skills in addition to hard skills. Therefore, in response to the needs of the labour market, one of the objectives of higher education is to prioritize the development of inter- and intra-disciplinary skills in addition to high-level theoretical and professional knowledge. In our paper, we study the STEM field, and within it the situation of engineering education, as to what abilities and skills are essential for engineering students or newly graduated engineers on the labour market. Based on the results of a questionnaire surveying 208 engineering students, we examined which soft skills are absolutely necessary to develop in higher education.

One of our research results is that the respondents emphasize the labour market expectations for problem-solving, practical engineers. From the data obtained, it is clear that the development of stress management and communication skills is particularly necessary in higher education.

Our research results draw attention to the importance of social skills and, in particular, of personality development. In engineering education, we promote the development of soft skills by courses that provide opportunities for cooperation, open and honest communication and the development of empathy in small groups, which contribute to the development of a positive self-image and realistic self-evaluation.

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