A study of labor market competencies among Hungarian engineering students

Skills required to use industrial robots

The study presents partial results of extensive research conducted among 320 engineering students. As part of the exploration of university students' attitudes towards robotization, our primary objective was to learn about their opinions regarding their own labor market competencies. The exploration of the labor-displacing effect of technological changes has long been the subject of research (Pol et al. 2017). The introduction of innovations is presented as a workplace threat to young people, as technical development represents a significant factor of uncertainty for future generations (Radinsky 2015). Investigators (Turja et al. 2022; Dornelles et al. 2023) have emphasized that the advance of robotics and artificial intelligence may further intensify this uncertainty. The results of our research show that students perceive themselves as having serious deficiencies in their self-confidence, judgment and decision-making skills, as well as their problem-solving skills.

Keywords: *robotization, labor market, competences, young workers*

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How to cite this article:

Katalin Kanczné Nagy, Péter Tóth. "A study of labor market competencies among Hungarian engineering students".
Információs Társadalom XXIV, no. 4 (2024): 9–28.
https://dx.doi.org/10.22503/inftars.XXIV.2024.4.1

1. Introduction

In 2022, related to Section 9.2.4 of the Competitiveness Programme of the National Bank of Hungary (MNB), we conducted a research project among 320 engineering students at the Budapest University of Technology and Economics on students' expectations regarding robotization: Do they have any fears; if so, why? What new skills do they think they need to learn to succeed in the labor market? What do they think about the effects of robotization on their career path?

As part of the research, students' opinions about their own labor market competencies were explored. In this study, we report on the findings of these studies. Our research questions were as follows:

- Q1: What do students think about the level of their own preparedness in terms of current labor market expectations?
- Q2: Is there a correlation between the assessment of competencies and knowledge and work experience related to robotization?
- Q3: How do they see the development of their own labor market key competencies?
- Q4: What do they think labor market expectations will be in five?

The development of students' labor market competencies and, in their opinion, employers' expectations were assessed with a self-developed, self-assessment questionnaire. The online questionnaire was sent to all students at the university through the administration system (Neptun). After data cleaning, the scores were evaluated using the IBM SPSS Statistics 28 program.

The age distribution of the students participating in the research project (M= 24.41 years; SD= 6.133 years) is as follows: 75% are aged 25 or under, with most aged 21 (15.3%) and 23 (13.8%). The proportion of those over 27 is 12.8%. 67.2% are men, and 32.8% are women. 59.1% are studying in a bachelor's degree program, 33.1% in a master's degree program and 7.8% in a doctoral program. Of the undergraduate students, 23.8% are majoring in computer science engineering, 13.23% in electrical engineering, 10.05% in mechanical engineering, 8.99% in chemical or mechatronics engineering, and 7.94% in business administration and management. The distribution of students in master's programs by major: IT engineering 13.21%, mechanical engineering 11.32%, and mechatronics engineering 8.49%. Of the doctoral students, 20% are studying at the Doctoral School of Computer Sciences, 20% at the Kandó Kálmán Doctoral School, and 16% at the Vásárhelyi Pál Doctoral School of Civil Engineering and Earth Sciences. 90.6% of the respondents are full-time students, while 9.4% are in the part-time correspondence program. 85.6% have received a state scholarship, whereas 14.4% are self-funding their education.

2. Literature review

Technology and globalization have led to profound transformations in the labor market. The number of unskilled jobs is decreasing, while the demand for qualified

professionals working on the design, construction, and operation of systems is increasing (Hussain et al. 2020). Therefore, it is not that fewer people are needed in the labor market, but rather professionals who can cope with the challenges of higher value-added jobs. In other words, competency expectations are changing, and there is an ever-increasing emphasis on creativity and human cooperation. According to the World Economic Forum (2020), the following 10 key competencies are the most important in the labor market:

- complex thinking;
- teamwork;
- interpersonal competency;
- critical thinking;
- negotiating;
- quality control;
- service orientation;
- judgment and decision making;
- active listening;
- creativity.

Technical development and robotization have appeared in the literature not only as a driver of economic and social change, but also as a factor of significant concern to cause unemployment (Khogali et al. 2023; Fehér et al. 2023; Bessen 2019; Campa 2014). Pol and Reveley (2017) focused their research on workplace threats to young people while investigating the workforce replacement effects of technological change. The impact on future generations is a major uncertainty factor with regards to the introduction of innovations, and this unpredictability can cause anxiety for employees. Citing Radinsky (2015), the advancement of robotics and artificial intelligence may generate fears of unemployment caused by technological progress. He quoted Stiegler, who believed that there is a "huge transition" in the making (Stiegler 2015, 126) as automation replaces jobs. He also supported his argument with the ideas published by Brynjolfsson and McAfee (2011) and Ford (2015), who advised young people to acquire more education, training, and skills in order to be protected from the threat of job loss. Pol and Reveley (2017) argued for the inevitability of technological unemployment and the need for coping strategies, the latter of which helps members of the younger generation deal with previous life situations.

Today, the exploration of the effects of technological change is increasingly focusing not only on economic values, but also on human factors. An important factor is the well-being and satisfaction of employees in a robotization environment. Turja et al. (2022) have stressed that recognizing and supporting employees' needs during and after technological change is essential for successful and socially responsible robotization. In their opinion, the most important question is the dilemma of "What does it mean to me?" This question concerns the extent to which new technology and robots both serve and are disconnected from human needs.

In their study, Dornelles et al. (2023) examined how the use of the collaborative robot, the "cobot," shapes workers' skills. Cobot is a type of Industry 4.0 technology designed to support manufacturing workers and create smart working

environments. Their results indicated that human-cobot interactions affect workers' skills in different production activities. However, based on their observations, most companies are in the early stages of deployment and are most focused on replacing workers when employing cobots.

Webber et al. (2015) found that employees' positive and negative work habits are directly related to workplace productivity. However, these habits are based on intangible behaviors and attitudes that, while not easy to quantify, are known to experienced managers. Based on the opinions of managers, certain positive factors increase productivity in the workplace:

- ethics;
- initiative;
- interpersonal skills;
- personal development.

Factors that negatively affect productivity in the workplace include:

- lack of interpersonal skills;
- inability to control one's own time;
- lack of focus.

Pirohov-Tóth (2022) drew attention to the importance of work experience gained during university studies. Referring to previous research by Kiss (2014) and Kiss-Máté (2016), the study claimed that prior professional experience can greatly contribute to one's success on the labor market. Students who work during their higher education studies develop certain work-related attitudes (e.g., cooperation skills, independence and teamwork, flexibility, precision) that will be indispensable in later employment.

In their research, Tóthné and Kelemen-Erdős (2020) attempted to identify employers' expectations of employee competencies. They identified the following 10 groups of competency variables formed by hierarchical cluster analysis:

- managerial competencies;
- multicultural competencies;
- high-level professional know-how;
- complex problem-solving competencies;
- creative problem-solving competencies;
- core problem-solving competencies;
- core task-solving competencies;
- openness;
- adaptation competencies;
- service approach.

Pirohov-Tóth (2022) found that very different opinions are present in the literature on key workplace competencies. According to Vincze (2013) and Kópházi (2017), although higher education institutions focus on the transfer of special knowledge, employers prefer transferable skills from their employees. At the same time, there is a great need for young people entering the labor market to acquire competencies during their higher education studies to be successful in later work. In our changing world, flexibility and continuous redesign are also essential for companies. Their application may be badly needed even during the job analysis, as external

environmental changes can have a great impact on determining the competencies most suitable for the job. Furthermore, it is important that all organizational components are aligned with the chosen organizational solution and the mindset and attitudes of its employees.

3. Results

3.1. Assessment of engineering students' own competencies

In the questionnaire (Cronbach's alpha=0.796), respondents had to score on a 10-point scale how they considered their own preparedness, competencies, and overall quality in terms of current labor market expectations (N=320; M=6.02; SD=2.116).

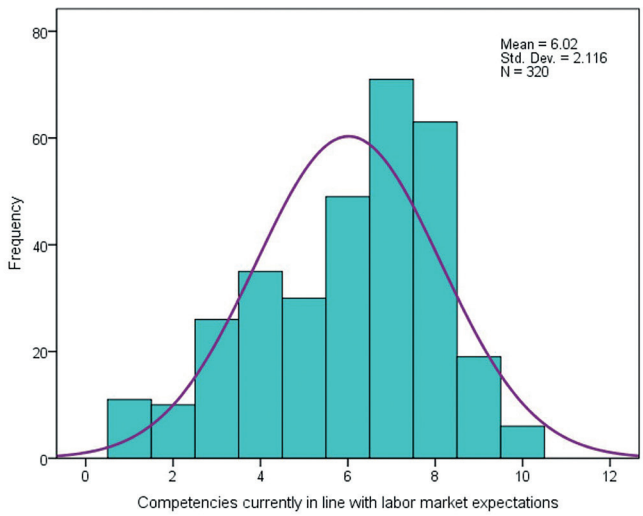

Figure 1: Students' perception of their preparedness for labor market expectations (self-editing)

A higher proportion of them feel more prepared (Figure 1).

49.2% of undergraduate students, 16.0% of graduate students, and 8% of doctoral students feel unprepared, meaning that this assessment decreases significantly as students progress in their studies (Figure 2).

In terms of funding for degree programs, 35.8% of state-sponsored respondents and 30.4% of self-funded students feel unprepared for labor market expectations.

Significant differences were observed in terms of robotization skills (c2= 8.202; p=0.017). 39.7% of those who did not study a related domain, 33.0% of those who had one related course, and 15.8% of those who had more than one related course felt that they were rather unprepared for labor market expectations. Therefore, learning robotization skills positively affects students' perception of their preparedness for

the labor market. 86.54% of those who had some robotization work experience (52 people) felt that they would not have any issues with labor market expectations. We found a significant relationship between the two variables, with moderate strength (c2=14.340; p=0.002; f=0.212).

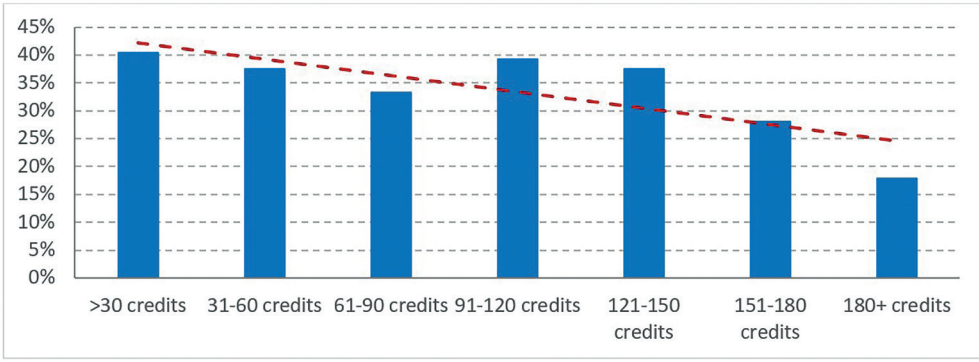

Figure 2: Feeling of students' unpreparedness for the labor market as they progress in their studies (self-editing)

3.2. Self-rated predictions of labor market key competencies and labor market expectations in five years

Next, we compared how students estimated how their own labor market key competencies and labor market expectations may look in five years. Both questionnaires are considered reliable (Cronbach's alpha=0.782 and 0.811). During the measurement, a 6-point scale was used to assess key competencies. The results of the opinions on their own present labor market competencies are shown in Figure 3, while the results of their predictions of possible labor market competency needs in five years are found in Figure 4.

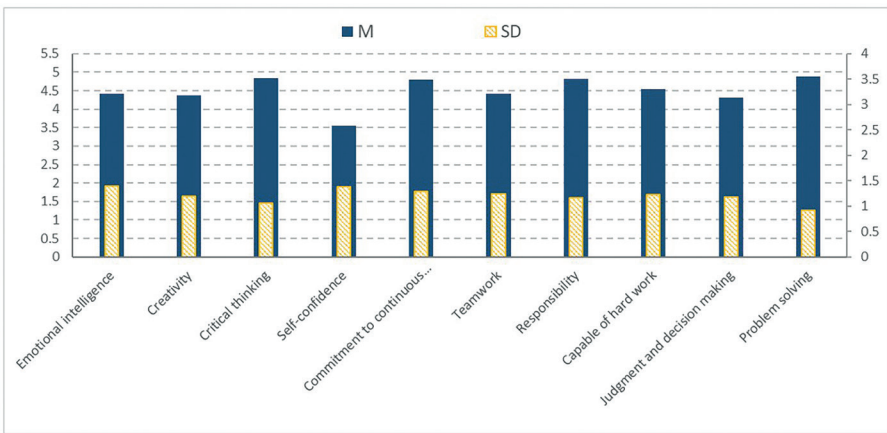

Figure 3: Self-rated existing labor market competencies (self-editing)

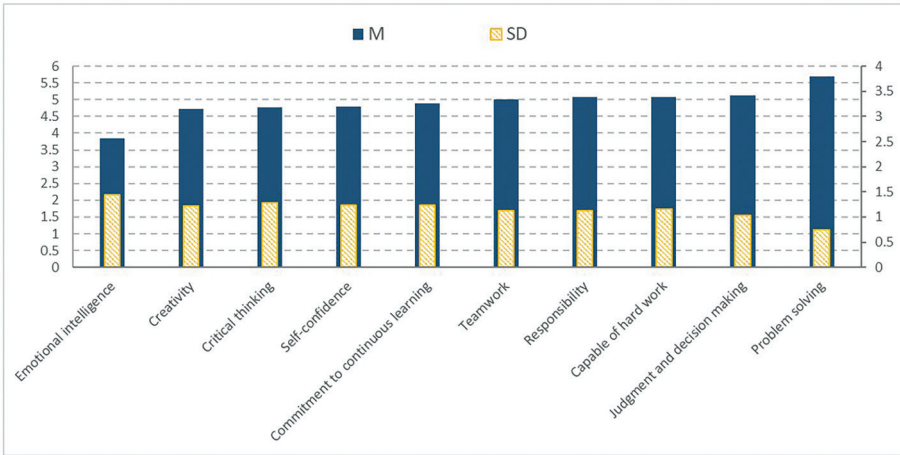

Figure 4: Predicted labor market competency needs in five years (self-editing)

With regard to labor market key competencies, students believe that advanced problem solving will be the most necessary in five years (M=5.68), while emotional intelligence will be the least important competency (M=3.82). The former has the lowest standard deviation (SD=0.762), while the latter has the highest standard deviation (SD=1.395) (Figure 18). Regarding their own level of competencies, respondents also found problem-solving skills to be the most developed here (M=4.87; SD= 0.921), but the least developed appeared to be self-confidence (M=3.48; SD=1.345). The indicators of emotional intelligence here were as follows: M=4.37; SD=1.354.

3.2.1. Comparison of opinions about labor market expectations in five years based on background variables

Male and female students assessed the competencies required in five years in a significantly different way in the following cases:

- critical thinking (c2=4.712; p=0.030),
- self-confidence (c2=8.359; p=0.004),
- emotional intelligence (c2=8.107; p=0.004),
- judgment and decision making (c2=4.091; p=0.043),
- capable of hard work (c2=6.258; p=0.012).

The mean and standard deviation of the above five competencies are listed in Table 1. For all five competencies, women were significantly more likely to predict their role would be important in five years than men.

Competency	Gender	N	M	SD
Critical thinking	female	104	4.98	1.134
	male	214	4.66	1.328
Self-confidence	female	104	5.03	1.076
	male	212	4.63	1.263
Emotional intelligence	female	104	4.12	1.345
	male	211	3.67	1.398
Judgment and decision making	female	104	5.25	0.969
	male	213	5.02	1.057
Capable of hard work	female	103	5.29	0.940
	male	212	4.92	1.213

Table 1: Prediction of the importance of soft skills in five years (self-editing)

By the level of education, we found a significant difference only in terms of commitment to continuous learning (c2= 7.827; p=0.020):

- Undergraduate degree program: N=178; M=4.72; SD=1.211,
- Graduate degree program: N=103; M=5.02; SD=1.171,
- Doctoral program: N=25; M=5.20; SD=1.190.

As they progress in their studies, students were significantly more likely to predict that commitment to continuous learning would be important in five years.

In terms of course load, we found a significant difference in three competency areas (Table 2).

Competency	Course load	N	M	SD	c2	p
Creativity	full-time	289	4.65	1.230	12.980	0.000
	part-time	30	5.38	1.015		
Emotional intelligence	full-time	285	3.75	1.402	9.360	0.002
	part-time	30	4.52	1.122		
Commitment to continuous learning	full-time	285	4.82	1.225	3.444	0.063
	part-time	30	5.24	0.912		

Table 2: Assessment of the importance of soft skills in five years based on course load (self-editing)

Students in part-time programs were significantly more likely to predict that these competency areas would be important in five years compared to their full-time counterparts. Obviously, their professional experience offers a good basis for such an assessment. This argument is supported by the comparison of labor market key competencies with robotization work experience. First, we used a scale for robotization work experience with four values:

- has no related work experience;
- has related experience but robotization played a limited role in their work;
- has related experience and robotization played a moderate role in their work;
- has related experience and robotization played a primary role.

This variable shows a significant or close to significant difference for the competencies shown in Table 3. In the case of problem solving and creativity, the means show an upward trend, while they tend to indicate a downward trend for critical thinking and workload capacity.

Competency	**Work experience in robotization**	**N**	**M**	**SD**	**c2**	**p**
Problem solving	None	267	5.64	0.804	5.400	0.145
	Limited	37	5.86	0.487		
	Moderate	10	5.67	0.500		
	Primary	5	5.82	0.523		
Creativity	None	267	4.63	1.249	10.080	0.018
	Limited	37	5.14	0.961		
	Moderate	10	4.89	1.364		
	Primary	5	5.80	0.447		
Critical thinking	None	266	4.72	1.307	8.907	0.031
	Limited	37	5.00	1.069		
	Moderate	10	4.44	1.014		
	Primary	5	4.87	0.902		
Capable of hard work	None	263	5.09	1.120	5.089	0.165
	Limited	37	4.94	1.264		
	Moderate	10	4.44	1.333		
	Primary	5	4.80	0.837		

Table 3: Assessment of the importance of soft skills in five years based on level of robotization work experience (self-editing)

If we narrow down the robotization work experience scale to two points (yes/no), the differences are even more significant, except for critical thinking (c2= 1.209; p=0.271). The aforementioned upward and downward trends in means are even more visible (Table 4).

Competency	Work experience in robotization	N	M	SD	c2	p
Problem solving	No	267	5.64	0.804	3.188	0.074
	Yes	52	5.84	0.468		
Creativity	No	267	4.63	1.249	7.684	0.006
	Yes	52	5.16	1.017		
Capable of hard work	No	263	5.09	1.120	2.322	0.128
	Yes	52	4.84	1.235		

Table 4: Assessment of the importance of competencies in five years based on robotization work experience (self-editing)

Examining the correlations between the key competencies required in five years, a moderately strong relationship can be detected in certain cases:

- problem solving – creativity: r=0.388; p=0.01;
- creativity – critical thinking: r=0.478; p=0.01;
- critical thinking – self-confidence: r=0.302; p=0.01;
- critical thinking – judgment and decision making: r=0.371; p=0.01;
- self-confidence – teamwork: r=0.337; p=0.01;
- self-confidence – emotional intelligence: r=0.335; p=0.01;
- self-confidence – judgment and decision making: r=0.301; p=0.01;
- teamwork – emotional intelligence: r=0.342; p=0.01;
- emotional intelligence – judgment and decision making: r=0.349; p=0.01;
- judgment and decision making – commitment to continuous learning: r=0.334; p=0.01;
- judgment and decision making – responsibility: r=0.496; p=0.01;
- commitment to continuous learning – responsibility: r=0.341; p=0.01;
- responsibility – capable of hard work: r=0.334; p=0.01.

Analyzing the relationships, judgment and decision making (five relationships) and self-confidence (four relationships) are the key competencies that are closely related with several other competencies, revealing their prominence in the analysis.

The key competencies were also subjected to factor analysis: KMO=0.828; c2=859.808 and p=0.000.

Factor analysis distinguished three factors (Table 5):

F1: cognitive key competencies
F2: emotional and social key competencies
F3: capable of hard work

Competency needs in 5 years	Component		
	1	2	3
Problem solving	.773	.126	.071
Creativity	.718	.258	-.280
Commitment to continuous learning	.685	.097	.211
Responsibility	.603	.203	.511
Critical thinking	.563	.467	-.311
Judgment and decision making	.559	.399	.292
Emotional intelligence	.127	.779	.028
Self-confidence	.120	.773	.127
Teamwork	.315	.623	.174
Capable of hard work	.033	.142	.846

Extraction Method: principal Component Analysis.
Rotation method: Varimax with Kaiser Normalization. [a]
a. Rotation converged in 5 iterations.

Rotated Component Matrixa

Table 5: Factors of key competencies predicted in five years (self-editing)

3.2.2. Comparison of self-rated labor market key competencies based on background variables

Regarding the existing competencies, we observed significant or close to significant differences in several cases by gender (Table 6).

Competency	Gender	N	M	SD	c2	p
Problem solving	female	105	4.78	0.951	1.893	0.169
	male	214	4.92	0.905		
Creativity	female	105	4.52	1.097	3.269	0.071
	male	212	4.26	1.196		
Critical thinking	female	104	4.63	1.116	3.305	0.069
	male	211	4.88	0.978		

Self-confidence	female	104	3.22	1.287	5.362	0.021
	male	212	3.61	1.358		
Emotional intelligence	female	104	4.80	1.267	17.598	0.000
	male	211	4.16	1.348		
Judgment and decision making	female	105	4.08	1.240	3.908	0.048
	male	211	4.37	1.084		

Table 6: Assessment of the importance of one's own competencies by gender (self-editing)

In terms of creativity and emotional intelligence, women are more likely to view their competencies as more advanced, while in the other cases, men judged themselves as being significantly more competent.

Regarding the level of education, we found significant or close to significant differences in almost all competencies. In almost all cases, the means increase as studies progress, which is possible due to the increase in academic and professional experience (Table 7).

Competency	**Level of education**	**N**	**M**	**SD**	**c2**	**p**
Problem solving	Undergraduate	189	4.66	0.959	21.912	0.000
	Graduate	105	5.15	0.772		
	Doctoral	25	5.28	0.792		
Creativity	Undergraduate	187	4.22	1.253	4.653	0.098
	Graduate	105	4.51	1.008		
	Doctoral	25	4.56	1.083		
Critical thinking	Undergraduate	185	4.68	1.109	5.433	0.066
	Graduate	105	4.92	0.882		
	Doctoral	25	5.12	0.927		
Self-confidence	Undergraduate	187	3.31	1.409	5.336	0.069
	Graduate	104	3.68	1.148		
	Doctoral	25	3.84	1.491		
Judgment and decision making	Undergraduate	186	4.12	1.198	5.880	0.053
	Graduate	105	4.51	1.056		
	Doctoral	25	4.40	0.957		

Commitment to continuous learning	Undergraduate	187	4.49	1.349	23.524	0.000
	Graduate	105	5.10	0.995		
	Doctoral	25	5.60	0.577		
Capable of hard work	Undergraduate	188	4.38	1.196	8.831	0.012
	Graduate	105	4.83	1.097		
	Doctoral	25	4.60	1.291		

Table 7: Assessment of the importance of own soft skills by level of education (self-editing)

Regarding course load, we found a significant or close to significant difference in the following competencies:

- problem solving (c2=4.936; p=0.026);
- self-confidence (c2=3.537; p=0.060);
- teamwork (c2=5.068; p=0.024);
- emotional intelligence (c2=2.944; p=0.086);
- judgment and decision making (c2=11.177; p=0.001);
- commitment to continuous learning (c2=4.271; p=0.039);
- capable of hard work (c2=4.572; p=0.033).

In all cases, the means of part-time students are significantly higher, which may be due to their more significant life and work experience.

In terms of funding, significant differences were found in the assessment of teamwork (c2= 4.657; p = 0.031) and judgment and decision making (c2= 6.101; p=0.014), while close to significant differences were found in emotional intelligence (c2= 2.888; p=0.089). In all cases, the means of the participants in the self-financed programs are higher, as most of these studies must work while studying, which greatly helps the assessment of their competencies.

The presence of a robotization course results in significant differences primarily in cognitive competencies:

- problem solving (c2=8.779; p=0.012);
- creativity (c2=6.994; p=0.030);
- critical thinking (c2=10.124; p=0.006).

Enrolling in a robotization course greatly increases the means of these competencies, which can be traced back to the knowledge of modern technologies. The impact of work experience in robotization is highly similar, the difference being that there are significant differences even in terms of commitment to continuous learning and workload capacity.

3.2.3. Competency balance by background variables

We compared competency needs with existing competencies and found weak medium correlations. The two strongest correlations were found in terms of emotional

intelligence (r=0.292; p=0.01) and teamwork (r=0.241; p=0.01), while the lowest was in critical thinking (r=0.084; p=0.139).

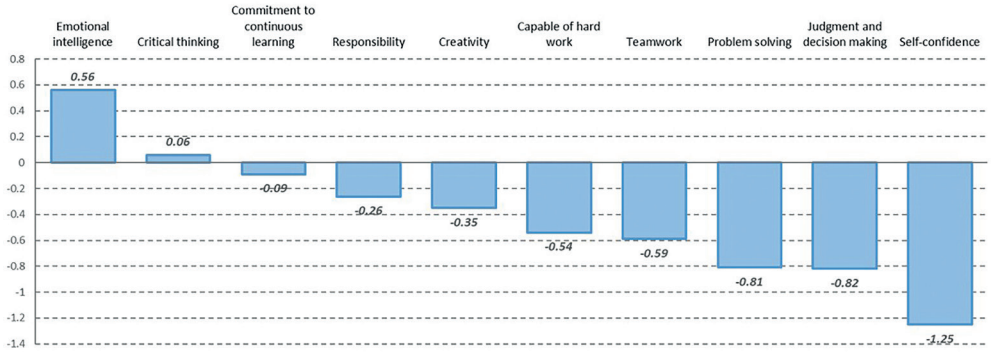

Figure 5: Competency balance (self-editing)

We also compared the means of competency needs and existing competencies. In most cases, we identified a competency deficit. With the exception of emotional intelligence and critical thinking, students reported that they fell short of labor market expectations in most competency areas. The gap is especially significant in the areas of self-confidence; judgment and decision making; and problem solving. The lack of self-confidence is likely to "sum up" the perceived competency deficit in other areas, as the students feel that key competences are not sufficiently developed at the university. Another question is whether this fear is real or only perceived due to a lack of experience. The results highlight the need to develop labor market competencies in higher education (Figure 5).

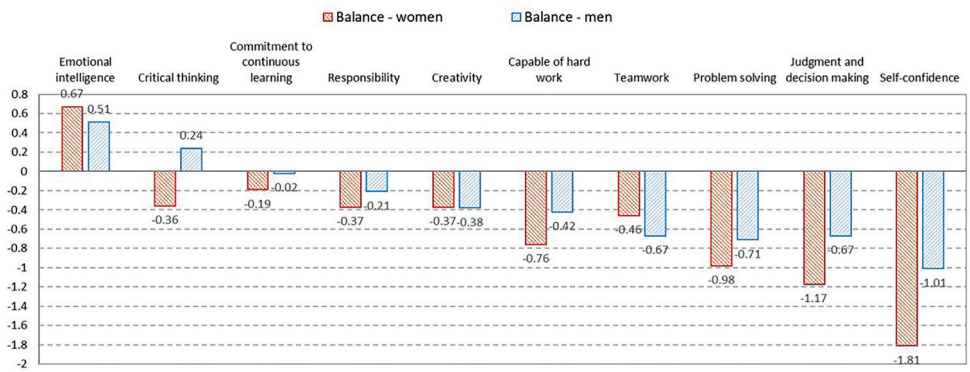

Figure 6: Competency balance by gender (self-editing)

The competency balance was also compared by gender. Women reported a more significant competency deficit than male students. This may be due to the fact that women are more likely to underestimate themselves while overestimating labor market expectations in areas such as technical careers, where they feel

less comfortable. Technical careers are stereotypically viewed as being primarily linked to men. Women's fears in this regard, e.g., inability to meet expectations, are reflected in the results. Only in the areas of emotional intelligence and teamwork do women show more positive expectations than men (Figure 6).

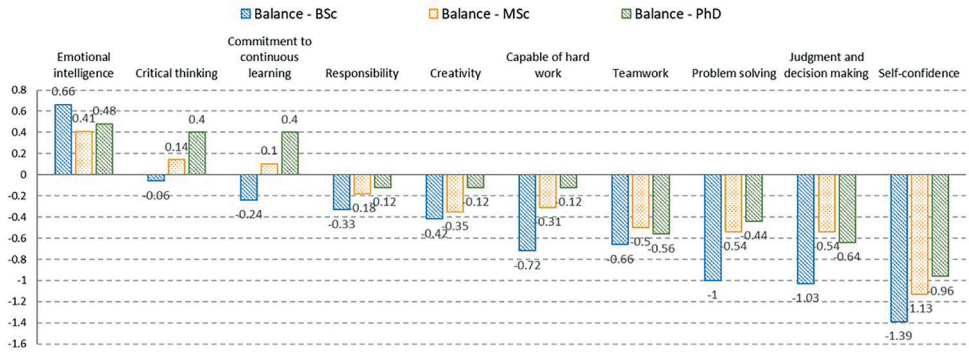

Figure 7: Competency balance by level of education (self-editing)

When comparing the competency balance by education level, only small differences could be detected in terms of future labor market expectations, whereas significant differences emerged in their assessment of their own competencies. As studies progress, competency deficits decrease. The biggest competency gaps in undergraduate education were in problem solving and judgment and decision making. In terms of graduate and doctoral programs, competency gaps differed only slightly (Figure 7).

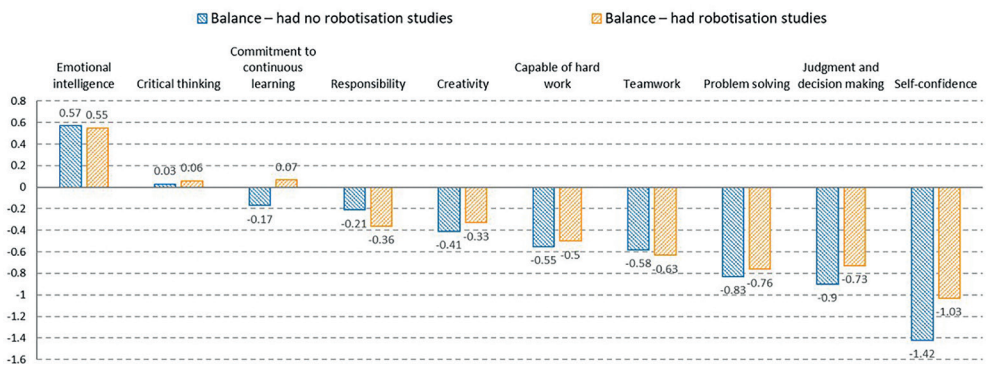

Figure 8: Competency balance by robotization studies (self-editing)

We also studied the competency balance in regard to robotization studies. It can be concluded that robotization studies slightly reduce the competency deficit, except for judgment and decision making, as well as self-confidence (Figure 8).

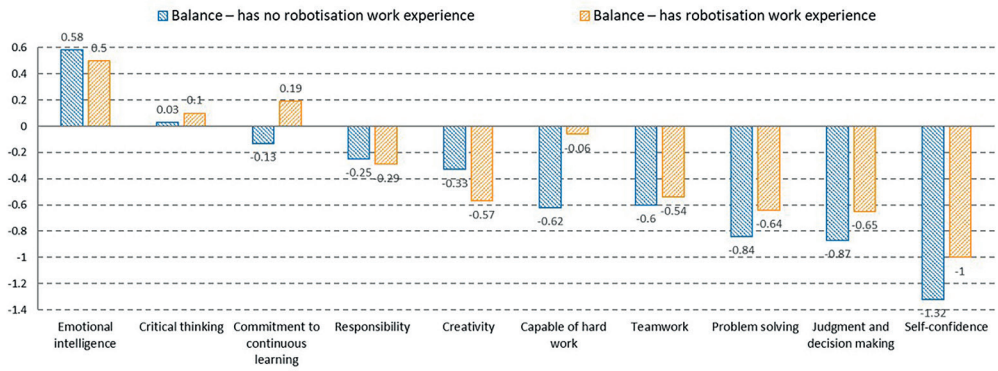

Figure 9: Competency balance by robotization work experience (self-editing)

Robotization work experience indicates a higher competency deficit. Students' existing competency was almost the same among those with or without robotization work experience, but the presumed competency in five years was predicted to be much higher by those with robotization work experience. However, an opposite trend can be observed in terms of workload capacity (Figure 9).

4. Summary and discussion

Our study presented the partial findings of a broad research project. The study uncovered the assessment of engineering students about labor market competencies.

We summarize our results by answering our research questions:

Q1: What do students think about the level of their own preparedness in terms of current labor market expectations?

- A high proportion of them feel unprepared, but this feeling decreases significantly as they progress in their studies. Nearly half of undergraduate students feel unprepared for labor market expectations. This figure drops to only 16% for those in graduate programs.
- With the exception of emotional intelligence and critical thinking, students reported that they fell short of labor market expectations in most competency areas. The gap is especially significant in the areas of self-confidence; judgment and decision making; and problem solving.

Q2: Is there a correlation between the assessment of competencies and knowledge and work experience related to robotization?

- Learning robotization skills and gaining robotization work experience positively affects their perception of preparedness for labor market expectations.
- Completing a robotization course results in significant differences primarily in cognitive competencies
- Among those with robotization work experience, the importance of problem solving, creativity and workload capacity competencies in the labor market is perceived as significantly higher.

Q3: How do they see the development of their own labor market key competencies?

- In terms of their own competencies, problem-solving skills were considered the most developed, and self-confidence was viewed as the least developed.
- In all cases, the means of part-time students were significantly higher, which may be due to their more significant life and work experience.
- Among the participants in the self-financed programs, teamwork, judgment and decision-making skills are significantly higher, as these students are more likely to be working while studying, which greatly helps the assessment of their competencies.

Regarding existing competencies, we observed significant or close to significant differences in several cases by gender. Women rated their creativity and emotional intelligence as more competent than their male counterparts, while in the other cases, men judged their own competencies to be significantly more advanced. We concluded that women reported a more significant competency deficit than male students. This may be because women are more likely to underestimate their abilities while overestimating labor market expectations in technical careers, where they feel less comfortable.

Q4: What do they think labor market expectations will be in five years?

- With regard to labor market key competencies, students believe that advanced problem solving will be the most necessary in five years, while emotional intelligence will be the least important competency. The role of critical thinking, self-confidence, emotional intelligence, judgment and decision making, and workload capacity competencies was predicted as being significantly more important in five years' time by women than by men.
- It can be concluded that the more students have progressed in their studies, the more important they think commitment to continuous learning will be in five years.
- Regarding future labor market expectations, only small differences could be detected between part-time and full-time students.

The literature review confirmed that technological development has led to profound transformations in the labor market, as evolving circumstances in the job market demand new employee competencies. Among the most important 10 key competencies outlined by the World Economic Forum (2020), creativity, critical

thinking, teamwork, and judgment and decision-making also appeared in our study. In the case of creativity and critical thinking, our results show students are divided in their beliefs that these skills will be as important in five years as they are now. On the other hand, students are likely to believe judgment and decision-making will be more important in the labor market in five years.

The results of studies investigating the correlation between technological changes and the fear of job loss (Khogali et al. 2023; Bessen 2019; Pol and Reveley 2017; Campa 2014) are further colored by our research results. We have shown that students' views about self-confidence are significantly related to teamwork, emotional intelligence, and judgment and decision-making, which confirms the importance of personal and interpersonal competencies. The importance of the transferability of special skills in the labor market has also been emphasized in the research (Vincze 2013; Kópházi 2017).

Our research supported the findings of Pirohov-Tóth (2022), Kiss (2014), and Kiss-Máté (2016), according to which professional experience gained during university studies improves work-related attitudes, thereby contributing to success in the labor market. In our studies, we revealed that students with robotization work experience have more confidence in strengthening their competencies.

5. Conclusion

In terms of soft skills, students indicated serious deficiencies in self-confidence; judgment and decision making; and problem solving. The development of these areas should be prioritized during their education. The need for methodological training for instructors is stressed. In terms of emotional intelligence, students indicated a significant surplus, which should be analyzed by further studies. The factors that play a role in the change in working conditions are viewed as more significant by female and full-time students. This is also true for students who have already learned about the social impacts of robotization during their studies. All this points to the need to emphasize the knowledge of the social effects of robotization in university courses.

It is necessary for university professors to renew the methods of processing curricula, because transversal competencies can be developed in this way. Educators must be prepared to introduce methodological innovations. Universities can achieve this goal by launching Training of Trainers programs. It is also important to make the relationship between employers and the university more dynamic (guest lectures about the labor market, dual education, plant visits, job fairs) and involve student organizations in the planning, implantation, and execution.

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