

Thematic Article

Recent graduates and labour market competencies – Issues of horizontal matching

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Abstract

This study examines the differences between the competencies possessed by recent graduates and those required in their jobs, with particular attention to horizontal matching. Its theoretical framework integrates human capital theory, job matching models, the skill mismatch approach, and competence theories, highlighting the growing importance of transversal and non-cognitive skills. The analysis is based on the Hungarian dataset of the Eurograduate 2022 survey (N = 6,797) and compares possessed and required competencies based on graduates' subjective self-assessments, while also examining the degree of horizontal mismatch. According to the results, in most of the examined competencies, only moderate differences can be observed between the required and actual levels, and in several cases, recent graduates rate their own competencies higher than those required for their work. Prominent differences can be observed in some dimensions of digital and communication competencies. Horizontal matching is high, although significant differences are observed by level and field of education. The findings suggest that both the level and the type of competencies play a decisive role in labour market matching, while mismatch is more of a differentiated rather than a general phenomenon.

Keywords: competence typologies; labour market competencies; matching; skill mismatch

Introduction

The transition from higher education to the labour market has become a central topic in social science research over recent decades, particularly in the context of skill mismatch and skill gaps (CEDEFOP, 2010; Allen & van der Velden, 2011; McGuinness et al., 2018; Teichler, 2018). Although graduate employment has expanded, numerous empirical studies point to persistent tensions between knowledge acquired in higher education and labour market expectations, especially in the domain of transversal and non-cognitive competencies (Balcar, 2014; Kautz et al., 2014; Nyilas, 2023; Tóth, 2025).

The concept of competence is not uniformly defined in the literature; however, increasing emphasis is placed on generic and transversal competencies that are not closely tied to a specific occupation but are nevertheless crucial for employability. In this context, higher education appears in a dual role: on the one hand, as a key institution for competence development, and on the other hand, as a frequent target of criticism for its perceived lack of practical relevance (Filep et al., 2012; Sági, 2013; Veroszta, 2014).

Both international and Hungarian studies (e.g. CHEERS, REFLEX, HEGESCO, as well as analyses based on the Graduate Career Tracking System) indicate that substantial differences exist between early-career graduates and labour market expectations, particularly in relation to soft skills, while professional knowledge is generally considered adequate (Balcar, 2014; Sipos et al., 2020).

This study examines labour market matching based on graduates' subjective competence assessments. Its aim is to explore the differences between possessed and required competencies and how these vary across social and educational characteristics. The analysis is based on the Eurograduate 2022 survey (N = 6,796).

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Our starting assumption is that significant differences can be identified between the competencies perceived by early-career graduates and labour market expectations, which reflects structural tensions between academically oriented training and labour market demands, and which is not homogeneous between the different student groups.

Theoretical and Research Background

The study of the transition from higher education to the labour market lies at the intersection of several interconnected theoretical approaches. This paper builds on four main frameworks: human capital theory, job matching models, the skill mismatch approach, and competence theories.

According to the classical human capital theory, education can be interpreted as an investment that increases productivity and yields returns in the form of higher earnings and improved labour market positions (Becker, 1964; Polónyi, 2019). This approach implicitly assumes that knowledge and skills acquired in the education system are directly utilized in the labour market. However, subsequent empirical research has shown that this matching is far from perfect, and graduates often do not fully utilize their acquired competencies (Allen & van der Velden, 2011; Teichler, 2018).

This problem is addressed by job matching theory, which posits that the quality of employment depends on the degree of fit between workers' capabilities and job requirements (Sattinger, 1993). Mismatch may take different forms, such as overeducation, undereducation, or skill-level discrepancies.

The skill mismatch literature further refines this perspective by distinguishing between vertical (educational level), horizontal (field of study), and skill-level mismatches (CEDEFOP, 2010; Manpower Group, 2015; McGuinness et al., 2018). One of its key insights is that mismatch is not merely a structural problem but a dynamic process influenced by technological change, the responsiveness of the education system, and individual competence development. The Manpower Group report also highlights that horizontal matching refers to substantive alignment in terms of field-specific, functional, and transversal skills. This typology closely aligns with labour market theories and empirical findings on the application of acquired knowledge and qualifications.

The reports *Skill Mismatch and Shortages in Europe* (CEDEFOP, 2010) and subsequent CEDEFOP analyses (2018) emphasize that shortages in transversal and non-cognitive skills play a significant role in labour market tensions, even when formal qualifications are adequate. According to CEDEFOP, addressing skill mismatch requires integrated education and labour market policy approaches.

However, these models alone do not fully explain which specific "skills" or "competencies" are affected. Competence theories provide a more precise analytical framework. Competence refers to the integrated application of knowledge, skills, and attitudes in a given context. Knowledge encompasses theoretical and factual understanding, skills refer to the ability to apply knowledge, while competence denotes the effective use of knowledge and skills in context (Winterton et al., 2006). This approach goes beyond formal qualifications and focuses on actual performance capacities.

Based on competence typologies, a distinction can be made between occupation-specific (functional) and generic (transversal) competencies (Lukácsné Hegyi, 2013). While the former are tied to specific professions, the latter—such as problem-solving, communication, collaboration, and learning ability—are widely applicable and play a key role in labour market adaptability (Balcar, 2014; Szabó, 2014; Council of the European Union, 2018). In this context, it is also important to refer to the key competences defined by the Council of the European Union (2018), including literacy, multilingual competence, mathematical and scientific skills, digital skills, personal and social competences, learning to learn, civic competences, entrepreneurship, and cultural awareness.

At the same time, the literature distinguishes between cognitive and non-cognitive skills. Cognitive skills relate primarily to information processing and problem-solving, while non-cognitive skills—such as self-regulation, perseverance, and cooperation—shape behavioural and social functioning. These two types of skills contribute in complementary ways to labour market and life outcomes.

International empirical studies (CHEERS, REFLEX, HEGESCO) consistently show that higher education is strong in the transfer of professional knowledge, while the development of transversal competencies is less emphasized, despite their growing importance in the labour market (Hager & Gonczi, 1996; González & Wagenaar, 2005; Allen & van der Velden, 2011; OECD, 2013). Similar findings emerge in Hungarian studies: recent graduates often perceive their own competence levels as lower in key areas, even though they are essential for job performance (Kiss, 2010a, 2010b; Szűcs & Fónai, 2011; Nyilas, 2023; Iharosi & Nagy, 2024).

Based on our analysis, recent graduates experienced high expectations for problem solving, independent work, collaboration, learning ability, concentration ability, and practical expertise. However, the ranking of their competencies showed that they were less likely to possess these skills (Fónai & Nyilas, 2024).

At the same time, employer expectations highlight the importance of communication, problem-solving, adaptability, and willingness to learn (ManpowerGroup, 2015). These competencies are largely transversal as well as non-cognitive, and their lack often leads to labour market problems even if the formal education is adequate. Regarding soft skills, like native language skills, foreign language communication, mathematical and natural science competencies, and digital competencies it can be seen that recent graduates consider them to be much more necessary for their work than they actually possess them (Nyilas, 2023).

By integrating these theoretical approaches, this study conceptualizes competence discrepancy in the transition from higher education to the labour market as a multi-level phenomenon. On the one hand, it appears as a structural mismatch between supply and demand; on the other hand, it varies across types of competencies, particularly in the domain of transversal and non-cognitive skills. Within this framework, the subjective competence assessments of young people starting their careers are not merely perceptions but important indicators of labour market matching.

Method and Sample, Limitations

This study analyzes the Hungarian results of the Eurograduate 2022 survey (Sági, 2024). The Eurograduate 2022 survey is an international questionnaire-based study aimed at tracking recent graduates after completing higher education, assessing their study experiences, and examining their professional careers. The project involves 17 European countries, including Hungary. The Hungarian data collection analyzed in this study was conducted between November 2022 and January 2023 among individuals who graduated or obtained their degree in 2017 or 2021, with a total population of 108,394. The cleaned dataset comprises 6,797 respondents, and the analyses presented in this study are based on this sample.

The mandatory module of the questionnaire collected basic information on respondents' socio-demographic background, higher education experiences, and labour market characteristics, while the optional module included questions on family and social background, education and employment, detailed occupational information, mobility, competencies, job satisfaction, and the match between education and work.

The aim of the analysis is to compare the competencies possessed by recent graduates with the competencies they consider necessary for their work, and based on them, to identify potential skill mismatch differences. This is achieved by comparing required and current competence levels (i.e. what is needed for the job and the level at which graduates possess these competencies). The phenomenon of skill mismatch is also examined using indicators of horizontal matching.

The research questions are as follows:

RQ1: Is there evidence of skill mismatch and competence gaps in the examined competencies?

RQ2: Do recent graduates perceive horizontal mismatch in their jobs?

The hypotheses are:

H1: Based on the findings of the literature and our previous research results, we expect that recent graduates perceive discrepancies primarily in the case of transversal, soft, and non-cognitive competencies; that is, they evaluate their own competencies in these areas as being higher than the level required in their jobs.

H2: We assume that perceived horizontal mismatch is mainly associated with the level and field of education.

One limitation of the secondary analysis is the competence list used in the questionnaire, which does not fully correspond to established competence models, as shown in Table 1. Nevertheless, the list allows for the examination of the research questions and hypotheses. A further limitation is that the analysis relies only on recent graduates' opinions; it does not include the views of higher education institutions or employers regarding required competencies. In addition, the results are based on subjective self-assessments by recent graduates. At the same time, this approach may also involve biases associated with the Dunning–Kruger effect (1999); nevertheless, subjective self-assessment remains a widely accepted methodological tool in the analysis of opinions and attitudes, and the study focuses on perceived matching rather than objectively measured competencies.

Table 1. Classification and Comparison of the Examined Competencies

Competency in the Eurograduate 2022 survey	Corresponding EU key competence	Transversal	Hard/Soft	Cognitive/Non-cognitive
Professional expertise in own field	Professional competence / learning	✗	Hard	Cognitive
Analytical thinking	Learning to learn	✓	Soft	Cognitive
Ability to rapidly acquire new knowledge	Learning to learn	✓	Soft	Cognitive
Coordination of activities	Entrepreneurial competence	✓	Soft	Non-cognitive
Productive teamwork	Social competence	✓	Soft	Non-cognitive
Clear communication	Communication competence	✓	Soft	Cognitive + non-cognitive
Use of ICT	Digital competence	✓	Hard	Cognitive
Advanced use of ICT	Digital competence	✗ (rather specific)	Hard	Cognitive
Generating new ideas	Entrepreneurial competence	✓	Soft	Cognitive
Questioning ideas	Civic / learning competence	✓	Soft	Cognitive
Presentation skills	Communication competence	✓	Soft	Cognitive + non-cognitive
Foreign language skills	Multilingual competence	✗	Hard	Cognitive

Source: own compilation.

Professional expertise and advanced ICT use are considered more specific competencies.

Hard vs. soft competencies: hard competencies are teachable and measurable (e.g. ICT, language, professional knowledge), while soft competencies are linked to behaviour and attitudes (e.g. communication, cooperation).

Cognitive vs. non-cognitive competencies: cognitive competencies relate to thinking processes (e.g. analysis, learning, language), while non-cognitive competencies relate to attitudes and social functioning (e.g. cooperation, coordination). Some competencies have a mixed character (e.g. communication).

Results

In our secondary analysis, in addition to comparing the mean values of the competence items, we analyze an index constructed from questions related to horizontal matching (the MisFit index), and then, through regression analysis, the effects of independent variables on the MisFit index are examined. Comparing the required and current competence levels shows the areas where recent graduates perceive differences (Table 2).

Table 2. Competencies Required for the Job and Current Self-Assessed Competence Levels (7-point scale, where 1 = very low and 7 = very high)

Competency	Required for current job		Current own level	
	Mean	SD	Mean	SD
Professional expertise in own field or discipline	4.94	1.745	4.91	1.183
Analytical thinking	5.03	1.534	5.25	1.177
Ability to rapidly acquire new knowledge	5.41	1.448	5.69	1.078
Coordination of activities	5.32	1.530	5.36	1.212
Ability to work productively with others	5.61	1.417	5.63	1.159
Ability to make one's message clear to others	5.65	1.420	5.40	1.207
Ability for applied use of information and communication technologies (ICT, e.g., text processing, working with tables, retrieve information from the internet, e-mail).	5.49	1.554	5.84	1.149
Ability for advanced use of information and communication technologies (ICT, e.g., programming, syntax in statistical software).	3.30	2.176	3.51	1.999
Ability to generate new ideas and solutions	5.02	1.637	5.28	1.223
Willingness to question one's own and others' ideas	4.24	1.719	4.77	1.472
Ability to present products, ideas, or reports to an audience	3.78	1.989	4.30	1.634
Written and spoken foreign language skills	4.31	2.255	4.94	1.720

Source: own compilation based on Eurograduate 2022.

A notable finding regarding the required and possessed competencies concerns the evaluation of ICT-related skills. At first glance, ICT competencies appear to be relatively less important in actual work settings, and recent graduates also rate their own competence levels in this area comparatively low. However, the questionnaire distinguishes between two different types of ICT competencies. The first refers to basic ICT use, such as word processing and spreadsheet handling, while the second refers to advanced ICT competencies, including programming and the use of statistical software. Recent graduates report high levels of competence in basic ICT use, whereas they evaluate their competencies in advanced ICT-related tasks, such as programming and statistical software applications, considerably lower. The findings suggest that digital competence should not be interpreted as a homogeneous category, as substantial differences emerge between general digital literacy and advanced, occupation-specific digital competencies.

In other areas, self-assessed competence levels are relatively high, and respondents also perceive expectations as relatively high. With the exception of two competence areas—coordination of activities and the ability to work collaboratively—only minor differences can be observed between the perceived required and current levels. In eight competence areas, recent graduates believe that their own competence levels are higher than what their jobs require. Although these differences are small and therefore do not in themselves explain potential mismatches in the horizontal matching, they nevertheless indicate a mild degree of underemployment/overqualification, at least in terms of the examined competencies.

Table 1 summarized how the competence list used in the Eurograduate questionnaire corresponds to different competence typologies. In terms of key competences, remarkable differences between required and current levels can be observed in two areas: digital competences and communication competences. Digital competence is measured through two items: on application (e.g. word processing, spreadsheets), and on use at a more advanced level (e.g. programming, statistical syntax). Significant differences emerge between these two dimensions: recent graduates report high levels of competence in applying digital tools, but rate themselves substantially lower in the “hard” dimension of digital competence (e.g. programming, using syntax), which, in most cases, is not expected by employers, since they are field- and occupation-specific competences. Similarly, workplaces do not appear to expect recent graduates to present products, ideas, or reports to the audience (communication key competence), even though respondents consider themselves much more capable in this respect.

The Eurograduate competence list primarily includes transversal competencies. In this context, recent graduates tend to feel that they possess these competencies to a greater extent than their jobs require. These transversal competencies are also soft competencies, and as the literature shows, transversal and/or soft competencies make a substantial contribution to labour market success. At the same time, transversal and soft competencies are not necessarily non-cognitive competencies, as shown in Table 1. Nevertheless, apart from ICT-related competencies, it can be stated that recent graduates possess both cognitive and non-cognitive competencies at relatively high levels, while also perceiving relatively high expectations in these areas. This is also a good predictor of the fact that they evaluate their own labour market match favourably on the main dimensions of job matching (Table 3).

Table 3. Dimensions of Horizontal Matching and Mean Values of the MisFit Index (0–4 scale)

Dimension	N	Mean	SD
Absolute horizontal match: position	5696	1.05	1.359
Absolute horizontal match: job tasks	5695	1.3048	1.39211
Absolute horizontal match: professional qualification	5706	1.4020	1.39849
Misfit index	5710	1.2539	1.09525

Source: own compilation based on Eurograduate 2022.

The questionnaire examined horizontal job matching with three questions: absolute horizontal matching in terms of position, matching in terms of job tasks, and the match between professional qualification and job (see Table 3). The original scales were transformed, without taking the direction of mismatch into account, into a 0–4 scale, where 0 indicates the highest degree of matching.

The data in Table 2 are indeed good predictors, as it can be stated that horizontal matching is high in all dimensions, and the MisFit index constructed from the three original variables also indicates a generally high level of horizontal matching. Based on the results of the Q-Q plot test, ANOVA analyses were conducted for several variables and the MisFit index. The level and field of education have a significant effect on the MisFit index, whereas among the variables examined, gender and study mode do not have a significant effect (Table 4).

Table 4. Relationship Between the Misfit Index and Level of Education

Level of education	N	Mean	SD
Bachelor's degree	3518	1.3250	1.13470
Master's degree	1668	1.1296	1.01676
Long-cycle undivided programme	608	0.9597	1.01290
Total	5794	1.2304	1.09668

Source: own compilation based on Eurograduate 2022. Sig. = .000

A linear relationship can be observed between the level of education and the MisFit index, as a higher level of education is associated with a lower mismatch score; in other words, higher qualifications are associated with stronger horizontal matching. This has important labour market consequences, for example in terms of achievable wages. The effect of field of education is also significant. The highest levels of matching are found in medicine and dentistry (.6577), teacher education (.8966), pharmacy (.9270), and information and communication technologies (.9647). Lower levels of matching characterize services (1.6258), arts (1.6146), languages, linguistics and literature (1.5867), and agriculture and forestry (1.4994), based on the Eurograduate classification of fields of education.

The high degree of horizontal matching is closely related to the regulation of access to certain occupations, since professions such as medicine, law, and teaching can only be practiced with the appropriate qualification.

These findings are partly consistent with our earlier analyses concerning recent graduates' qualifications, knowledge, and competencies in relation to horizontal and vertical matching (Fónai et al., 2014; Fónai & Csonka, 2023). One of these indicators is overqualification: among graduates of the University of Debrecen, this rate was found to be 23.7% around 2010 (Fónai et al., 2014). In another analysis, using data from the Graduate Career Tracking System, several indicators of horizontal and vertical matching were examined. In surveys conducted between 2016 and 2021, recent graduates rated the extent to which the knowledge and skills

acquired during their studies is used in their current job between 3.25 and 3.32 on a five-point scale. It is lower than the comparable indicator in the Eurograduate survey, although the direction of the two scales differs: the Eurograduate 2022 survey suggests stronger matching, whereas the Graduate Career Tracking System shows rather a moderate level of matching.

In addition to the ANOVA analyses, a linear regression model confirms the results discussed above (Table 5).

Table 5. Effects of Fields of Education and Competence Factors on the MisFit Index

Parameter	B	Std. Error	t	Sig.
Intercept	3.279	.110	29.839	.000
Education Science (non-teacher training)	-.479	.139	-3.438	.001
Teacher Training	-.678	.085	-8.012	.000
Arts	-.081	.103	-.789	.430
Humanities (except languages, linguistics, and literature)	-.324	.116	-2.782	.005
Languages, Linguistics, Literature	-.029	.096	-.300	.765
Social Sciences, Journalism, and Information	-.118	.082	-1.437	.151
Psychology	-.471	.107	-4.404	.000
Business and Administration	-.342	.076	-4.485	.000
Law	-.311	.111	-2.810	.005
Natural sciences, Mathematics, and Statistics	-.337	.088	-3.809	.000
ICT (Information and Communication Technologies)	-.504	.092	-5.468	.000
Engineering, Manufacturing, and Construction	-.406	.078	-5.227	.000
Architecture and Urban Planning	-.460	.112	-4.105	.000
Agriculture, Forestry, Fisheries, and Veterinary Sciences	-.165	.105	-1.563	.118
Medicine, Dentistry	-.743	.133	-5.600	.000
Other Medical Services	-.617	.105	-5.851	.000
Pharmacy	-.621	.238	-2.616	.009
Social Care	-.306	.140	-2.187	.029
Services	0a	.	.	.
Gender	.022	.031	.699	.484
Level of education	-.139	.025	-5.447	.000
Form of Education	.033	.033	1.013	.311
General and social competence factor	-.157	.015	-10.609	.000
Technical and professional competence factor	-.156	.014	-11.217	.000

a. This parameter is set to zero because it is redundant.

The model was prepared using services as the reference category. The results of the multivariate regression model are summarized in Table 5. The parameter estimates (B values) and their significance levels confirm that, compared to the reference category of services, all other fields of education are associated with lower mismatch. The strongest movement towards better matching can be observed in medicine and dentistry (B = -0.743), teacher education (B = -0.678), pharmacy (B = -0.621), and other medical services (B = -0.617). By contrast, although mismatch is also lower than in the reference category, the improvement in matching is relatively weaker in arts (B = -0.081) and in languages and literature (B = -0.029), where the effects are not statistically significant.

The competence factors—general and social competencies, as well as technical and professional competencies—also significantly reduce the MisFit index. In other words, higher levels of competence are clearly associated with better labour market matching.

Discussion and Conclusion

Our findings refine dominant interpretations of competence matching between higher education and the labour market in several respects. The assumption of human capital theory that competencies acquired through

education are directly utilized in the labour market is only partially confirmed. Although horizontal matching is generally high, the utilization of competencies is not uniform but varies across fields of education and types of competence. In contrast, job matching models and the skill mismatch approach provide a more accurate analytical framework: matching is not a dichotomous but a gradual and structured phenomenon.

The answers to the research questions reinforce this differentiated picture. The first question (RQ1) received only limited confirmation: although differences can be identified between the required and the existing competencies, they do not appear as a general lack of competence. Recent graduates rate their own level in several competency areas as higher than what their jobs require, which suggests underutilization or mild overqualification. The second question (RQ2) received a clearer answer: horizontal matching is high, but it is also significantly differentiated by level of education and, in particular, by field of education.

Of the hypotheses, H1 was confirmed, as recent graduates evaluated their transversal and non-cognitive competencies higher than the level required in their jobs. H2 was confirmed: the mismatch is clearly structural in nature and is closely associated with the level and field of education. Matching is stronger in programmes linked to regulated professions, pointing to the decisive role of institutional and regulatory frameworks. The results suggest that the competence-based approach is particularly useful, since it highlights that labour market matching depends not only on the level of competencies but also on their type and contextual utilization. The discrepancies observed in different dimensions of digital and communication competencies further support this differentiated interpretation.

The study also has important policy implications. On the one hand, it challenges the generalized narrative of competence shortage and points to the need for differentiated interventions tailored to specific fields of education. On the other hand, it indicates that, alongside competence development, greater emphasis should be placed on strengthening the conditions for the effective labour market utilization of competencies.

A limitation of the study is that the analysis relies on graduates' subjective self-assessments and does not include the employers' perspective. At the same time, these perceptions are relevant indicators of matching in the early-career stage. Future research should therefore integrate the perspectives of multiple actors and apply longitudinal approaches.

The findings also highlight several implications for higher education development. Although recent graduates report relatively strong transversal competencies overall, the results indicate that more targeted development of advanced digital and communication competencies may be necessary. In particular, higher education institutions could place greater emphasis on the practical application of advanced ICT skills, including data analysis, statistical software use, and digital problem-solving. In addition, the relatively lower labour market expectations regarding presentation and communication competencies suggest the importance of strengthening opportunities for applied communication tasks, project-based learning, teamwork, and audience-oriented presentations within university curricula. Closer cooperation between higher education institutions and employers could further support the alignment between competence development and labour market expectations.

Overall, the labour market position of recent graduates is shaped not by a general competence deficit, but by the differentiated utilization of competencies and by patterns of matching linked to educational structures.

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Appendix

Appendix 1. Competence Factors Required for the Current Job

Competencies required for the current job	General and social competencies	Technical and professional competencies
Coordination of activities	.799	
Ability to make one's meaning clear to others	.780	
Ability to work productively with others	.773	
Ability to rapidly acquire new knowledge	.632	.381
Ability to generate new ideas and solutions	.628	.461
Professional expertise in own field or discipline	.546	
Ability to use information and communication technologies (ICT) at an advanced level		.791
Written and spoken foreign language skills		.622
Ability to use information and communication technologies (ICT)		.590
Willingness to question one's own and others' ideas	.410	.566
Analytical thinking	.449	.546
Ability to present products, ideas, or reports before an audience	.422	.500



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