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Aims and Scope: The *European Scientific Journal for Dual Higher Education* is an open-access, peer-reviewed scholarly journal dedicated to research, theory, and practice in dual and work-integrated higher education. It serves as a European platform for interdisciplinary, evidence-based scholarship that connects academia and professional practice, promoting innovation, transformation, and future-skills development in higher education.

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EDITORIAL — INAUGURATING A EUROPEAN VOICE FOR DUAL HIGHER EDUCATION

European Scientific Journal for Dual Higher Education (ESJ DHE), Vol. 1, No. 1, (2025)

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1 A Historical Beginning: Launching the European Scientific Journal for Dual Higher Education

With this issue, we are proud to inaugurate the *European Scientific Journal for Dual Higher Education (ESJ DHE)* — a journal born within and shaped by the **EU4Dual European University Alliance**. This inaugural publication marks a **historic moment**: for the first time, an academic journal dedicated entirely to *dual higher education (DHE)* — its theory, research, and practice — brings together scholars, practitioners, and institutions across Europe to exchange insights, evidence, and visions.

This launch is not merely an academic milestone but also a symbolic act of collaboration. *Many hands and minds have contributed to this creation* — researchers, practitioners, editors, reviewers, and alliance partners. As Chief Editor, I am both humbled and proud that this collective endeavor now provides a **scientific voice** for the field of dual higher education, strengthening its position within the broader European discourse on the future of learning, work, and skills.

The journal is situated within the EU4Dual alliance's mission to **integrate learning and work, theory and practice**, education and innovation. It aspires to document, analyse, and inspire the evolution of dual higher education across Europe and beyond — supporting evidence-based dialogue among universities, companies, policymakers, and students.

2 Future Skills as a Compass for Dual Education

At the heart of this issue lies the concept of **Future Skills** — the abilities and competencies individuals need to act responsibly, creatively, and effectively in transforming societies and workplaces.

The discussion about *soft skills* has evolved substantially in recent years. Increasingly, these are recognised not as "soft" or supplementary, but as **core enablers** of human capability in the age of AI, automation, and globalisation. Future Skills encompass **cognitive, social, and reflective capacities** that empower people to adapt, co-create, and transform — to be *agents* rather than *subjects* of change.

In dual higher education, Future Skills are developed in authentic contexts — where learning meets work, reflection meets practice, and education meets enterprise. They represent the **connective tissue** of modern curricula: linking academic theory to real-world responsibility, innovation, and ethics.

Thus, dual education becomes not merely a mode of delivery but a **philosophy of learning** — one that integrates experiential learning, critical reflection, and societal relevance. This first issue presents research that collectively illuminates how Future Skills emerge, can be measured, and can be sustained within dual learning systems.

3 The Articles in this Inaugural Issue

This first issue of the *ESJ DHE* presents six peer-reviewed articles — diverse in topic, but unified in purpose: to strengthen the scientific understanding of dual education as a driver for competence development, innovation, and inclusion.

1. **The Influence of Dual Higher Education Programmes and Work Experiences on Soft Skills Development in Master's Degree Students** *(Iraia Urkia-Basterra, Ainara Imaz Agirre and Paula Álvarez-Huerta)*

This opening article establishes the conceptual foundation for the issue. It investigates how dual programmes and work-based experiences contribute to students' development of key Future Skills such as communication, adaptability, and self-efficacy. Quantitative evidence from master's students demonstrates the *added value of structured work integration* and provides a valuable framework for subsequent studies.

2. **Analysis of Soft Skills in Dual Higher Education Students: Pilot Validation** *(Szilvia Varga and Norberta Sági)*

Focusing on measurement and validation, this contribution presents the development of a new instrument for assessing soft (Future) Skills in dual students. Through pilot testing and psychometric evaluation, the authors show both the complexity and feasibility of scientifically assessing competencies that go beyond technical knowledge — a cornerstone for future empirical work in this field.

3. **Skills of Generation Z Dual Students Entering the Workplace** *(Norberta Sági)*

The third article turns to the perspective of a new generation. By comparing expectations between dual students and employers, the study reveals alignment gaps and perception differences that affect recruitment and retention. Grounded in the Person–Job Fit model, it offers a nuanced view of how Future Skills shape employability and organisational integration for Generation Z.

4. **Internationalisation and Work Life Skills Across the Baltic Sea: The KUT–Savonia COIL Project** *(Joanna Stankiewicz-Majkowska and Irene Hyrkstedt)*

This contribution exemplifies *innovative practice*: a pilot Collaborative Online International Learning (COIL) project connecting students from Poland and Finland within the EU4Dual alliance. The study demonstrates how international virtual teamwork fosters linguistic confidence, intercultural competence, and work-life skills — embodying the EU4Dual spirit of cooperation and experiential learning.

5. **Enhancing Objective and Holistic Assessment in Dual Higher Education: A Multidimensional Rubric Approach** *(Mikel Ezkurra, Amaia Gomendio, David Alonso de Mezquía, Leire Markuerkiaga and Josu Galarza)*

Bridging research and practice, this article introduces a comprehensive rubric model for assessing students' workplace learning. By integrating self-, peer-, and company-based evaluation, the authors provide a robust tool for quality assurance and reflective learning in dual settings — a key contribution to the evidence-based management of Future Skills.

6. **Understanding Student Dropout in Hungarian Technical Higher Education: A Mixed-Methods Study** *(Zsolt F. Kovács)*

The final article widens the perspective toward institutional and systemic challenges. Addressing student dropout through a mixed-methods lens, it connects individual learning experiences to

structural conditions of dual programmes. Kovács' findings underline that developing and sustaining Future Skills also requires supportive institutional cultures, flexibility, and social inclusion.

4 A Shared European Mission

Collectively, these six contributions illustrate the **diversity**, **maturity**, and **transformative potential** of dual higher education across Europe. They connect theory, empirical evidence, and pedagogy — from validation studies to practical interventions — while all operating under the shared framework of **EU4Dual**, one of the European University Alliances fostering sustainable innovation and regional anchoring.

This inaugural issue demonstrates how collaboration within EU4Dual already produces tangible scientific outputs and cross-border synergies. Each article, in its own way, contributes to building a European research community around dual higher education — a field that unites *learning*, *working*, and *innovation* for a more resilient and capable Europe.

5 Looking Ahead

As Chief Editor, I extend my heartfelt thanks to all authors, reviewers, section editors, and alliance colleagues who made this first issue possible. Your dedication and belief in the idea of a *European journal for dual higher education* have turned a long-standing vision into reality.

This is a **beginning** — not only for a journal but for a shared intellectual space where evidence, reflection, and innovation can meet. I hope that the *European Scientific Journal for Dual Higher Education* will serve as a **platform of trust and inspiration**, strengthening the academic foundations of our field and supporting the next generation of dual learners, educators, and researchers.

May this first issue — the *historical foundation* of our journal — inspire many to contribute, collaborate, and co-create the future of dual higher education in Europe and beyond.

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THE INFLUENCE OF DUAL HIGHER EDUCATION PROGRAMMES AND WORK EXPERIENCES ON SOFT SKILLS DEVELOPMENT IN MASTER'S DEGREE STUDENTS

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Abstract
Soft skills are crucial for graduate employability in a rapidly changing society. While dual higher education programs support their development, the specific skills gained remain unclear. Likewise, the role of non-curricular work experiences in shaping these skills is also underexplored. This study investigates the influences of DHE programmes and non-curricular work experiences on soft skills, focusing particularly on social competences, efficacy beliefs, flexibility, lifelong learning, and communication. A quantitative study was conducted on 96 students of two master's degrees in two distinct fields of study. Analysis of variance was employed to examine the differences in the mentioned skills across students with and without experiences in DHE programmes and non-curricular work experiences. The findings illustrate the complex effects of these experiences on soft skills development, highlighting a particularly positive impact of current DHE programmes on students' efficacy beliefs. Furthermore, the role of master's programmes is significant, especially concerning students' communication skills. The results suggest that well-structured DHE programmes can effectively foster both professional and personal growth. Nevertheless, further research is needed to clarify the nature of the found inconsistencies, including studies with larger sample sizes and longitudinal research designs.

1 Introduction

As society continues to grow more complex and diverse, the workplace is also becoming increasingly intricate. This means that higher education students must adapt to these changes and become more aware of their surroundings to face the challenges that arise (OECD, 2019). Global changes, such as digitalisation, climate change and artificial intelligence pose challenges for the future of students (OECD, 2019). Globalisation has led to the need for skilled labour (European Commission, 2017). Additionally, career paths are becoming less straightforward, requiring employees to adjust to various work settings (Santos, 2020). In this context, skills and, more specifically, soft skills have gained relevance and are thought to be helpful in facing these challenges (OECD,

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2019). In Europe, the Bologna Process emphasised the need for higher education institutions to develop these skills (Sin & Neave, 2016). However, despite efforts by higher education institutions to address this issue (Succi & Canovi, 2020), the skills shortage remains a concern (Jackson, 2024).

Working while studying has been found useful in the development of soft skills (Bennet et al., 2023). In this context, educational programmes such as Dual Higher Education (DHE) are gaining relevance as they integrate student curricula with practical experience gained through specific internship periods in qualified companies, allowing students to apply their theoretical knowledge in real-world settings (Pogatsnik, 2018; Turk, 2023). Many universities in Europe are in the process of implementing or have already implemented DHE programmes within their degree offerings (Dragan & Hochrinner, 2024; Dupouy & Bakni, 2024a; Dupouy & Bakni, 2024b; Viklund & Elgundi, 2024). These work experiences are incorporated into student programmes through initiatives like DHE, Work-Based Learning (WBL), or Work-Integrated Learning (WIL) (Ferns et al., 2024; Lester & Costley, 2010; Pogatsnik, 2018). These terms are often used interchangeably, but the terminology and structure of these programmes vary across countries (Varga & Sági, 2024). Apart from allowing for the integration of theory and practice, DHE programmes have been perceived as useful for soft skills development (Dupoyu & Bikini, 2024; Tuononen et al., 2022), as they facilitate the application of discipline-specific knowledge and skills in the workplace (Clarke, 2017).

Nonetheless, the effectiveness of these programmes on all soft skills is still debated, as some soft skills are less represented in literature (Urkia-Basterra et al., 2025). Although paid work as an extra-curricular activity has been argued to be useful for soft skills development, research in this area is still limited (Clark et al., 2015). Moreover, to our knowledge, little research (Alves et al., 2017; Grooters et al., 2023; Martín-Lara et al., 2019) has been conducted on the relevance of DHE programmes and work experiences among master's degree students. To this end, this article presents an empirical study that compares the effects of DHE programmes and prior non-curricular work experiences on the development of soft skills among two master's programmes in distinct academic disciplines.

1.1 Theoretical framework

There has been a noticeable shift in literature towards the increasing importance of soft skills, moving from a focus on technical skills to a greater emphasis on non-technical skills (Zegwaard & Rowe, 2019). Moreover, the COVID-19 pandemic emphasises the role of skills such as communication and teamwork as essential to adapt to rapid changes (Konstantinou & Miller, 2021). Despite their importance, the definition and theoretical consistency of soft skills remain subjects of debate in academic literature, where terms such as soft skills, generic skills or transversal competencies are used interchangeably (Cinque, 2016; Marin-Zapata et al., 2022). Numerous frameworks have attempted to face this challenge, including Life Skills Education in School (WHO, 1993), 21st Century Skills (Ananiadou and Claro, 2009), and the OECD Future of Education and Skills 2030 project (OECD, 2019). The latter outlines skills as "the ability and capacity to carry out processes and to be able to use one's knowledge in a responsible way to achieve a goal." (OECD, 2019, p. 89). Additionally, it aims to clarify the knowledge, skills, attitudes, and values that students need to adjust to changes in their environment and everyday life, as well as to help shape the future (OECD, 2019).

To foster the development of soft skills, DHE programmes are thought to be useful due to the application of knowledge and skills in the workplace (Dupoyu & Bikini, 2024; Tuononen et al., 2022). Although definitions of DHE programmes are still debated, several theoretical perspectives have been identified for application for work-based type of programmes (Ferns et al., 2024). The Situated Learning Theory emphasises that learning is fundamentally a social process, taking place through interactions and collaboration within social environments (Lave & Wenger, 1991). This concept is particularly relevant to DHE programmes, as students engage in practical learning within the workplace environment alongside experienced professionals (Ferns et al., 2024). Additionally, Sociocultural Theory states that learning is a social process, emphasising that knowledge and skill development arise through social interaction (Vygotsky, 1978). Engeström (1999) expanded this concept into Activity Theory, which emphasises the significance of collective activity and contextual learning. These perspectives align well with the structure of DHE programmes, where students acquire skills and knowledge relevant to the workplace through meaningful social interactions in real-world

professional environments (Ferns et al., 2024). In addition, Kolb's Experiential Learning Theory (1984) offers a valuable lens for understanding how students in DHE programmes acquire and refine soft skills. According to this model, learning occurs through a process of experience, reflection, conceptualisation, and active experimentation. Within the structure of DHE, this process is supported as students alternate between academic and workplace settings, learning as they engage in and reflect on real-world tasks and professional experiences (Ferns et al., 2024). In this context, the social interactions between students and university and world-of-work tutors also seem to be key to the effectiveness of DHE programmes (Dragan & Hochrinner, 2024; Tynjälä, 2008).

While higher education provides formal learning settings, the workplace offers chances for informal and spontaneous learning opportunities (Eraut, 2004). Through workplace learning, employees develop and enhance their knowledge, skills, and attitudes (Janssens et al., 2017). Workplace learning recognises the value of learning from peers and promotes the growth of various skills, personal development, and teamwork, among other advantages (Eraut, 2004). In particular, studies emphasise the potential benefits of working while studying in aspects such as career awareness, social skills and the development of professional skills (Brosnan et al., 2024; Clark et al., 2015). Research focusing on pre-entry work experiences also found benefits of these work experiences on skills such as communication, and career exploration and awareness (Bennett et al., 2023). Nevertheless, it is argued that this relationship between non-curricular work experiences and skills development is complex and seeks further research (Bennett et al., 2023). Work experiences, both non-curricular and through DHE programmes, offer significant advantages for student development. DHE programmes are also believed to be beneficial for soft skills development, with communication, problem-solving, critical thinking, and teamwork being the most emphasised in literature (Urkia-Basterra et al., 2025).

Effective communication is key for overall societal understanding (OECD, 2021) as well as team performance and communication in the workplace (Marlow et al., 2018). As mentioned above, communication skills represent one of the most extensively researched competencies in DHE programmes (Urkia-Basterra et al., 2025). Research conducted in a variety of fields of study has concluded that DHE programmes are perceived as helpful for developing communication skills (e.g. Doolan et al., 2019; Fleming & Haigh, 2017; Grooters et al., 2023; Jackson, 2013b, 2013a; Martín-Lara et al., 2019). However, although effective communication has been identified as one of the most important skills, it remains a skill students frequently lack (Moore & Morton, 2017).

The workplace and learning in the workplace is a social process (Leiß & Rausch, 2023), providing opportunities for experiential learning. The cognitive and behavioural development of students has been found to be directly correlated with the quality of their interactions with colleagues and supervisors (Tan et al., 2022), emphasising the importance of social competencies. Research has shown that social competences can be developed through paid work experiences (Bennett et al., 2023; Jackson et al., 2019). Moreover, in the field of education, social and communication skills gained from work experiences outside students' main fields of study have proven to be valuable in their future careers (Wylie & Cummins, 2013). Although social skills have been previously researched in the form of teamwork or interpersonal skills (Urkia-Basterra et al., 2025), stakeholders have still identified deficits in the social competences of students (Prikshat et al., 2019). Therefore, considering its transferability, the interactions of DHE programmes and non-curricular work experiences on social competencies are worth exploring.

From a career development perspective, students engaging in non-curricular work experiences demonstrate enhanced confidence in career decision-making processes (Brosnan et al., 2024). These students typically develop stronger connections between their academic studies and future employment prospects while simultaneously building greater self-efficacy regarding their career-related efficacy beliefs (Brosnan et al., 2024). In contrast, the influence of career-related efficacy beliefs in DHE programmes is underexplored (Urkia-Basterra et al., 2025).

Flexibility has been proven essential in navigating rapidly evolving workplace environments and the unknown future (Holmes, 2013; Jackson et al., 2019). In this context, immersive DHE experiences have been found to be particularly effective in fostering professionals with the ability to adapt to occurring changes (Gardner, 2017). For instance, Martín-Lara et al. (2019) found adapting to changes to be one of the most developed skills in their DHE programme according to students. Despite that, flexibility has been found to be a skill people often lack (Chinn et al., 2020). Succi and

Canovi (2020) also found that this skill is not considered important among students, unlike employers who rated it as one of the most essential skills. Therefore, the effectiveness of the workplace in developing this skill requires further research.

Students with higher lifelong learning scores seem to demonstrate superior workplace adaptation and performance (Drewery et al., 2017). Moreover, equipping students with lifelong learning skills is essential to their well-being and overall success (Ferns et al., 2024). Even so, research on lifelong learning remains emergent, with a pressing need to investigate the influence of DHE programmes and other non-curricular learning opportunities on this skill (Drewery et al., 2020).

1.2 The present study

As mentioned in the introduction, the development of soft skills among higher education students is essential in order for them to navigate the uncertainties of the workplace and society (OECD, 2019). Previous research has established the importance of both DHE programmes and non-curricular work experiences in developing soft skills (Jackson, 2013; Jackson & Bridgstock, 2021). Nevertheless, there is still a persistent skills gap and talent shortage (Jackson, 2024). Moreover, literature reveals inconsistencies in how different soft skills are represented in research, with communication skills receiving substantial attention while others like lifelong learning remain underexplored (Urkia-Basterra et al., 2025). Furthermore, while DHE programmes have been perceived as useful for soft skills development (Clarke, 2017; Pogatsnik, 2018), more empirical evidence on non-curricular work experiences (Clark et al., 2015) and how they compare against structured DHE programmes is needed.

Given the significance of social interaction in learning within DHE programmes and Robles' (2012) definition of soft skills as a blend of interpersonal skills and career attributes, this study adopts a perspective that aligns soft skills with the meta-cognitive, social, and emotional competencies outlined in the OECD Future of Education and Skills 2030 framework (OECD, 2019). Interpersonal skills, referred to as social competences, are described as the capability to establish and maintain professional relationships, as well as the ability to collaborate effectively and foster a cooperative team environment (Scoupe et al., 2023). In the development of these social competences, communication skills are essential as they represent an individual's verbal and written communication skills, including their capacity to express their thoughts and opinions to a diverse range of stakeholders (Scoupe et al., 2023). Similarly, concerning career attributes, efficacy beliefs are occasionally described as the confidence individuals have in their capability to perform tasks within their specific field or discipline (Scoupe et al., 2023). Skills related to career attributes include flexibility, which involves both active and passive adaptation to change (Van Der Heijde and Van Der Heijden (2006); Scoupe et al., 2023). Additionally, lifelong learning is defined as the ability to secure future employment, develop professionalism, and contribute to job satisfaction (Dacre Pool and Sewell (2007); Scoupe et al., 2023).

Therefore, the primary aim of the present study is to examine the impact of DHE programmes and non-curricular work experiences on five key soft skills: social competencies, communication skills, flexibility, efficacy beliefs, and lifelong learning. By comparing these effects across two distinct master's programmes, we aim to provide insights into how gender and different academic disciplines may influence soft skill development outcomes. Through this investigation, we seek to enhance our understanding of how different forms of work experience contribute to developing the soft skills increasingly demanded in today's complex and diverse workplace environments (OECD, 2019; Santos, 2020), ultimately informing more effective higher education strategies for preparing students to meet contemporary workplace and societal challenges.

2 Methodology

2.1 Participants

The study sample comprises 96 students enrolled in two Master's degree programmes: one in Educational Sciences and the other in Business. Both programmes are offered at the same university in the Basque Country, in northern Spain.

Table 1. Demographic characteristics of the participants

Master's	*Total students*		*Female*		*Male*		*Non-binary*		*Prefer not to answer*	
Education	45		29	64.4%	14	31.1%	1	2.2%	1	2.2%
Business	51		34	66.6%	17	33.3%	0		0	
Age range	*20-25*		*26-30*		*31-40*		*41-50*		*50+*	
Education	13	28.9%	15	33.3%	5	11.1%	11	24.4%	1	2.2%
Business	44	86.3%	5	9.8%	2	3.9%	0		0	

2.2 Instruments

This study examined five soft skills - social competencies, communication skills, flexibility, efficacy beliefs, and lifelong learning - using the SECQ Questionnaire (Scoupe et al., 2023). The instrument employed a 5-point Likert-type scale ranging from 1 ("Completely disagree") to 5 ("Completely agree") across all dimensions.

The Social Competencies dimension comprised six items, including "I can operate within and contribute to a respectful, supportive, and cooperative group climate." The Efficacy Beliefs construct consisted of eight items, such as "I know what is required of me to successfully obtain the type of work I want to do" and "I feel confident and ready to start working." Flexibility was assessed through four items, exemplified by "In my field of expertise, I consider myself competent to add value by embracing new ideas and demonstrating creativity in addressing challenges and problems." The Lifelong Learning dimension incorporated six items, including "The academic tasks motivate me to put in a substantial amount of effort" and "I am focused on continuously developing myself." Finally, Oral and Written Communication skills were measured using five items, such as "I clearly express my thoughts and opinions in writing" and "I have strong oral communication skills." Reliability analysis revealed an internal consistency of a Cronbach's alpha of 0.63.

2.3 Procedure

Convenience sampling was employed to recruit participants who are students enrolled in the mentioned master's programmes for the 2024-2025 academic year, meaning that the study design is cross-sectional. Data was collected at the beginning of the academic year, between October and December 2024. The previously indicated skills, together with demographic questions, were presented in an online questionnaire. Participants were informed about the study's nature, with an emphasis on the fact that their participation was entirely voluntary and confidential. Prior to data collection, all students provided their electronic informed consent. The survey took approximately 10 minutes to complete. The study protocol was approved by the Ethics Committee for Research Involving Human Subjects of Mondragon University, approval number IEB-20240917.

2.4 Data analysis

We began the statistical analysis by performing descriptive statistics and correlation analysis for all variables. All variables showed adequate skewness and kurtosis values (skewness: range from –0.778 to 0.525; kurtosis: range from 0.227 to 1.307), which were considered acceptable for

normality. We followed by analysing the effects of previous and current dual programmes as well as the previous non-curricular work experiences in the aforementioned soft skills by conducting a MANOVA analysis. We also conducted ANOVA analyses on the statistically significant variables, along with post-hoc tests. All analyses were conducted using JAMOVI version 2.3.28.0.

3 Results

3.1 Analysis of variance

Even though there are no multivariate effects of previous or current dual experiences or work experiences on the combination of soft skills, there are some specific significant interaction effects. Univariate analysis shows that the interaction between previous dual experiences and current dual experiences have a significant effect (F = 5.225; p = 0.025) on efficacy beliefs. The combination of previous dual experiences and previous non-curricular work experiences also shows a significant effect on social competences (F = 5.115; p = 0.027) and lifelong learning (F = 4.123; p = 0.046). The analysis also shows that previous dual experiences have a significant effect (F = 4.503; p = 0.037) on flexibility. Lastly, current dual experiences and previous non-curricular work experiences also have a significant effect (F = 4.566; p = 0.036) on student communication skills.

Table 2. Analysis of variance of soft skills with significant interactions

ANOVA		*Sum of squares*	*df*	*F*	*p*	*η²p*
Efficacy beliefs	prev_DUAL	2,069	1	6,22	0,015 *	0.064
	pres_DUAL	0,826	1	2,48	0,119	0.026
	prev_DUAL ✻ pres_DUAL	1,270	1	3,82	0,054	0.040
	Residuals	27,946	84			
Communication	prev_JOB	0,461	1	1,19	0,279	0.015
	pres_DUAL	0,936	1	2,41	0,124	0.029
	prev_JOB ✻ pres_DUAL	1,922	1	4,95	0,029 *	0.058
	Residuals	31,046	80			

prev_DUAL	Independent variable assessing whether or not students have been enrolled in dual programmes in previous academic years.
pres_DUAL	Independent variable assessing whether or not students are enrolled in dual programmes in the academic year the survey was sent.
prev_JOB	Independent variable considering whether or not students have had non-curricular work experiences in previous academic years.
Master's	Independent variable considering the master's degree programme, education or business, students are enrolled in.

After analysing the dependent variables in independent ANOVA tests (Table 2), we found that previous dual experiences have a significant effect on efficacy beliefs with a medium effect size (F = 6.22; p = 0.015; η^2p = 0.064); nevertheless, the combined effect of current and previous dual experiences was not statistically significant. Moreover, post-hoc comparisons show a negative effect of the previous dual experiences on efficacy beliefs (*Mean diff* = –0.413; p = 0.015, d = –0.747). When also considering the master's programme as an independent variable, the analysis demonstrates a significant relationship between efficacy beliefs and both current dual programmes and master's programmes, but no significant relationship with previous dual experiences. Post-hoc comparisons show a significant differences between participants with and without current dual experiences (*Mean diff* = 0.454; p = 0.025, d = 0.827), with participants with current dual experiences

reporting higher efficacy beliefs. Furthermore, the analysis also indicates that Education students score significantly higher than their Business counterparts (*Mean diff* = 0.468; *p* = 0.021, *d* = 0.852).

Table 3. Analysis of variance of soft skills with significant interactions with the masters considered

ANOVA		*Sum of squares*	*df*	*F*	*p*	*η²p*
Efficacy beliefs	prev_DUAL	0,529	1	1,756	0,189	0.021
	pres_DUAL	1,157	1	5,216	0,025 *	0.060
	Master's	1,670	1	5,539	0,021 *	0.064
	prev_DUAL ✻ pres_DUAL	0,156	1	0,519	0,473	0.006
	prev_DUAL ✻ Master's	0,276	1	0,914	0,342	0.011
	pres_DUAL ✻ Master's	0,031	1	0,103	0,749	0.001
	prev_DUAL ✻ pres_DUAL ✻ Master's	5.18e-4	1	0,002	0,967	0.000
	Residuals	24,414	81			
Communication	prev_JOB	0,662	1	1,745	0,191	0.023
	pres_DUAL	3.15e-4	1	8.30e-4	0,977	0.000
	Master's	1,704	1	4,488	0,037 *	0.056
	prev_JOB ✻ pres_DUAL	1,253	1	3,301	0,073	0.042
	prev_JOB ✻ Master's	5.83e-4	1	0,002	0,969	0.000
	pres_DUAL ✻ Master's	0,006	1	0,016	0,901	0.000
	prev_JOB ✻ pres_DUAL ✻ Master's	0,081	1	0,214	0,645	0.003
	Residuals	28,854	76			

The interaction between previous dual and working experiences also shows a significant interaction (F = 4.511; p = 0.036) on social competences; however, post-hoc comparisons show no significant interactions. Furthermore, when the master's programme is considered, the interaction between previous dual and working experiences on social competences shows no significant interaction. When analysing lifelong learning and previous dual and work experiences, as well as masters programmes, no significant interactions were observed. The analysis of neither previous dual experiences nor master's programme on flexibility revealed significant differences.

Lastly, the interaction between previous work experiences and current dual experiences also shows a significant interaction (F = 4.95; p = 0.029) effect on communication skills. Nevertheless, post-hoc comparisons show no significant difference. Furthermore, when master's programmes are also considered, data shows significant differences among master's programmes, with education students scoring higher than business students (Mean diff = 0.388; p = 0.037, d = 0.630), but no significant differences were found in previous work and current dual experiences.

4 Discussion

The aim of this study was to examine the influence of DHE programmes and non-curricular work experiences on five distinct soft skills. We observed a significant impact of DHE programmes on efficacy beliefs and flexibility. Additionally, there was a combined effect of DHE programmes and non-curricular work experiences on social competencies, communication, and lifelong learning. Nonetheless, our investigation revealed that the effects were intricate and multifaceted.

Our findings highlight a nuanced relationship between dual experiences, master programmes, and efficacy beliefs. The negative association between previous dual experiences and efficacy beliefs is an unexpected result. One possible explanation is that students who had prior exposure to

DHE programmes may have developed certain expectations that may not have been fully met by their current institution or programme. This mismatch could lead to a lowered confidence in their ability to manage academic and work-related tasks. This points to the potential role of institutional alignment with students' prior experiences and expectations. In contrast, students currently enrolled in DHE programmes did report significantly higher levels of efficacy beliefs, suggesting that the active engagement in these programmes may have a more immediate effect on students' self-perceptions. In this context, the articles of Cull et al. (2022) and Sambell et al. (2020) have also explored the relationship between DHE programmes and career-related efficacy beliefs (Urkia-Basterra et al., 2025). Although they do identify a positive impact of DHE programmes on career-related efficacy beliefs, the limitations of these studies include low response rates and sample sizes. Consequently, further research is needed to clarify the nature of these inconsistencies. Interestingly, non-curricular work experiences have not been found to be significant for efficacy beliefs.

The absence of statistical significance regarding social competences is worth noting, particularly since social skills are one of the most mentioned soft skills to be developed in DHE programmes (Urkia-Basterra et al., 2025). The lack of significance we found may stem from either the small sample size or the fact that the sample consists of master's students. When considering other research, in their analysis of various soft skills in DHE within a master's programme, Alves et al. (2017) identified critical and analytical thinking, problem-solving, and decision-making as particularly significant while not emphasising social skills. In a similar vein, Martín-Lara et al. (2019) found teamwork skills to be developed in their DHE programme but only after communication skills and adaptability. Nevertheless, Tuononen et al. (2024) found that students with work experience related to their study field scored higher in networking skills. Thus, further research is required to better understand the effectiveness of DHE programmes and non-curricular work experiences in developing social competences in master's students.

While we did not identify any statistically significant results concerning lifelong learning, we consider this an important finding that warrants further investigation, as previous research has shown that students who adopt a lifelong learning mindset tend to have greater confidence in their abilities and report a more fulfilling work experience (Drewery et al., 2020). Related to this, Fleming and Haigh (2017) did not find lifelong learning as being referred to in the intention of DHE programmes. The lack of significant interactions for lifelong learning and flexibility indicates that these attributes may be influenced by other factors, such as personal motivation rather than formal education or work experience alone. Alternatively, the absence of significant effects could also be due to ceiling effects, where participants already scored highly on these attributes, limiting the potential for measurable improvement. This suggests that greater emphasis should be placed on the importance of these skills, as well as on their integration into DHE programmes and curricula.

Although our findings indicate that non-curricular work experiences and current dual programmes have a significant interaction effect on communication skills, the absence of significant differences in the post-hoc test suggests that this effect is not straightforward. This finding contrasts other research that found communication skills to be the most developed skill in a master's degree DHE programme (Martín-Lara et al., 2019). Furthermore, the significant difference observed between students in Education and Business master's highlights their role in communication skill development. Moreover, the lack of significant effects from non-curricular work experiences and current dual programmes when master's programmes are considered may indicate that academic experiences have a stronger influence compared to work experiences regarding communication skills.

5 Limitations and further research

This study has a number of limitations worth acknowledging. The internal consistency, indicated by a Cronbach's alpha of 0.63, was below the commonly accepted 0.70. Given the exploratory nature of this study, this limitation is noted, and results should be interpreted cautiously. Thirdly, the relatively small sample size may have diminished statistical power and contributed to the lack of significance observed in some findings. Another limitation is the lack of information regarding the extent to which non-curricular work experiences are connected to students' fields of study. Moreover, we did not account for students' socio-economic status, which may provide crucial context for

interpreting the impact of work experiences, as the motivation behind engaging in such experiences may have implications on skill development and overall learning experiences. Finally, the cross-sectional nature of this study limits our ability to determine cause-and-effect relationships. A longitudinal approach would be better suited to distinguish between pre-existing differences among participants and actual changes resulting from their experiences.

Regarding further research, a larger sample could provide more robust conclusions, and a more reliable measurement, particularly in light of the relatively low internal consistency. Additionally, a longitudinal approach could provide further information about how DHE programmes and non-curricular work experiences contribute to long-term growth in soft skills. Understanding the connection between non-curricular work experiences and students' fields of study is also worth considering, as it could clarify whether these experiences reinforce academic learning or serve other purposes. Future studies should also consider students' socio-economic factors, assess whether they influence students' engagement in DHE programmes and non-curricular work experience, and better understand how these factors may influence soft skill development in these experiences. Finally, given that interactions between university and workplace tutors with students are essential for students' learning processes in DHE programmes (Winchester-Seeto et al., 2016), further research should consider assessing the nature of those interactions and their influence on the soft skills development of the students.

6 Conclusion

This study highlights the complex and nuanced effects of DHE programmes and non-curricular work experiences on the development of soft skills. While previous dual experiences were found to negatively affect students' efficacy beliefs, the significant positive impact of current dual experiences in master's students indicates that actively participating in structured learning and work environments may influence efficacy beliefs perceptions. Furthermore, the role of master's programmes in enhancing communication skills, along with the differences observed between Education and Business students, underscores the importance of fields and academic programmes on soft skills.

To enhance these outcomes, curriculum designers should consider embedding structured reflective practice sessions within DHE placements, helping students to critically engage with their experiences and better internalise soft skill development. Additionally, establishing stronger links between academic content and workplace tasks, offering targeted training in soft skills, and incorporating mentorship components could further support the development of students. Finally, providing opportunities for feedback from both academic and workplace supervisors may help students better understand and track their progress in these key areas. Overall, these findings imply that well-structured DHE programmes can create valuable learning opportunities that promote both professional and personal growth.

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ANALYSIS OF SOFT SKILLS IN DUAL HIGHER EDUCATION STUDENTS: PILOT VALIDATION

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Abstract

The main aim of this study was to develop and conduct a preliminary evaluation of an online questionnaire (N = 344) designed to assess ten soft skills. The instrument consisted of demographic questions, items measuring the perceived importance of soft skills in the workplace, and self-assessment items. The psychometric results indicated partly acceptable reliability (Cronbach's α = .79) and item consistency. Although several indicators met conventional thresholds, the overall model fit suggests that further refinement is required to strengthen construct validity. The findings show that students particularly value communication, time management, autonomy, adaptability, and stress tolerance. Self-assessment results indicate relatively high perceived competence in teamwork, communication, critical thinking, creativity, autonomy, adaptability, and stress tolerance, whereas slightly lower proficiency was reported for foreign language skills, presentation skills, and time management. These results are preliminary and exploratory, and additional validation is planned in future research.

1 Introduction

Dual Higher Education integrates academic learning with practical workplace training, emphasizing the development of both technical and soft skills to prepare students for real-world challenges. While technical knowledge is crucial, soft skills play an equally significant role in shaping well-rounded professionals. Special emphasis should be placed on soft skills at universities as there seems to be a gap between the employers' expectations and the university graduates' skills (Varga & Sági, 2024). Companies need employees who can solve problems quickly and creatively (Dragan & Hochrinner, 2024; Dupouy & Bakni, 2024; Halista-Telus, 2023; Laukkanen et al., 2024; Merlo et al., 2023; Montalto & Agius, 2023; Sági & Fülöp, 2024; Turk, 2023; Viklund & Elgundi, 2024).

Soft skills offer a lot of benefits. They contribute to career advancement since strong communication, leadership, and teamwork skills increase job opportunities, promotions and support better working relationships. Effective communication and empathy enhance customer satisfaction and brand reputation. Employees with strong collaboration skills contribute to a more productive and harmonious workplace. Therefore, employers benefit from the workers' advanced soft skills. Good interpersonal skills create a positive work environment, reducing stress and burnout. In addition, good interpersonal skills encourage cooperation, and promote social harmony (Chamorro-Premuzic et al., 2010).

Problem-solving and creativity help individuals navigate career changes and challenges, and they lead to higher efficiency (Doherty & Stephens, 2023). Interpersonal skills and empathy help build meaningful personal and professional relationships since they increase adaptability. Leaders

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with advanced social and conflict resolution skills drive teams toward success. A society with skilled professionals fosters economic growth and innovation. Empathy and integrity in leadership contribute to fair policies and sustainable development. Soft skills play a crucial role in shaping a more efficient, connected, and prosperous world (Goleman, 2008).

1.1 Definition of soft skills

The term soft skills entail a range of non-technical skills that relate to how individuals work and interact with others. Soft skills have different names in literature e. g., 21st century skills, transversal skills, future workplace skills (Cimatti, 2016). Emotional intelligence and soft skills are also commonly employed concepts (Ricchiardi & Emanuel, 2018). Bandura's social learning theory emphasizes the importance of observational learning where individuals acquire knowledge, skills, attitudes, and beliefs by watching the actions of others and the outcomes of those actions, ultimately leading to the modelling and internalization of those observed patterns (Bandura, 1986).

There are different definitions of soft skills in literature. Soft skills are non-technical interpersonal and behavioural skills that enable individuals to communicate, collaborate, and adapt effectively in different environments. The workplace-oriented definition emphasizes the personal attributes and social abilities that help employees interact productively with colleagues, customers, and management, such as teamwork, communication, and problem-solving (Cimatti, 2016). The psychological definition postulates that soft skills are cognitive and emotional intelligence-based abilities that influence how individuals perceive, respond to, and engage with others in various social and professional settings (Stankevičiūtė et al., 2024). From an educational perspective soft skills are transferable skills that go beyond academic knowledge, including leadership, adaptability, and critical thinking, essential for lifelong learning and career success (Marin-Zapata et al., 2022). In the field of business and management soft skills are crucial human-centred competencies that drive workplace efficiency, leadership, and organizational success by fostering collaboration, innovation, and positive company culture. In sociology, soft skills are social behaviours and communication techniques that facilitate cooperation, conflict resolution, and relationship-building within communities and organizations. Soft skills are related to personal development. They encompass self-management, emotional intelligence, and interpersonal skills that contribute to an individual's personal growth, confidence, and ability to navigate life challenges (Sokhanvar et al., 2021).

Models of soft skills identify several soft skills. The Big Five Personality Traits Model (OCEAN Model) categorizes personality traits that influence soft skills development: openness (creativity, adaptability, and curiosity), conscientiousness (organization, reliability, self-discipline), extraversion (social interaction, teamwork, and leadership), agreeableness (empathy, cooperation, and conflict resolution), and emotional stability including stress management and resilience (De Raad, 2000). The Big Five is a personality model, it describes tendencies not teachable competencies. Also, it lacks specificity, for example, agreeableness might imply communication, but necessarily conflict resolution or presentation skills.

The Emotional Intelligence (EQ) Model affects personal and professional success. It consists of self-awareness that is understanding one's emotions, self-regulation that is controlling impulses and emotions, motivation, inner drive to achieve goals, empathy which means understanding others' emotions and social skills which promote effective communication and conflict resolution (Goleman, 2008). Emotional intelligence model is often criticised for conceptual ambiguity. There is no single, universally accepted definition. Also, there are measurement issues since self-report tools are prone to social desirability. EI often overlaps with personality, empathy, or even general intelligence.

Soft Skills Competency Models focus on workplace requirements. This model concentrates on interpersonal skills, decision-making, analytical skills, adaptability, resilience, work ethic and professionalism. The competency model plays a key role in closing skill gaps between employers' expectations and employees' skills by aligning workforce capabilities with organizational objectives; therefore, it contributes to shaping a sustainable society (Sá & Serpa, 2022). One of the weaknesses of the model is the lack of conceptual clarity. Additionally, the concepts included in the model are difficult to measure objectively.

Interestingly, the soft skills included in the top skills forecast for 2025 of The World Economic Forum highlight different skills from the above-mentioned ones: analytical thinking and innovation,

active learning and learning strategies, complex problem-solving, critical thinking and analysis, creativity, originality and initiative as well as leadership and social influence, technology use, monitoring and control, technology design and programming, resilience, and tress tolerance (Vera Millalén, 2023). A substantial number of soft skills are included in the model, but there is a conceptual ambiguity that makes the assessment difficult since the dimensions defined loosely.

1.2 Methods for assessing soft skills

Measuring soft skills can be challenging due to their subjective and intangible nature. To address this, both quantitative and qualitative methods have been developed to evaluate these skills systematically. Quantitative methods focus on numerical data and statistical analysis to assess soft skills. These methods provide standardized and objective measurements (surveys and questionnaires), making them suitable for large-scale assessments and comparisons (Ricchiardi & Emanuel, 2018). Quantitative methods also involve structured tests, such as problem-solving exercises or role-playing scenarios which can be used to test a conflict resolution. In addition, digital tools, online tests, questionnaires, and artificial intelligence might be applied to analyse communication patterns, body language, and voice tone (Emanuel et al., 2021). These tools provide quantitative metrics on factors like emotional intelligence or adaptability during interviews or interactions. Quantitative methods are suitable for extensive applications. However, they may oversimplify complex behaviours, they often rely on self-reported data, which can introduce bias, moreover, they lack context and depth in understanding individual behaviours.

On the other hand, qualitative methods emphasize understanding the context, experiences, and behaviours that underpin soft skills. These methods incorporate structured or semi-structured interviews, observations, case studies, portfolios and focus groups, which enable evaluators to explore an individual's experiences and behaviours (Chiu, 2024).

1.3 Challenges in the assessment of soft skills

Assessing soft skills in higher education presents significant challenges due to their subjective and context-dependent nature. Unlike technical skills, which can be measured through exams and practical tasks, soft skills require different assessment approaches. One of the primary challenges in assessing soft skills is their subjective nature. Unlike technical competencies, soft skills such as communication, leadership, and adaptability lack clear-cut measurement criteria. Standardized assessments that effectively capture that these skills are still evolving (Ponmalar et al., 2018).

Soft skills involve qualitative attributes that are challenging to quantify. Soft skills are often situation-dependent, meaning their effectiveness varies based on the context. A student might demonstrate excellent teamwork in one setting but struggle in another. This variability complicates assessment, as performance in one scenario does not always translate to overall proficiency.

Assessing soft skills requires more time and effort compared to traditional exams. Role-playing exercises, case studies, and feedback-driven assessments demand extensive observation and analysis, which can strain faculty resources (Cimatti, 2016). Many institutions struggle to implement comprehensive soft skill assessments due to these constraints. Students often perceive soft skill assessments as subjective and less important than technical evaluations. Additionally, educators may lack training in assessing these skills effectively, leading to inconsistencies in implementation. Overcoming this resistance is essential for integrating soft skill assessments into higher education effectively.

1.4 Roles of soft skills in different learning and working environments

Effective communication is essential for students in dual higher education as they navigate both academic and workplace environments. Strong verbal and written communication ensure clarity in expressing ideas, collaborating with peers, and interacting with supervisors. Presentation skills and foreign language skills also promote fulfilling the employees' career goals. Additionally, active

listening helps students understand instructions and feedback, improving overall performance (Iksan et al., 2012).

Teamwork is a fundamental soft skill in dual education, as students often work in groups during academic projects and within professional teams at the workplace (Prada et al., 2022). Learning to collaborate effectively, respect diverse opinions, and contribute meaningfully to group tasks foster a cooperative work ethic that is essential for career success (Kónyi et al., 2023).

Balancing academic coursework with workplace responsibilities requires adaptability. Students must adjust to different environments, work under various management styles, and respond to new challenges quickly. Flexibility in handling unexpected changes or shifting priorities ensures they remain efficient and productive (Emanuel et al., 2021). Autonomy is a crucial skill at workplaces. Having autonomy means being able to work independently, make decisions, and take responsibility for tasks without constant supervision. It boosts productivity, employees who manage their own time and tasks efficiently get more done. Autonomy increases job satisfaction. People feel more engaged and motivated when they have control over their work (Caeiro-Rodríguez et al., 2021).

Managing time effectively is crucial in dual higher education since students juggle multiple responsibilities. Prioritizing tasks, meeting deadlines, and maintaining an organized schedule help prevent burnout and improve efficiency. Developing these skills early on prepares students for future professional challenges where time management is a key factor in productivity.

Students in dual education programs encounter real-world problems that require critical thinking and problem-solving skills. Analysing situations, evaluating practical solutions, and making informed decisions contribute to their ability to handle workplace challenges effectively. These skills also enhance their ability to innovate and improve processes in their professional roles (Guzm et al., 2023).

Creativity in the workplace is not just about artistic skills; it is about thinking outside the box, solving problems, and producing innovative ideas. Creative employees contribute to innovative ideas, products, and processes that improve efficiency and competitiveness. Creativity helps with problem-solving. Thinking creatively allows employees to tackle challenges in a unique way (Sá & Serpa, 2022).

Understanding and managing emotions, as well as recognizing the emotions of others, are essential for maintaining healthy professional relationships. Emotional intelligence helps students navigate workplace dynamics, resolve conflicts, and build strong interpersonal connections, contributing to a positive and productive work environment (Marin-Zapata et al., 2022).

The existing literature suggests that most available tools are tailored to specific learning environments and typically do not assess both perceived importance and self-assessment at the same time. For this reason, we decided to develop a new instrument tailored to dual higher education.

2 Methodology

2.1 Objectives

The primary aim of this study is to create and conduct a preliminary evaluation of an online instrument to assess various aspects of soft skills in dual higher education. Our research questions are related to the instrument, the structure, and dimensions of soft skills.

1. What do the psychometric properties of the questionnaire reveal about the internal consistency reliability and construct validity of the instrument?
2. What relationships and patterns appear related to the importance and self-evaluation of soft skills in the examined sample?

H1: We hypothesize that dual students, as well as those engaged in permanent employment, will attribute greater importance to soft skills and report higher levels of self-perceived competence compared to their non-dual peers.

H2: We hypothesize that students in higher semesters will assign greater importance to soft skills and report higher levels of self-assessed soft skill competence.

2.2 Participants

344 full time students answered the questions: male (N=223), female (N=121). The number of students from different faculties were the following: GAMF Faculty of Engineering and Information Technology (N=206), Faculty of Economics and Business (N=118), Faculty of Horticulture and Rural Development (N=20). Number of dual students (N=58), non-dual students (N=286), students who have a permanent workplace (N=112), students who do not have a permanent workplace (N=232). The respondents were 18–19 (N=58), 20–21(N=193), 22–23 (N=56), 24–25 (N=23), 26 and over (N=14) years of age. Division of students according to semesters: 1st (N=3), 2nd (N=152), 4th, (N=101), 5th (N=1), 6th (N=64) 7th (N=1), 8th (N=12) 9th (N=1) 10th (N=9). We only analysed the data of the 2nd, 4th, and 6th because in other semesters we only had a small number of responses.

2.3 The instrument and the procedures

Microsoft Forms online platform was used to design the questionnaire. The survey was anonymous, and voluntary. Part 1—general questions: We asked the students about their gender, age, the faculty they study at, which semester they spend at the university, whether they are dual students or not, whether they have a permanent workplace or not. Part 2—The respondents indicated how important soft skills are at the workplace. A 6–point Likert scale was employed: 1: not important—6: very important. Ten dimensions of soft skills were selected: teamwork, communication, time management, foreign language skills, presentation skills, creativity, critical thinking, stress tolerance, autonomy, and adaptability (Alt et al., 2023; Escolà-Gascón & Gallifa, 2022).

Part 3—The students were asked to indicate their perception of their level of the skills in each area using the 6–point Likert scale. The students had to evaluate themselves on the following scale: How true are the following statements for you: it is never true (1)—it is always true (6).

The instrument was constructed based on the literature (Table 1). We applied the following models: The Big Five (De Raad, 2000), Emotional Intelligence (EI) (Goleman, 2008), Soft Skills competency Model (Sá & Serpa, 2022), World Economic Forum (Vera Millalén, 2023), WEF, The Future of Jobs Report, 2020, 2025.

Table 1. Models related to the items of the questionnaire

	Big Five	EI	Soft skills competency model	Future of Jobs 2020	Future of Jobs Report 2025
teamwork	agreeableness	social skills	teamwork		cooperation
communication	extraversion	social skills	communication		sociability
time management		self-regulation	time management	self-management	dependability and attention to detail
foreign language skills		social skills	intercultural competence	multilingualism	multilingualism
presentation skills	agreeableness	self-regulation, social skills	public speaking		communication
creativity	openness	self-awareness, motivation	problem solving	creativity, initiative	creativity
critical thinking			analytical thinking	critical thinking	critical thinking
stress tolerance	emotional stability	self-regulation		stress tolerance	
autonomy		self-management	self-direction	self-direction	
adaptability	openness	emotional self-regulation	flexibility	resilience	resilience

The questionnaire consisted of thirty questions. In Part 2, we enquired about the importance of the given soft skill, the questions had the same item stem, for example, “How important is teamwork at the workplace?” In order to avoid social desirability bias we used general questions. In Part

3 we asked students to evaluate themselves in different soft skills. We did not use the same item stem. every question was different. See the examples in Table 2.

Table 2. Examples for self-evaluation questions

dimension	examples
presentation skills	1. I can draw up presentations on complex technical topics and present them without having to read the text. 2. Giving presentations on complex technical topics is challenging for me.
critical thinking	1. I never doubt the correctness of the information I got from my teachers and employers. 2. I recognise the biases in my thinking, and I try to mitigate their effects.
creativity	1. I often find novel solutions to problems which others could not see/find. 2. The tasks requiring creativity are challenging for me.
time management	1. I can effectively manage my time which helps me complete my tasks in my studies. 2. It often happens that I postpone my assignments to the last minute.

Participants responded to the questionnaire voluntarily and under conditions of anonymity. By ensuring the anonymity, we attempted to counterbalance students' anxiety while answering the questions, it was also aimed to avoid social desirability bias. The sampling method used was convenience sampling. The decision to employ this sampling method was driven by practical limitations, particularly time constraints.

3 Results & Discussion

3.1 General analysis

The psychometric properties of the questionnaire show an acceptable reliability: Cronbach's Alpha: 0.79. The internal consistency of the subscales was assessed using McDonald's Omega (ω) (Table 3). The reliability coefficients showed substantial variation across the dimensions (ω = .30–.75). The communication subscale demonstrated acceptable reliability (ω = .75), while autonomy showed a borderline acceptable value (ω = .64).

Table 3. Reliability of the subscales

Dimensions	1	2	3	4	5	6	7	8	9	10
McDonald's ω	0.31	0.75	0.43	0.46	0.35	0.43	0.42	0.40	0.64	0.30

note: 1: teamwork, 2: communication, 3: time management, 4: foreign language skills, 5: presentation skills, 6: creativity, 7: critical thinking, 8: stress tolerance, 9: autonomy, 10: adaptability

In contrast, the remaining subscales yielded low omega coefficients (ω < .60), suggesting limited internal consistency for those dimensions. These results indicate that, although one dimension can be considered reliable and one shows potential, the majority of the subscales require further refinement to improve measurement precision.

The validity analysis was conducted on AMOS 26 software. The results are the following: χ2=1298,23. this number is influenced by the sample size. CMIN=3.65 which is good because it should be less than 5, GFI= .758, RMSEA= 0.088. The reliability and validity assessments produced mixed outcomes: while internal consistency coefficients and selected validity indicators were satisfactory, several factors did not achieve ideal statistical performance. Accordingly, the study calibrated validity claims to the actual CFA fit, emphasizing that although the measurement model shows preliminary empirical support, its construct representation requires further refinement.

Correlation analyses were conducted using the ten subscales. Due to the low internal consistency of several dimensions, the results should be interpreted with caution. Despite this limitation, the analyses reveal meaningful patterns that provide preliminary insights into the relationships between the investigated constructs.

Pearson's correlation results indicate that the questionnaire has a strong internal consistency, and significant positive weak and moderate positive correlations at the 0.01 level were found among the items of the questionnaire except the correlation between time management and foreign language skills (r=.12 p<.05) level.

Correlations among interpersonal skills (teamwork, communication, foreign language skills and presentation skills) show significant positive relationships at .01 and .05 level (Table 4). Teamwork shows weak but positive correlations with all the other constructs. These findings may indicate that the instrument captures teamwork as a separate intrapersonal or behavioural domain, not just a byproduct of communication skills. The other three skills (communication, presentation, foreign language) form a moderate to strong cluster, whereas teamwork sits slightly outside that cluster. This implies good discriminant validity—the instrument does not artificially inflate relationships between different soft skills.

Table 4. Correlations among interpersonal skills

	teamwork	communication	foreign language	presentation
teamwork	1			
communication	,154**	1		
foreign language	,123*	,288**	1	
presentation	,133*	,341**	,301**	1

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed).

We investigated correlations among intrapersonal skills. The examination showed significant positive relationships among the variables (critical thinking, creativity, time management, autonomy, adaptability, and stress tolerance (Table 5). The moderate to strong positive correlations between related intrapersonal skills (e.g. adaptability, stress tolerance, autonomy, creativity) suggest that the tool successfully measures related constructs that are expected to be associated. The weaker, though still significant, correlations of critical thinking with other intrapersonal skills (e.g. time management, autonomy) show that the tool can differentiate between constructs that are related but not identical (construct validity). The correlations are not too high, which avoids redundancy or multicollinearity—another sign that the instrument is not measuring just one general soft skill, but a range of related but distinct abilities.

Table 5. Correlations among Intrapersonal skills

variables	critical	creativity	time management	autonomy	adaptability	stress
critical thinking	1					
creativity	,263**	1				
time management	,146**	,188**	1			
autonomy	,175**	,339**	,261**	1		
adaptability	,221**	,399**	,217**	,384**	1	
stress tolerance	,174**	,304**	,286**	,330**	,437**	1

** Correlation is significant at the 0.01 level (2-tailed)

Although the reliability of some subscales was limited, the group comparison results were retained to explore potential trends. Table 6 provides the following patterns: students value soft skills more than they feel competent in them. These findings support the need for targeted soft skills development, especially in communication, time management, and stress tolerance. The instrument seems effective in capturing both subjective importance and self-perceived competence.

Table 6. Importance of soft skills and self-evaluation

M/SD	1	2	3	4	5	6	7	8	9	10
importance	4.79	5.31	4.36	4.67	4.58	4.19	5.06	5.12	5.00	5.07
	.99	.87	1.18	1.11	1.36	1.16	.91	.95	.98	1.08
self-evaluation	4.28	4.14	3.87	4.25	4.49	4.05	3.91	4.31	4.27	4.24
	0.96	0.91	1.01	0.94	0.93	1.14	1.18	0.93	0.85	1.02

note:1. teamwork, 2. communication, 3. foreign language skills, 4. critical thinking, 5. creativity, 6. presentation skills, 7. time management, 8. autonomy, 9 adaptability 10. stress tolerance

The analysis of the whole sample indicates that students place primary importance on five subskills: communication (5.31), time management (5.06), autonomy (5.12), adaptability (5.00) and stress tolerance (5.07). Our research might suggest that the students rated themselves highest in creativity (4.49) and autonomy (4.31), the lowest in foreign language skills (3.87), and time management (3.91).

3.2 Soft skills through a gender lens

In general, female students consider all soft skills to be more important than male students. Both male and female students give a high priority to communication skills, time management and autonomy. Female students find stress tolerance (5.31) particularly important, for male students it was less important (4.94). We see the same tendency in adaptability: female (5.12), male (4.94) (Table 7).

Table 7. Gender differences in the importance of soft skills

Variables	*Men*		*Women*		*t (342)*	*p*
	M	*SD*	*M*	*SD*		
teamwork	4.82	.94	4.73	1.06	.838	.403
communication	5.26	.86	5.40	.87	-1.53	.127
time management	5.02	.97	5.14	.79	-1.19	.235
foreign language skills	4.38	1.18	4.33	1.186	.38	.704
presentation skills	4.16	1.18	4.24	1.126	-.59	.552
creativity	4.75	1.21	4.26	1.573	3.26	.001*
critical thinking	4.83	1.03	4.37	1.184	3.75	.000*
stress tolerance	4.94	1.12	5.31	.956	-3.03	.003 *
autonomy	4.97	.98	5.38	.829	-3.88	.000*
adaptability	4,94	1,00	5,12	,936	-1,68	,092

note: * p<0.05 level

The self-evaluation showed female students rate themselves lower than male students in foreign language skills (3.59), presentation skills (3.79) and stress tolerance (4.08). A significant difference has been found between female and male students' self-evaluation in foreign language skills and presentation skills. Female students evaluate themselves higher than male students in teamwork (4.34) (Prada et al., 2022), creativity (4.67), time management (4.23) and autonomy (4.41). A significant difference has been found between male and female students in time management at 0.05 level. All genders evaluated themselves on the same level in communication, critical thinking, and adaptability.

3.3 Students in different faculties

Students studying at different faculties prioritized the same skills as the whole sample shows except creativity which students of Economics Faculty and Business (3.93) regarded to be less important than the students of the other two faculties (4.91,4.95); significant differences were found at 0.05 level among the students of the Faculty of Economics and the other two faculties regarding the importance of creativity.

The self-evaluation shows that students studying at different faculties gave similar self-evaluation in all soft skills. However, there are a few differences. The students of the Faculty of Economics and Business and the Faculty of Horticulture and Rural Development think that their strength is creativity (4.60, 4.95); however, they assume that it is not really important at future workplaces (3.93). The students of the Faculty of Engineering rated themselves between 4.14 and 4.40 in all skills except foreign languages (3.96), and time management skill (3.79) in which similarly to the students of the other two faculties, they confessed that foreign language skills, presentation skills and time management skills are their weaknesses, therefore, these skills should be improved. The students studying the Faculty of Economics and Business evaluated themselves similarly in all skills (4.14-4.60) except in foreign languages (3.73), presentation skills (3.78). Students of Faculty of Horticulture and Rural Development evaluated themselves above 4.00 (4.03- 4.95) in seven soft skills. The lowest values appear in three skills: communication (3.82), foreign language skills (3.78), and presentation skills (3.88).

3.4 Students' self-evaluation studying in different semesters and different age groups

Students studying in their sixth semester value teamwork, communication skills, foreign language skills, time management, and critical thinking higher than students studying in the 2nd and 4th semester. Regarding self-evaluation, students show a slight improvement in the following skills: critical thinking, presentation skills, autonomy, adaptability. However, there is no increase in the following fields: teamwork, communication, creativity, foreign language skills, time management, stress tolerance.

All soft skills tend to be more important for older adults. The self-evaluation shows that the students improved their skills in teamwork, communication, critical thinking, creativity, time management, autonomy, adaptability, and stress management. Unfortunately, foreign language skills and presentation skills do not show differences in the examined age groups.

3.5 Dual and cooperative learning

Dual students put greater importance on certain soft skills than non-dual students especially on teamwork, communication, time management, presentation skills, and autonomy. There is no difference between the two groups related to foreign language skills and critical thinking. The non-dual students regard creativity, stress tolerance and adaptability higher than dual students. Dual students evaluate their competences higher than non-dual students in six soft skills: communication, critical thinking, time management, presentation skills, adaptability, and stress tolerance (Figure 1).

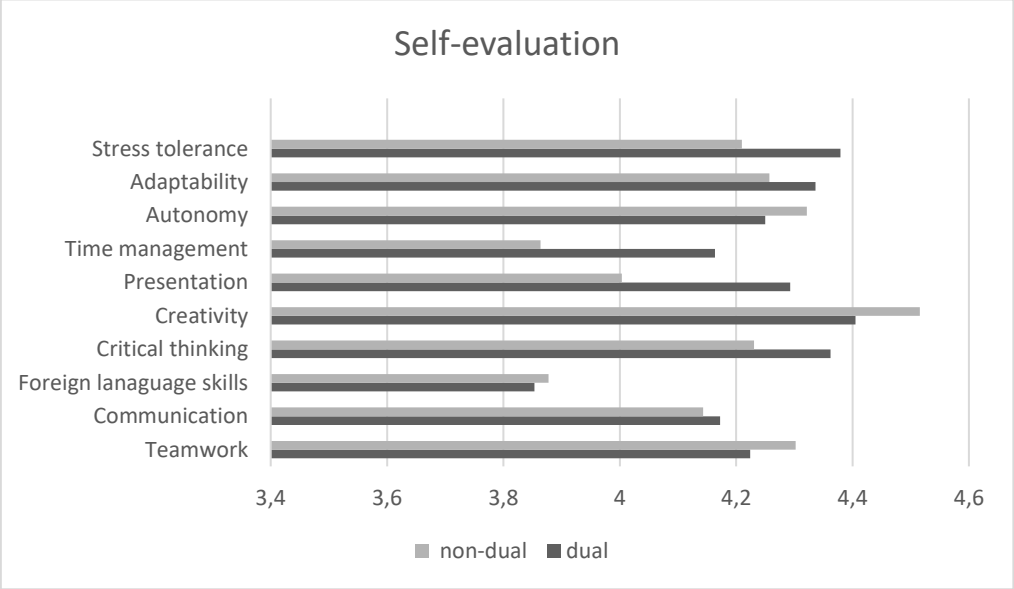

Figure 1. Self-evaluation of dual and non - dual students on soft skills.

The students who have a permanent workplace attached slightly higher importance to communication, foreign language skills autonomy, and adaptability. Also, they evaluated themselves slightly higher than the students who do not have work experience in all soft skills except foreign language skills.

The T test shows that students who had work experience rated themselves higher in several skills. We found significant differences between students with work experience (M=4.68, SD=.74) and without work experience (M=4.41, SD=1.00) in creativity: t (342) =2.52, p=.01. In presentation skills, we also found a difference between students with work experience (M=4.26, SD=1.94), and without work experience (M=3.95, SD=1.10) t (342) =2.34, p=.02. Concerning autonomy, students with work experience (M=4.47, SD=.84), and students without work experience (M=4.23, SD=.97) showed significant differences: t (342) =2.21, p=.02. Similar tendency is observed in adaptability between students with work experience (M=4.47, SD=.79), without work experience (M=4.17, SD=.87), t (342) =3.10, p=.002.

4 Conclusions

The primary objective of this study was to create and an online questionnaire for assessing ten soft skills. This instrument is aimed to fill a research gap since previous instruments do not assess the perceived importance and self-assessment of soft skills at the same time. We carried out a preliminary evaluation of our online instrument to assess various aspects of soft skills in dual higher education. Our research questions referred to the instrument, its structure, and dimensions of soft skills. Based on the research literature, ten dimensions of soft skills were selected: interpersonal skills such as teamwork, communication, foreign language skills, presentation skills, and intrapersonal skills such as time management, creativity, critical thinking, stress tolerance, autonomy, and adaptability. We asked the students about how important these soft skills are at the workplace, and to assess themselves in each area using the 6–point Likert scale.

Based on our analyses the answers to the research question 1 are as follows: the psychometric properties indicate a partly acceptable reliability (Cronbach-α: 0.79). The validity tests partly show partly acceptable results, but $\chi 2$ value, needs to be improved, by increasing the sample size. CMIN is acceptable 3.65 it should be <5 and RMSEA also needs to be improved (0.08) The current measurement model exhibited partial construct validity, with several fit indices meeting, but not consistently exceeding, established standards. A limitation of the present study is the low internal consistency of several subscales. As a result, the findings should be interpreted with caution, particularly for subscales with $\omega < .60$. Nevertheless, because the study is exploratory and represents an early phase of instrument validation, the analyses were retained to identify preliminary trends. These findings indicate that although the model offers a promising foundation for measuring the targeted constructs, re-specification or item revision may be required to improve its psychometric robustness.

The correlations analyses were conducted to investigate potential trends. Significant associations were found between skills that are theoretically expected to be related and weaker correlations among skills that are conceptually distinct. Overall, the tool effectively captures a diverse range of soft skills and mirrors the way these abilities are connected in real-life contexts.

Our study showed that the students attach immense importance to communication, time management, autonomy, adaptability, and stress tolerance, the students rate themselves higher in teamwork, communication critical thinking, creativity, autonomy, adaptability, and stress tolerance. However, they find themselves slightly weaker in foreign language skills, presentation skills, and time management.

Female students regard all soft skills more important than male students. Both male and female students give a high priority to communication skills, time management and autonomy. Foreign language skills, presentation skills, and stress tolerance are more challenging for female students than for male students. Male students are less skilful than female students in teamwork, creativity, time management and autonomy.

Regarding the research question 2 we have come to the following conclusions: It is anticipated that students participating in dual programmes and those with permanent employment will place increased importance on soft skills (teamwork, communication, time management, presentation

skills, and autonomy) than non-dual students. Also, students studying in dual and cooperative education evaluate their own proficiency levels more favourably than non-dual students in soft skills e.g., adaptability, communication, critical thinking, presentation skills, stress tolerance and time management (H1). These findings support the efficiency and success of the dual higher education model since dual students and students with work experience are more aware of the importance of soft skills and become more competent in most soft skills than the ones without work experience.

Some soft skills become slightly more important for students during university years (teamwork, communication skills, foreign language skills, time management, and critical thinking) and students improve in most soft skills (H2). Therefore, our second hypothesis is partly justified by our data. The fact that foreign language skills and presentation skills do not improve during university years implies that there is a need for intervention. These findings should be regarded as tentative and exploratory.

Further limitations of the research are the following: We could rely only on self-assessment which arises the issue of the potential social desirability bias. Therefore, the research should be complemented by peer, instructor, or employment assessments. The sample size, the sampling method and the contextual specificity also restrict the generalisability of our results.

Future research should expand or refine the item pools to improve internal consistency and measurement precision as well as longitudinal research, employer validation and cross-cultural comparisons.

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SKILLS OF GENERATION Z DUAL STUDENTS ENTERING THE WORKPLACE

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Abstract
This study presents the results of research, conducted in 2024 at a Hungarian university which offers dual training programs in four study fields. A salient issue currently affecting dual training programs is the inadequate mutual understanding of expectations and requirements between students and employers. The research conducted focused on elucidating these expectations and enhancing mutual knowledge.
The labour market exhibits the presence of representatives from multiple generational cohorts. Members of Generation Z (born after 1995), who are just before or at the beginning of their professional careers, have different competencies and abilities from those of previous generations. In the study, we show the Person-Job Fit model and which competencies students believe are important in companies, assessing the extent to which these perceptions align with actual company expectations.

1 Introduction

The Hungarian design of the dual higher education (so called Kecskemét model) was inspired in 2009 by the establishment of the Mercedes Benz company in Kecskemét. Since Sági and Fülöp (2024) recently described the Hungarian dual higher education; therefore, we will not go into the specific features of the Hungarian dual training here. Noteworthy research findings regarding the essential soft skills in the context of Industry 5.0 (Varga, 2024a) served as a reliable foundation for further exploration.

Thanks to the Eu4DUAL project, several studies have already been published regarding the spread of dual education or work-based education in Europe. Among them there are also papers presenting national characteristics (Dragan & Hochrinnen, 2024; Dupouy & Bakni, 2024; Halista-Telus, 2023; Laukkanen et al., 2024; Merlo et al., 2023; Varga, 2024b, 2024c; Varga & Sági 2024; Viklund & Elgundi, 2024)

In analysing the entry of Generation Z employees into the labour market, we employ the Person-Job Fit model as a theoretical framework to guide our investigation. Person-Job Fit, defined as the alignment between an individual's characteristics and the demands of a specific job, serves as a critical framework for understanding how employees' satisfaction, performance, and retention can be influenced by their compatibility with their roles. By framing our research questions within this lens, we can logically explore how various factors—such as skills, values, and personality traits—interact with job demands and environments. (Edwards, 1991, Juhász, 2006, Chhabra 2015)

1.1 The career capital of Generation Z

The need for factual knowledge is decreasing among both employees and employers, and at the same time, organizations are looking for and expecting a solid foundation of basic knowledge, skills, abilities, and competencies. According to Böhmer et al. (2020), career capital is the value of

skills and competencies created by the continuous improvement of the employee's career situation. The three basic elements of career capital (Böhmer et al. 2020):

- *Knowing-why:* identification with the world of work, understanding the meaning and significance of work, motivation and invested energy.
- *Knowing-how:* the implicit and explicit knowledge that the student/employee gathers regarding social and professional competencies during their professional career.
- *Knowing-whom:* networks, connections, information sources, reputation, which he/she builds during his/her career.

The authors also point out that the competence acquired in the dual training can be transposed and transferred to other workplaces, and through the network of relationships and individual development opportunities built up during the training, the student can also be tied to the company training place.

1.2 Person-Job Fit models

Person-Job Fit models appeared in the second half of the 20th century. Success, i.e. the real correspondence between the individual and the work, can be deduced from the degree of compatibility. A proven person can meet performance requirements in the long term, at a consistent level of performance, without harming their physical and mental health. The fact that someone can fill a given job does not mean suitability, and vice versa: it is not possible to deduce whether it will work out from the individual's suitability. Very importantly, aptitude is an indicator of a person's ability to meet the job criteria. "While career suitability means the potential correspondence between a person and a career, success shows a real correspondence." (Juhász, 2006)

The Person-Work Compliance Model developed by Edwards (1991) emphasizes the interaction between person and work. It defines person-to-work matching as a correspondence between a person's skills and job requirements, or a person's needs and job attributes. As Chhabra (2015) declares, it is a common recognition that person-work compliance has a huge impact on a person's behaviour and work performance.

However, we know that during workplace socialization, the "compatibility" of the new employee and his or her new workplace can improve by thoroughly getting to know and learning the norms and expectations of the workplace, perhaps with the help of a mentor or by participating in workplace trainings.

When examining the fit between person and work, work psychologists focus on the personal, social, interpersonal processes and the characteristics of the job because they can predict the effectiveness or ineffectiveness of the person and the organization, which can lead to a decrease in performance and dissatisfaction. If the person and the job are highly compatible, the employee is capable of good performance and is motivated. However, there are also factors (e.g. money or physical security) which affect the efficiency of work. (Juhász, 2006)

2 Methodology

A qualitative content analysis, desktop research was carried out, we utilized publicly accessible resources, online databases, and statistical data from database of John von Neumann University (Hungary/Kecskemét) according to the institutional ethical guidelines of the University.

Based on the above, we were looking for answers to the following research questions:

- Q1: What are the expectations of companies towards prospective dual students?
- Q2: Are dual students aware of the company's expectations?

We conducted a questionnaire survey with 16 questions for students and for companies related to the two research questions above. The survey measured the students' and the dual partners' attitude on a Likert scale. The choice of an eight-point scale without a neutral midpoint is justified on

the grounds that it encourages respondents to make definitive choices rather than falling back on a neutral or indecisive option. An eight-point scale can provide clearer distinctions between varying levels of agreement or satisfaction, thereby offering richer insights into respondents' attitudes or behaviours. We expected more meaningful data, as it compels participants to lean towards either end of the scale, which can enhance the granularity of response data. (Nowlis et al, 2002)

The questionnaires were created in Google form format, they were completed online, voluntarily and anonymously. The results were evaluated using the SPSS program.

In the dual student questionnaire (we use the letter D and a number to identify the questions), we were looking forward to feedback on the qualities, hard and soft skills expected at the time of selection processes by the company (DH9), and the written and oral competencies expected in the chosen profession (DH10-DH11).

In the dual partnership questionnaire (we use the letter C and a number to identify the questions), we expected an answer to the expectations towards dual students: components of written and oral communication, knowledge, soft skills, and other competencies (C9-C11).

2.1 Questionnaire for dual students

In September 2024 all 239 dual students of John von Neumann University (full-time, BSc) were invited to fill out the questionnaire. At JvNU, students can choose dual training in four fields of study: engineering, IT, agriculture and economics. Nearly 73% of the dual students answered the questions (see Table 1). We aggregated the data by field of study. The agricultural field was excluded from the analysis because of insufficient data, which raises concerns about power considerations and potential sampling bias. Consequently, the results from the technical, IT, and economic fields were assessed. The distribution of the answers by field of study is shown in Table 1.

Table 1. Distribution of NJE dual students by fields of study and % distribution of respondents.

Study field	*Number of Dual students*	*Responses*	*Responses received in % compared to the number of students*
Economics	65	52	80.00%
Engineering	155	113	70.29%
IT	12	9	75.00%
Agriculture	7	4	57.14%
Total	239	178	74.47%

The percentage data indicate the proportion of respondents per study field.

Source: own edit.

2.2 Questionnaire for companies employing JvNU dual students

At the time of the survey, John von Neumann University had 58 dual partners. Dual partners who have already employed or are currently employing dual students, i.e. have experience in selecting and integrating dual students, were invited to fill out the questionnaire.

In terms of the number of employees, the responding companies were classified into small, medium-sized and large enterprise categories (10-49 employees by small enterprises, 50-249 employees by medium-sized enterprises, large enterprises with more than 250 employees).
Table 2-3 shows the number of responding students and the distribution of them by field of study and by company size. Most dual students and most of the responding students (94.3%) work for large companies. Concerning the study programs, students in the field of technology work in the largest proportion by large companies.

Table 2. Distribution of NJE dual students and responding dual students by company size in %

Partner companies	*Number of dual students*	*Number of responding dual students*	*Distribution of responding duals students by company size*
small businesses	12	3	1,7%
medium-sized enterprise	11	7	4%
Large enterprise	216	164	94,3%
Total	239	174	100%

Source: own edit

Table 3. Distribution of respondents by field of training and company size based on the responses

	company size			*Total*
	small	*medium*	*large*	
Engineering	0	4	104	108
	0,0%	57,1%	65,4%	63,9%
IT	1	1	7	9
	33,3%	14,3%	4,4%	5,3%
Economics	2	2	48	52
	66,7%	28,6%	30,2%	30,8%
Total	3	7	159	169
	100,0%	100,0%	100,0%	100,0%

Source: own edit

3 Results

3.1 Expectations of companies towards prospective dual students (Q1)

When organizations recruit a new employee, in this case a dual student, they already have an idea of who the ideal candidate would be. The expectations towards dual students can be divided into two groups. One of them includes the characteristics that can be checked during the selection, and the other part refers to the case of use as a dual student.

During the selection process, depending on the complexity of the selection process, the company ascertains the applicant's academic progress, academic results, language skills, written and oral communication skills, working in a group, mathematical and physical problem-solving skills, and also gets an idea of the motivation, interests and future plans of the dual student.

Based on the answers to question C3 of the questionnaire, we can see that the ideal candidates are motivated to continuous learning, have an open mind and an outstanding desire to work, for whom personal development and the desire to learn are more important than the opportunity to earn money. The candidates are open-minded, interested in the company's activities, and can communicate in English and/or German. The ideal dual students do not measure the time spent on internships at the company in terms of money. They are agile, humble, eager to learn. They receive a high level of theoretical training; their knowledge is up to date. They have the appropriate professional foundations and are interested in how the knowledge gained there can be used in the industry. The ideal dual students are committed to the company and to their chosen profession, they perform the work entrusted to them responsibly, meet deadlines and have the right desire to innovate. When evaluating the answers to the questions (the C9, C10, C11, C14 about expectations related to general characteristics, personality traits, competencies), I also looked at the results by company size, as I assumed that in large companies, where there are more interested people and there is a larger selection to choose from, the expectations will be higher. I will discuss the differences below.

On the Likert scale, the company received an average score of around 7 or above on average, which means that good task and problem-solving skills (average 6.96) and a tendency to fit in and work in a group (7.21) were considered very important. In oral communication, the highest average scores were given to asking questions (7.04), reading comprehension (7.25), clarity (7.25), politeness (7.0) and sense of responsibility (6.96), while the most effective motivational tools used by dual students were the recognition of work (7.0), working conditions (6.96) and the possibility of progress

(7.08). Good task and problem-solving skills (7.2), reading comprehension (7.27) and clarity (7.4) are considered important by large companies above average, and overall, it can be stated that large companies have the highest, i.e. above-average, scores for all the above-mentioned expectations. At the same time, contrary to the expectation of reading comprehension, the average score for Hungarian secondary school results was only 4.17 points, with only good manual dexterity being less expected, with an average score of 4.04. In the expectations of large companies, high school final exam results in Hungarian language and Literature received the lowest average score (3.73), suggesting that they do not see a connection between the level of reading comprehension and other communication skills and Hungarian high school results. Good verbal expression (6.87), good drafting skills (6.87) and good speaking skills (6.6) are expected.

The average score was below 6 for the previous practical experience (for example from a summer job) (4.58). A good result in mathematics (5.25, 5.0 in large companies) is not expected, even though engineering, information technology and economics majors participated in the study. This low value can be explained by two reasons: on the one hand, only students with good grades in mathematics are invited after the pre-screening to the job interview, and on the other hand, it can probably refer to the low predictive ability of secondary school academic results in relation to workplace performance (like the Hungarian results). Good foreign language skills (5.38 on average) are the least expected in medium-sized companies (3.86), while the expectation is above average in large companies (6.13). Stress tolerance (5.58 on average) is not emphasized, dual students are probably not exposed to a great amount of stress, and the expectation of endurance and good endurance is also low (5.58 on average, 4.0 in small companies).

On average, dual students are less expected to look good (5.83), which is least expected by large companies (5.53) and more by small companies (6.5). In the case of large companies, uniform workwear ensures the expected appearance, so it is less important what the dual students wear when they arrive at the workplace, as they must wear the clothes provided by the company.

As an example, in Figure 1, we present the expectations profile for mechanical engineering students. The highest value was achieved by good problem-solving skills (6.778) and the ability to work in a group (6.778), followed by knowledge/practicality, the ability to formulate professional ambitions, and a good sense of practice. The Hungarian secondary school results weigh the least.

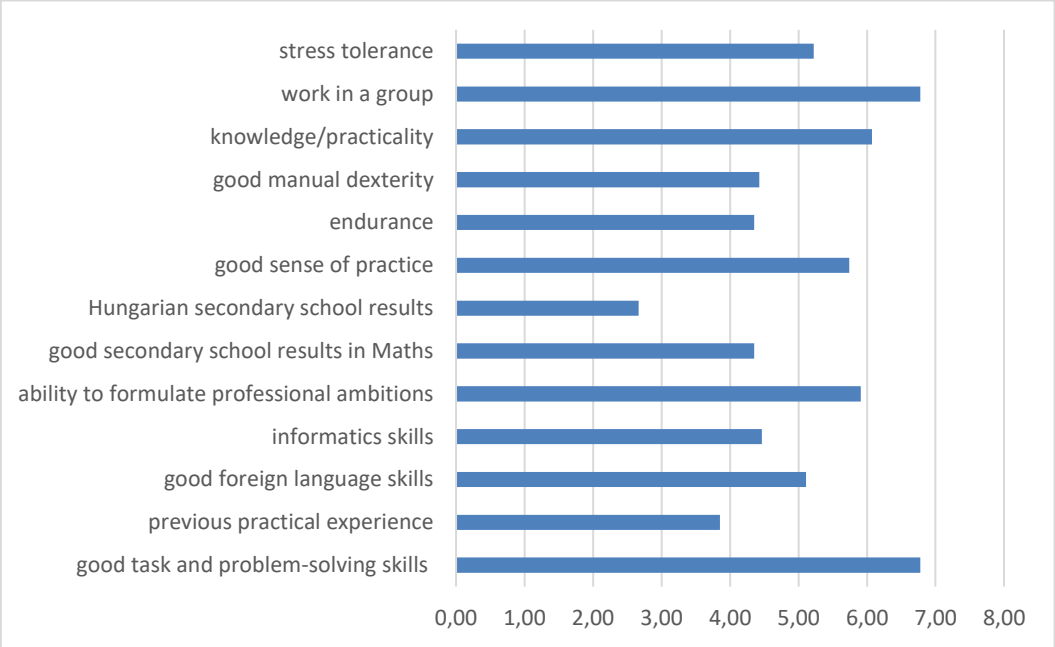

Figure 1. Importance of Competencies and Prior Experiences of Dual Students in Mechanical Engineering as Rated by Employers

3.2 Dual students' knowledge of the expectations placed on them (Q2)

Dual students had to answer the question of what qualities and skills are needed for the special field and profession they have chosen, and what companies expect. We summarized the results according to the three fields of training. In the field of technical training, we considered the responses of dual students of mechanical engineering, logistics engineering, vehicle engineering, IT engineering, and economics, business and marketing, finance and accounting, and international business. Since the number of respondents was exceptionally high in the technical field, the average values pull in this direction. I will mention the differences separately. Dual students believe that the most important factors in the selection process by the company are the ability to work in a group (6.97) and good task and problem-solving skills (6.91). Within this, group work seems to be the most pronounced among IT engineers (7.44), while good problem-solving skills were rated with the highest score by those in economics (7.08). The third place is occupied by awareness and practicality, which achieved a value of around 6.22 average points in all three fields of training. According to the scores, a good high school final exam results in Hungarian language and literature is the least expected of dual students (average 3.08), which reached the lowest score of 2.89 in engineering, but the field of economics rated it only at 3.52. Preliminary practical experience (from high school or summer jobs) scored an average of 3.72 points, which in the field of technology stopped at only 3.52 on average. Good stamina and endurance were rated very low (4.14), which was scored 4.17 for students in the technical field and 3.56 for IT students. It is interesting to look at the high school math results. On average, he scored only 4.51 points, which is surprising for these mathematics-emphasized majors. Technical and engineering students rated this at 4.58 points, while economics students rated it at 4.4 points, and the responding IT engineers rated it at 4.33 points.

Considering communication skills, clarity was indicated as the most important in all three fields of study (7.31 on average), followed by professionalism (7.29) and good oral expression (7.07) in the technical field. In the case of IT specialists, continuous feedback (7.0) and good drafting skills (6.89) are behind the clarity, while in economics majors, reading comprehension (7.0) and good expressive skills (6.9) are considered the most important. The human qualities in the questionnaire all received an average score of around 7, it seems that the respondents feel that almost all of them are very important: discipline, politeness, attentiveness, obedience, punctuality, precision, humility, sense of responsibility, curiosity. We have seen above that good looks have received a low average score (5.83) for companies, students rated this at 6.69 average points, but this can be explained by the fact that good looks are presumably not the same for Generation Z as they are for employers. The highest average score is seen for the sense of responsibility (7.34), which achieved a quite outstanding value of 7.75 points in the IT field, i.e. almost everyone rated it with the maximum score. Discipline (7.17) and politeness (7.31) also stand out, and both were scored highest by IT engineers (7.56 and 7.44, respectively).

3.3 Harmony of corporate expectations and student ideas

From the above, dual students are aware that the most important expectations in companies are good task and problem-solving skills, as well as the inclination and ability to integrate and work in groups. Table 4 shows the scores of the expectations for the three fields of study (engineering, IT, economics). On a scale of 1 to 8, companies and students rated very similar values on knowledge, practicality, good foreign language skills and stress tolerance. Companies valued prior practical experience, IT knowledge, good stamina and workload, and a good sense of practice with a higher value than students. According to the results, students do not feel the importance of good secondary school results (Hungarian, mathematics) and professional ambitions to a sufficient extent.

Table 4. Scores of expectations by students and companies (independent sample t test)

Competencies		*N*	*M*	*SD*	*t-test significance value**
good task and problem-solving skills	students	171	6,92	1,359	0,998
	companies	26	6,92	1,44	
prior practical experience	students	171	3,71	2,048	0,038**
	companies	26	4,62	2,099	
foreign language skills	students	171	5,37	1,985	0,970
	companies	26	5,38	2,192	
IT knowledge	students	171	5,05	1,778	0,002**
	companies	26	6,23	1,608	
professional ambitions	students	171	6,02	1,616	0,241
	companies	26	6,42	1,604	
good result in Maths	students	171	4,52	1,962	0,188
	companies	26	5,08	2,244	
good results in Hungarian	students	171	3,09	1,842	0,011**
	companies	26	4,12	2,197	
good stamina and workload	students	171	4,16	2,138	0,001**
	companies	26	5,65	2,058	
good practical sense	students	171	5,71	1,82	0,064*
	companies	26	6,42	1,724	
good drafting skills	students	171	3,69	2,107	0,390
	companies	26	4,08	2,296	
practicality	students	171	6,21	1,599	0,455
	companies	26	6,46	1,555	
ability to integrate and work in groups	students	171	6,97	1,408	0,382
	companies	26	7,23	1,423	
stress tolerance	students	171	5,36	1,893	0,324
	companies	26	5,54	1,881	

*Note: Based on the Levene test, the significance value of the corresponding t test is ** - significant at 5%, * - significant at 10%*

Source: own edit

With the Levene test, we examined the similarity of the standard deviation of the two samples. Based on this, I selected the appropriate T test for equality of the means. In the table, the level of significance of the corresponding T test is indicated. We took 5% and 10% as the significance levels. As indicated in the table, a significant difference of 10% was found in the case of good practical sense. At 5%, we experienced a significant difference in previous practical experience, IT knowledge, good Hungarian language and literature high school final exam results, and workload. Regarding the standard deviation, which shows the average deviation of the sample elements from the sample mean, we can see that the values range from 1.359 to 2.296. The variation of student and company responses was the most different in the case of good foreign language skills, good

high school final exam results in mathematics and Hungarian language and literature, and good manual dexterity.

Examining the results and significance values by field of study, we can see that significant differences between student and company responses are more pronounced in the field engineering: in the case of prior practical experience, IT knowledge, good stamina, workload, good practical sense and good manual dexterity, there are differences between the expectations of companies and the students' knowledge of them. In engineering careers, these are necessary or even essential; therefore, so it is worth focusing on them. In the field of economics, only good stamina and endurance were not sufficiently known to students. In the field of IT training, there was no significant difference between the responses of companies and students.

4 Conclusions

The dual higher education is characterized by the fact that the training takes place based on one curriculum, but at two locations. In response to the needs of the labour market, this form of training involves integrating the corporate sector into the training and provides an opportunity for students to acquire knowledge that has not been taught or cannot be acquired in a higher education institution or cannot be acquired sufficiently as an employee of an organisation. The result of the training is a fresh graduate employee who has 7 semesters of practical experience, who has acquired specific professional knowledge related to a given company, and who has gained skills in corporate culture in addition to his grade.

The research question Q1 concerned the expectations of companies towards prospective dual students. The research results show that companies place high expectations on dual students due to the energy (financial resources, human resources, time) to be invested in the 6-7 semesters of dual training. The ideal candidate is not only motivated to learn formally and non-formally but also is interested in the company's activities and how the knowledge gained at the university can be used in industry. Even though, according to the survey, high school results do not weigh much, the applicant must still arrive with good academic results and be able to communicate in at least one foreign language. The ideal dual student is a good team player and has good task and problem-solving skills.

The research question Q2 related to the previous one was about if dual students are familiar with the company's expectations, and whether they know what skills, competencies and knowledge they need to have. The results show that dual students are aware that good task and problem-solving skills, as well as the inclination and ability to integrate and work in groups, are the most important expectations for them at the company. (Assessing this ability is also part of the selection process in many places.) Similarly to companies, students valued knowledge, practicality, good foreign language skills and stress tolerance. Students feel less important about previous practical experience, IT knowledge, good stamina and workload, and a good sense of practice. According to the results, students do not feel the weight of good high school results (Hungarian, mathematics) and professional ambitions to a sufficient extent, which can be attributed to the fact that this is almost not mentioned at all during the selection process, as basically applicants whose academic results are already above the level considered sufficient by the company are invited for selection. The biggest difference between expectations and students' knowledge of this was found in the field of technical training, where there was a significant difference in previous practical experience, IT knowledge, good stamina, workload, good practical sense and good manual dexterity.

Companies compile the elements of the selection process depending on the level of development of their HR organization. Large companies can require candidates to perform personality tests and trial jobs to predict the company-person-work correspondence. This practice should be applied to all companies. To increase the number of dual students and thus the number of candidates, it is recommended to hold open days at companies employing dual students, where high school students can get to know the company's expectations, where they can get acquainted with the corporate environment and learn about possible jobs within the company with the same degree. It is also recommended to communicate to prospective dual students that previous practical experience (e.g.

through a summer job) is an advantage in the selection. All of this would greatly reduce uncertainty for candidates at the time of application and during the selection process.

The aim of the research was to collect and analyse data to collect information on the labour market characteristics of Generation Z dual students, and to support the success of dual students in the workplace during their university studies, if necessary, after exploring the expectations of the company. For dual training to be successful, it is important that prospective students are aware of the expectations of their chosen profession and their own abilities. The selection of the most suitable participants in dual training and the promotion of workplace integration is in the common interest of those concerned (student, company, higher education institution). Knowledge of the competencies and personal qualities expected in each field of study can make it easier for future dual students to choose a study program, prepare for the selection event, and thus contribute to the success of the selection process in the future.

To facilitate the successful integration of Generation Z dual students into the workplace, HR practitioners should implement structured pre-placement orientation days that clearly communicate the expectations of both the industry and the specific organization. These orientation sessions should include workshops that outline essential competencies and personal qualities relevant to each field of study, interactive exercises that allow students to assess their abilities, and networking opportunities with current employees to provide real-world insights. This proactive approach will enhance dual students' understanding of their roles and responsibilities, ultimately fostering a smoother transition and greater success in their dual training experiences.

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INTERNATIONALISATION AND WORK LIFE SKILLS ACROSS THE BALTIC SEA: KUT–SAVONIA COLLABORATIVE ONLINE INTERNATIONAL LANGUAGE LEARNING PROJECT

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Abstract
This article examines the Collaborative Online International Learning (COIL) pilot project between Koszalin University of Technology (Poland) and Savonia University of Applied Sciences (Finland) within the EU4Dual alliance, reflecting on 28 students' experiences of international communication and problem-solving projects within regular English language classes. The project highlights the importance of experiential learning and self-reflection for developing language confidence and communication skills in an international virtual teamwork environment. The findings indicate self-reported increases in students' linguistic confidence and perceived work-life skills for future careers.

1 Introduction

The Collaborative Online International Learning (COIL) pilot project was conducted between two higher education institutions allied in EU4Dual and aimed to implement project-based elements into an English curriculum to familiarise students with practical problem-solving skills through virtual international teamwork during their English classes. We explore whether teacher-led, bottom-up COIL integration is feasible and beneficial within the EU4Dual incentivizing framework which creates a basis for ongoing, long-term cooperation. The article explores participants' perceptions, emphasising the significance of experiential learning for developing language and work-life skills, as well as enhancing internationalisation in higher education, even at home and by virtual means. The study also considers the personal and professional benefits of the COIL approach via a descriptive and thematic analysis (Dixon & Tahmaz, 2020; Heirweg et al., 2021; Baranowski & Jabkowski, 2023).

The article is structured into 5 sections. The introduction consists of an overview of the EU4Dual alliance which creates the framework for the collaboration and describes how the COIL project may contribute to training for the labour market (1.1). It also provides a review of the terminology regarding virtual exchange in the selected literature (1.2), the theoretical concepts which our work draws upon i.e. Kolb's Experiential Learning theory as well as Lewin's Model of Action Research and Laboratory Training (1.3). Then, in the method section (2), we turn to the COIL project procedures and to data collection; in the results section (3) we analyse students' responses The discussion section (4) gives answers to the research questions, and the final conclusion section (5) presents relevant concerns.

We aim to obtain the information necessary to answer the following research questions:

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- RQ 1. What is the impact of the COIL virtual collaboration on increasing students' linguistic confidence and communication skills in an international virtual teamwork?
- RQ 2. How do learners experience internationalisation at home and develop work-life skills for future careers during the COIL virtual collaboration?
- RQ 3. What is the impact of COIL virtual collaboration on mobility readiness?

We aim to explore these questions related to the teaching experiment, placing emphasis on qualitative methods and gathering information through a student survey. Teacher observations of classroom activities and interactions between students in their natural setting play an important role but are neither documented nor treated as research data as such. They will be used for reflection in Section 4. As the teaching experiment was short-term and only a small part of the total course work, we excluded the assessment of language and communication skills from this research. The overall objective of the research on this teaching experiment is to find evidence on whether COIL-based teaching could be a meaningful addition to language classrooms in EU4Dual universities. The research also aims to address the suitability of the chosen practical COIL design and provide actionable recommendations for language teachers in the field of Language for Specific Purposes (LSP). The research interests do not lie within methodological, contextual or theoretical questions.

Many studies have emphasised the benefits of collaborative online international learning (COIL) in higher education (Laal & Ghodsi, 2012; Helm, 2015; Chun, 2015; Rubin, 2017; Poulová at el, 2019; O'Dowd, 2018; Hackett at al., 2023), but far fewer have investigated them empirically in the context of dual and practical higher education (Dixon & Tahmaz, 2020; Rubin & Guth, 2023; Nowak & Rążewska, 2024). Moreover, empirical research on the benefits of COIL for increasing students' language confidence and communication skills is sparse within individual research areas, e.g., pre-service teacher training (Huertas-Abril & Palacios-Hidalgo, 2024; O'Dowd & Vinagre, 2024). To fill this gap, we present our empirical perspective in a theoretical framework to contribute to a better understanding of the need to implement COIL projects in language teaching at EU4Dual HEIs.

1.1 Learning in the EU4Dual context

The EU4Dual alliance, established in 2022, is one of 65 European Universities alliances that have been created by the EU since 2018 to enhance internationalization in higher education. EU4Dual promotes values including dual education, sustainability, innovation and regional anchoring. Despite its nascent stage, EU4Dual has already contributed to fostering academic internationalisation by creating joint master's programs, organising conferences, staff weeks, blended intensive programmes (BIPs), and issuing joint research in the Scientific Journal of European Dual Higher Education.

However, the holistic integration of policies into practice requires time and effort, which is confirmed by the report on the outcomes and transformational potential of the European Universi-ties initiative, published in January 2025. Data for this report were collected from 38 alliances in 2019 and 2020.

"The European Universities are in the process of intensifying their efforts to deepen and mainstream their activities, reaching out to more students and staff members; these efforts need to be continued, engaging all faculties and departments of the partner institutions, in an unprecedented scale and scope... Most alliances have established transnational diversity and inclusion/gender inclusion/social inclusion plans, codes of conduct, strategies, support staff, and offices. Some HEIs report that their participation in an alliance also pushed the diversity and inclusion matters to the top of the institutional agendas. Despite these achievements, the alliances did not fully reach their potential yet, and more efforts are still needed" (Grumbinaitė et al., 2025, p.315)

Opinions in the literature review, which have been shared by members of other European universities' alliances on their involvement in this initiative, are in line with the report's findings emphisising the long-term goals and perspectives. Researchers point to the slow growth levels of participation in alliances' activities and highlight that organic community growth needs time, more internationally-minded adopters and the evolution of institutional conditions (Curyło & Frame, 2024). Nevertheless, the partnerships are perceived as 'a way for the international academic community to interact more broadly, to prepare people better for the future and to do better research.' (Bugaj et al., 2023, p.20)

Training and internships are typical practice-based forms of learning in dual study programmes. Various recent studies have described and compared the dual education and their national features from the point of view of training and internships, e.g., in Hungary (Sági & Fülöp, 2024), in Austria (Dragan & Hochrinner, 2024), and in France (Merlo et al., 2023). Training and internships aim to familiarise students with the specifics of work in enterprises (Halista-Telus, 2023). In Finland, for example, workplace pedagogy models and learning practices have long been linked to the authentic work life phenomenon, where theory and practice are not seen as separate, but competence is developed comprehensively (Laukkanen et al., 2024).

However, as Turk (2023, p. 1-2) points out, one of the main characteristics concerning dual study programs is 'that the practical phases go beyond the usual scope of professional internship, both in terms of time and in terms of specification of the content'. As we see it, the dual approach due to the diversified national regulations should be flexible–offering high-quality academic teaching, and simultaneously, training students to be skilled workers with high employability. The COIL projects could be seen as one of the flexible methods that go beyond the usual scope of traditional learning methods, such as internships.

According to the January 2025 report (Grumbinaitė et al., 2025, p.166), 123 COIL projects were carried out by the 38 alliances under study. Being language teachers involved in sub-task 6.9 of EU4Dual Work Package 6, which is responsible for language classes to foster seamless mobility and creating the Language Portal to offer on-site, online and tandem courses, we decided to launch a small-scale pilot project to test COIL's feasibility in language learning, identify potential issues and refine the approach before further deployment.

We believe that incorporating remote work elements into the curriculum of language courses might contribute to practice-based education. Both dual and practical education prioritizes connecting academic teaching with the needs of industry by strengthening the relationships between higher education institutions (HEIs) and industry. Since virtual cooperation in an international industrial environment is an essential skill in today's global workforce, it should not be excluded from classroom-based teaching. It is risk-free, cost-efficient and can be practised just as the other work-related skills offering a chance to gain confidence in authentic intercultural situations during regular English as a Second Language (ESL) and Language for Specific purposes (LSP) classes. After all, the optimal aim for all stakeholders in dual education is students-future employees with a well-rounded skill set to succeed in the labour market.

1.2 Review of Terminology

According to Stevens Initiative's "2024 Survey of the Virtual Exchange Field. Report findings from a survey of virtual exchange programmes connecting young people in different countries from autumn 2022 through summer 2023" virtual exchange definitions pose challenges both for re-searchers and statistics reports. Virtual exchange programs are defined and understood differently due to typology, which may be specific to a given world region. They have been referred to as virtual international activities (O'Dowd, 2018), telecollaboration (Chun, 2015), online intercultural exchange (Akbar, 2015) and virtual mobility (European Commission, 2013), among others. Rubin and Guth (2022, p. 26) coined the following analogy to clarify one of the terminology issues: 'Virtual Exchange is like the word sports, while COIL is like the word basketball.' Elaborating on this sports analogy, all these terms may be referred to as activities with the ultimate goal of keeping the ball of structured online interactions rolling. They aim to engage learners with partners from different cultural backgrounds as a part of their study programmes under the guidance of teachers.

1.2.1 COIL

Collaborative Online International Learning (COIL) is an educational method that has been used to internationalise curriculum and facilitate international learning through collaboration (Hacket et al, 2023). COIL is a relatively new method and is sometimes used simultaneously with international virtual exchange (Kastler, 2020) as the design and implementation of COIL involve technology and do not require physical mobility. The COIL format is cost-effective, highly collaborative and follows a bottom-up approach. There are institutions that support COIL modules, e.g., the SUNY COIL

Centre launched on the Purchase College campus of the State University of New York in 2006 or the Collaborative Online International Learning Initiative's directory, which offers a chance to match partners worldwide.

The newest definition coined by Hacket et al. (2024) integrates COIL assumptions in the most accurate way and aligns with the COIL project discussed. 'It is an inclusive, environmentally friendly teaching and learning method used to internationalise the curriculum, in which educators from different educational institutions in different countries connect to co-design and co-facilitate collaborative online learning assignments that are embedded within the curriculum, with the goal of facilitating the development of students' collaborative skills, intercultural competence, and curriculum con-tent learning through collaboration'. (Hackett, et al., 2024, p 1084)

1.2.2 Virtual Collaboration

Virtual collaboration is classified under type 4 of the OECD Centre for Educational Research and Innovation's typology. This type focuses on curricula in foreign languages or linguistics that explicitly address cross-cultural communication and provide training in intercultural skills (Nilsson, 2001). Collaborative learning is an inherent concept of social constructivist theories (Vygotsky, 1978; Bruner 1961). They emphasise the importance of social interactions, problem solving, and active exploration in the learning process. Thus, collaborative learning is an example of the educational strategy in line with social constructivism, which involves a group of learners who cooperate towards a common goal to find a solution to a problem, complete a task or create a product with an educator as a facilitator (Dillenbourg, 1999; Johnson & Johnson, 2008; Laal & Ghodsi, 2012).

1.2.3 Virtual mobility and Internationalisation at home

Virtual mobility (VM) and Internationalisation at Home (IaH) have been prominent in academic discourse since the early 2000s, influenced by advancements in learning management systems, social networks, and collaborative online tools (Rubin, 2017; de Wit & Hunter, 2015; Crowther et al., 2001). VM is defined as 'the use of information and communication technologies to obtain the same benefits as one would have with physical mobility but without the need to travel' (Poulová et al, 2007, p. 87). IaH involves the purposeful integration of international and intercultural dimensions into the formal and informal curriculum for all students within domestic learning environments (Beelen & Jones, 2015, p.69). The European Commission's 1999 strategy introduced IaH as a third pillar, broadening ERASMUS programmes with virtual mobility and Blended Intensive Programmes. The Erasmus+ 2025 programme guide defines virtual mobility as "...online people-to-people activities that promote intercultural dialogue and soft skills development. They make it possible for every young person to access high-quality international and cross-cultural education without physical mobility, which takes place in small groups and is always moderated by a trained facilitator. They should be easily integrated into youth (non-formal education) projects or higher education courses." (Erasmus + Programme Guide, 2025, p. 211)

1.3 Theoretical Framework for the COIL Pilot Project

Experiential learning theory (Kolb, 1994) emphasises the central role of experience in the learning process; it describes the relationship among learning, work, other life activities and the creation of knowledge itself. It is thus interconnected with the work of Levin (1998).

"In the Levinian experiential learning model, immediate experience is the basis for observation and reflection. These observations are assimilated into a "theory" from which new implications for action can be deduced. These implications or hypotheses then serve as guides in acting to create new experiences. This action research is based on feedback processes. Lewin borrowed the concept of feedback from an electrical engineer to describe a social learning and problem-solving process that generates valid information to assess deviations from the desired goals. This information feedback provides a basis for a continuous process of goal-oriented action and evaluation of the consequences of that action." (Kolbe, 1994, pp 21-22)

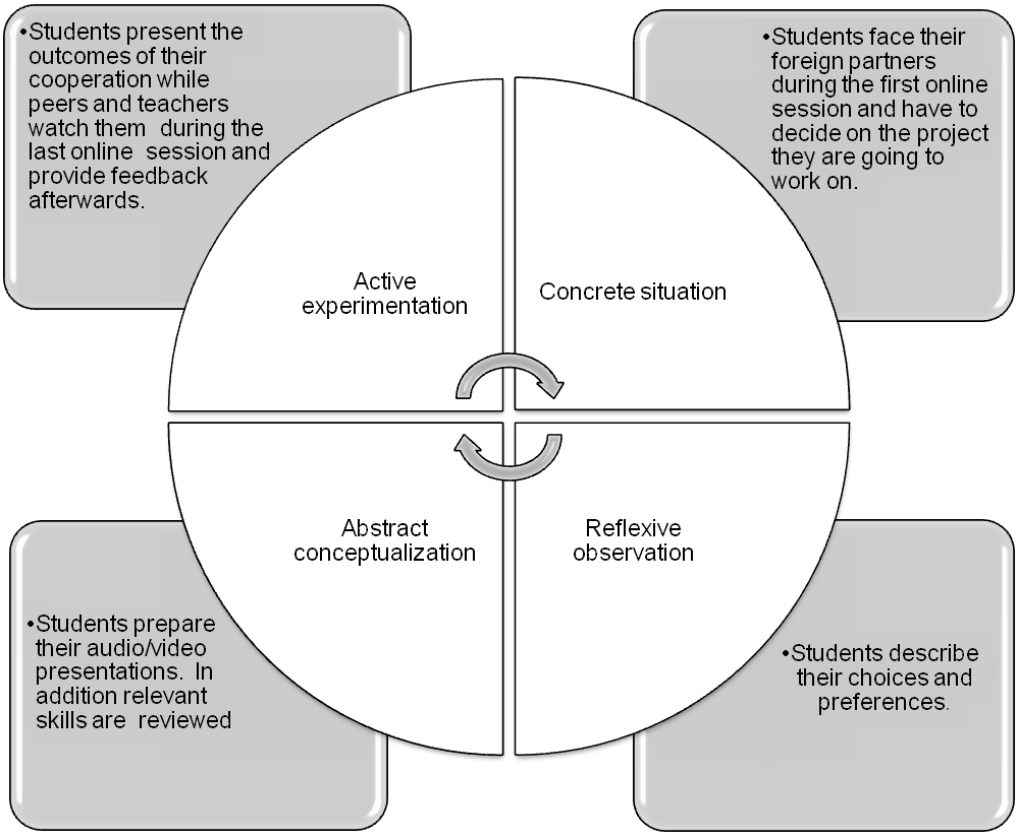

Figure 1. Experiential learning in COIL. Adapted from Kolb's learning cycle

Students who participate in COIL programmes have a chance to be immersed in a real, immediate experience and must deduce new implications on the way towards achieving the desired goal, i.e. completion of the task assigned in an international, new but structured environment. Combining reflective observation abilities, abstract conceptualization abilities and active experimentation, they should decide in a real information gap situation which set of learning abilities to use for a specific task. In this way, they can form adaptive approaches to international collaboration. They first detect, depict, or grasp knowledge, and then the phase of construction should occur to complete the learning process (Abdulwahed & Nagy, 2009).

2 Method

In this section, the implementation and learning process design of the COIL teaching collaboration will be described, also showing the relation to Kolb's experiential learning cycle (Section 2.1). The data collection method used in this COIL teaching experiment was a student survey. The survey and the respondent profile will be presented in the last section (Section 2.2).

2.1 Practical implementation of KUT-Savonia COIL virtual collaboration

2.1.1 Curriculum integration and student participation

The COIL pilot project was carried out in cooperation between Koszalin University of Technology in Poland and Savonia University of Applied Sciences in Finland in March 2025, over a peri-od of three weeks. The planning work started in May 2024. The COIL pilot project was integrated into such English language courses at both universities where the objectives of the COIL collaboration fit naturally into the current curriculum. The suitable courses for the pilot project were identified by comparing their descriptions and learning outcomes, which included acquiring the knowledge of

determinants of social relations, demonstration of a sufficient range of lexical resources to express thoughts with some acceptable hesitation, demonstration of flexibility in linguistic interactions, formulation of understandable spoken statements and making a presentation on the issues of the studied discipline. The feedback students received was based on these criteria. However, it was pedagogical only, not part of this research analysis. The workload, from the student's perspective, was designed to be approximately 0.5 ECTS (13-14 hours). The students were aware of the implementation plan of the course when registering for it. The courses that included the COIL pilot project were part of students' compulsory studies. The students at Koszalin University of Technology were 3rd year students in logistics (Bachelor degree), while the students at Savonia University of Applied Sciences were 2nd and 3rd year electrical engineering and information technology students (Bachelor degree). A total of 28 students participated in the teaching experiment. Of these, 2 were Belarusian, 11 were Finnish, 13 were Polish, and 2 Ukrainian.

The COIL pilot project consisted of a learning process that included the following five (5) phases:

a. Pre-boarding – Introducing the teachers, objectives of the COIL pilot project and participating universities (independent work)
b. Orientation and preliminary task – Studying preparatory materials and project case descriptions (independent work)
c. Session 1 – Ice-breaking and first decisions (teamwork)
d. Session 2 – Team working and solving the project case (teamwork)
e. Session 3 – Presenting the results & self-assessment (independent work)

2.1.2 Pre-boarding, Orientation and the preliminary task, Sessions 1-3

2.1.2.1 Pre-boarding

In the pre-boarding phase, the students independently familiarised themselves with an introduction video produced by the teachers in which the teachers and the objectives of the COIL pilot project were introduced. Additionally, the students were guided to familiarise themselves with the partner university through its web portal. The aim was to create a positive impression of the upcoming international collaboration and to emphasise that the aim of the collaboration was to enable the students to have an authentic experience in international work life related co-operation and how to communicate with participants of various language levels and cultural backgrounds, while working virtually. The pilot project prioritised the communicative competences necessary to achieve the purpose rather than the extent of language systems' usage (grammar, vocabulary and pronunciation).

2.1.2.2 Orientation and the preliminary task

The orientation phase included participation in the information Session organised by a teacher, held separately for each university. In other words, there was one initial info Session for KUT students and one for Savonia students. In addition to the real-time, face-to-face meeting, the course implementation plan and other instructions were shared with the students in writing. Additionally, a separate meeting was arranged where students could test joining the Zoom meeting platform, which was used as the working platform, before the first joint online meeting.

The preliminary task for the students, before Session 1, was to familiarise themselves with eight (8) project case descriptions and select their top 3 preferences. Project cases are often used in educational settings to simulate professional work environments and enhance learning experiences. The goal is to develop solutions, strategies, or recommendations for the given case, which can then be presented and evaluated.

The project case descriptions were all in English and their topics were varied, relating, for example, to HR management, electrical planning of a studio room or a warehouse, and logistical issues in harsh conditions. The challenge was creating topics for projects that would include work-life skills such as negotiation, elements of LSP (Language for Specific Purposes) and cultural diversity.

The priority was to prepare projects that would be low in complexity but integrative and boosting collaboration. The projects are presented in Appendix 1 at the end of the paper.

2.1.2.3 Session 1

The next phase was Session 1, where the students met each other for the first time, face-to-face, virtually. It was held via Zoom, lasting 60 minutes. After a brief welcome speech and introduction of the meeting agenda by the teachers, the students were divided into smaller teams using the Breakout Room function.

Each team consisted of 3-5 students, with at least one student from both KUT and Savonia UAS. The goal of the first meeting was to get to know the team members. This was supported by a short ice-breaking task. Additionally, the team had to decide on the following:

- Which project case to choose for their team to solve?
- When will the team meet next?
- Which tool will they use for online meetings (Zoom, Teams, Face Time, Discord…)?
- What tool will the students use for written communication (email, WhatsApp …)?
- How will they prepare for the next team meeting (Session 2)?

After session 1, each student reported personally to their own teacher about the success of the meeting and what was decided, either orally or in writing (a memo sent by email).

2.1.2.4 Session 2

Each team carried out Session 2 independently, as they had agreed with the team members (e.g., time and meeting platform). The goals of Session 2 were to:

1. Discuss and solve the project case.
2. Decide how the team will present the results in the last session (Session 3).
3. Plan and prepare the presentation material to be used in Session 3.

The team recorded the meeting and submitted the recording to the teachers who provided feedback based on the recording to the team members on the home universities' Moodle platforms respectively. The feedback was aligned with the assessment criteria which focused on:

1. Organisation and timing (topic was clearly stated; talk was well-timed)
2. Content (speaker was in control of the subject matter)
3. Speech (pace was varied and volume appropriate)
4. Pronunciation did not hinder comprehension
5. Discussion management (speaker controlled the flow of questions and discussion, they responded confidently)

The criteria are informative explanations as the project was embedded in the curriculum, not only designed for this research purpose.

2.1.2.5 Session 3

Session 3 was the final meeting of the COIL pilot project, again held via Zoom and lasting approximately 90 minutes. During the session, each team presented the project case they had chosen and how the project case was solved. They also described the perspectives and issues they considered when solving the project case as well as the most challenging aspects of the project case. At the end of the presentation, they described the useful work-life skills they learned from the international collaboration for their future careers. The feedback given to each team focused on communication and presentation skills.

The final task of the COIL pilot project was to complete a self-assessment task regarding the learning and the experience itself. The last task also served as a feedback survey, which was mandatory for all participants.

As an extra reward, the students were offered the option to receive a separate certificate of participation in the international EU4DUAL based on the learning project. It could be used in the future job application process to document students' experience in communication and cooperation in the intercultural context in higher education.

2.1.3 The COIL learning design featuring Kolb's experiential learning cycle

As presented in Section 1.3, the theoretical framework of this COIL project pilot is based on Kolb's (1994) experiential learning cycle. It consists of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

The COIL pilot project was aligned with this model but pre-boarding and orientation (including preliminary tasks) were the pre-stages of concrete experience. There, students watched an introduction video and familiarised themselves with the partner university, setting the stage for their learning experience. Participation in info sessions and familiarisation with project case descriptions provided initial hands-on training.

The first concrete situation was facing other foreign students and the immediate experience of interacting with them to negotiate the choice of pre-read projects. The reflexive observation stage was included in Session 2. Students reflected on their initial interactions and decisions made during the ice-breaking activities and team formation. As students worked on their project cases, they reflected on their teamwork and problem-solving processes and analysed how to collaborate best.

The stage of abstract conceptualization was part of Session 2 and Session 3. Students developed strategies and solutions for their project cases, conceptualizing their experiences into actionable plans, presenting their solutions, structuring their ideas, reflecting on the theoretical aspects of their projects and integrating their experiences into broader concepts. They could also analyse what happens when interacting with their international peers.

Active experimentation, the final stage of Kolb's cycle, was also included in Sessions 2 and 3, where students first tested their solutions and strategies in a collaborative environment, experimenting with different approaches. Finally, they presented their results in public and completed the self-assessment. These allowed students to apply and assess their learning and the feedback received, which they can use in future learning tasks, projects and at work.

2.2 Data collection

The final learning task of the COIL project pilot was a self-assessment and feedback survey. It served as a data collection method for the research purposes. In addition, the two teachers involved in the teaching experiment observed all the learning activities and interaction taking place throughout the experiment, both in documented learning outcomes (written and recorded documents), as well as in teacher-student communication and interaction in a live virtual classroom. However, these observations were neither documented nor treated as research data, but they will be used for reflection in Section 4.

2.2.1 The survey

The survey was conducted online using Google Forms. The language of the survey was English. It contained 23 questions (Table 1), of which 17 were multiple-choice questions (closed or structured) and 6 were open-ended, semi-structured questions. Their relevance to the research questions is shown below:

- RQ 1. What is the impact of the COIL virtual collaboration on increasing students' linguistic confidence and communication skills in an international virtual teamwork? → *Q10, Q11, Q12*

- RQ 2. How do learners experience internationalisation at home and develop work-life skills for future careers during the COIL virtual collaboration? → *Q13, Q14*
- RQ 3. What is the impact of the COIL virtual collaboration on mobility readiness?→ *Q19, Q20*

Table 1. Google survey questions. KUT - Savonia cooperation (COIL), March 2025

1. How old are you?
2. Please write your gender.
3. Your nationality
4. How would you describe your English skills? Are you a basic (A1-A2), independent (B1-B2) or advanced (C1-C2) user?
5. Is this your first experience of international virtual co-operation at university?
6. Which platform did you use to work with your team?
7. The general instructions for team work were clearly explained. Likert's scale
8. The instructions for the project cases were clear and easy to understand. Likert's scale
9. The project cases were: easy, challenging enough, not challenging.
10. This co-operation was a positive experience. It increased my confidence in speaking English. Likert's scale
11. Based on the co-operation experience, what are you already good at, when communicating in English?
12. Based on the co-operation experience, what kind of English or communication skills should you still practise and learn more about?
13. This co-operation increased my self-confidence when working with international colleagues and partners. Likert's scale
14. How did this co-operation in the international team strengthen your work-life skills for the future? What did you learn about working virtually in international teams?
15. The teachers should have been involved more with the teams. Likert's scale
16. The length of this co-operation (3 meetings together) was too short. Likert's scale
17. Were there any challenges when doing the project? (technical, communicational, cultural...)
18. Would you recommend taking part in this kind of international co-operation to other students? Why?
19. I have never been interested in being an exchange student and taking part in ERASMUS+ exchanges. Likert's scale
20. After this KUT - Savonia co-operation experience, I could consider taking part in ERASMUS+ exchanges. Likert's scale
21. Evaluate the number of working hours you needed to complete this co-operation process (incl. all preparation, meetings, contacting, feedback survey etc.)
22. Anything else you want to say to the teachers, Joanna and Irene? Any development ideas for the co-operation in future?
23. Do you grant your permission to use the contents of this survey for research purposes? The survey data will be processed in accordance with GDPR regulations and the answers will be anonymous.

The task had to be completed immediately after Session 3, and it was a compulsory part of the course work. All the students were informed in advance that their responses would be treated as research data. In the survey, the students were asked to grant permission to use the contents for research purposes (see Table 1, Question 23). Withholding research consent did not affect course grading and only anonymised, consented responses were analysed. The survey data were processed in accordance with the EU's GDPR regulations.

2.2.2 Respondent profile

The survey was answered by 28 respondents. Table 2 with the respondents' profile is based on closed questions 2, 3, and 4 in the survey.

Table 2. Respondents' profile

DETAIL	TOTAL RESPONDENTS	TOTAL % PERCENTAGE
1. Gender		
Female	9	32.14%
Male	18	64.29%
Non-binary	0	0.00%
Prefer not to say	1	3.57%
2. Nationality		
Belarusian	2	7.14%
Finnish	11	39.29%
Polish	13	46.43%
Ukrainian	2	7.14%
3.English skills - self-assessment		
A1-A2	2	7.14%
B1-B2	21	75,00%
C1-C2	5	17,86%

Overall, 93 % of the respondents self-assessed their skills to be on the level of B1-B2 or higher on the CEFR scale. The English skill level aimed at our HEIs is typically B2.

3 Results

All participating students completed the COIL pilot project successfully. In this section, we examine the survey results reflecting the three research questions. We describe the learners' experiences related to the development of their linguistic confidence and communication skills in an international virtual teamwork (Section 3.1), the strengthening of their international competence needed in working life during the COIL pilot project (Section 3.2), and the impact of the experience on respondents' attitudes towards Erasmus+ mobility (3.3).

The key findings will be illustrated in two ways. Figures 2-5 are based on the structured survey questions (Questions 10, 13, 19, and 20) where a Likert's scale from 1 to 5 was used, while the discourse samples represent the semi-structured survey questions (Questions 11, 12, 14, 18, and 22). The discourse samples were chosen as illustrations as they allow the students' voice to be heard as it is, with nuances and rich details.

3.1 Learners' experiences in developing language confidence in international teamwork

Most learners (78,6 %) viewed the COIL pilot project as a clearly positive experience and saw it as boosting their confidence in using the English language.

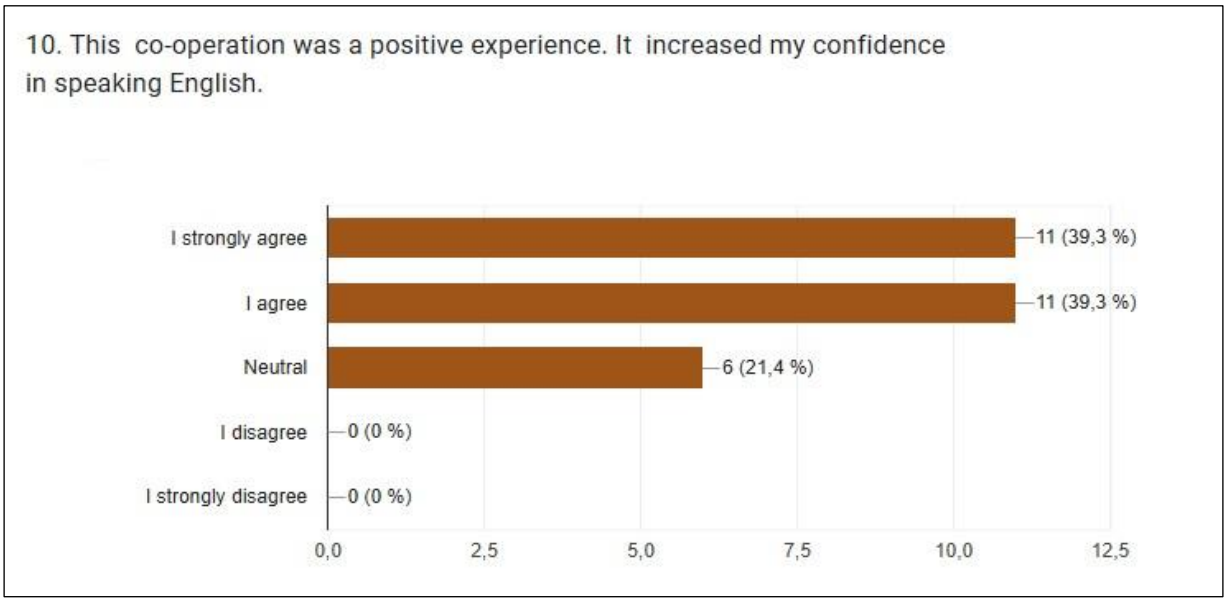

Figure 2. Students' self-assessment of the increase in speaking English confidence

In questions 11 and 12, students were asked to reflect on their language skills before and after the COIL project.

The learners recognised that they already had a good understanding of English; they could speak English well and felt confident using it in teamwork and problem-solving situations. Writing and vocabulary skills were also highlighted as strengths in several responses.

"I can understand and speak well."
"I'm already comfortable speaking English."
"I think my strength is in writing and the English vocabulary."

The responses also reflected a decrease in negative feelings and experiences during the COIL experiment. However, the need for further learning was highlighted alongside the strengths.

"I am less ashamed to speak English because I don't like my accent."
"less stress and more confidence during the conversation"
"I think I'm better at it, but I still have a lot to learn."

The learners were able to recognise many development needs related to the English language and communication skills. The most prominent need was to increase vocabulary management, especially regarding English for Specific Purposes. Responses also emphasised the importance of improving speech production, focusing on both pronunciation and presentation skills.

"I need to work on improving my pronunciation and expanding my knowledge of professional terminology."
"Widen my vocabulary especially regarding technical terms"
"I need to practice speaking more to improve my pronunciation."

The importance of active listening skills for smooth interaction was identified, along with the need for precise expression.

"I have sometimes struggled with clearly expressing my ideas in discussions, so I need to practise giving concise and structured responses. I also want to improve my active listening skills to ensure better understanding and collaboration."

Many respondents also highlighted their successes and identified learning methods to independently improve their English language skills, proving that experiential learning contributes to reflective observation development.

> *"my language barrier has decreased significantly; I can explain what I am talking about in different ways so that everyone can understand"*
> *"I think I still need to work on my confidence and I think it was a good experience that we recorded how we spoke and thanks to that we can listen to how we speak again and see what mistakes we make."*

3.2 Learners' experiences in internationalisation at home and development of work-life skills for future careers.

Most of the learners (78,5%) felt that participating in the COIL pilot project during their English course made them feel more confident when working with international colleagues and partners. It is noteworthy that for a vast majority of the respondents (89,7%) this COIL project was their first experience of international virtual cooperation at university.

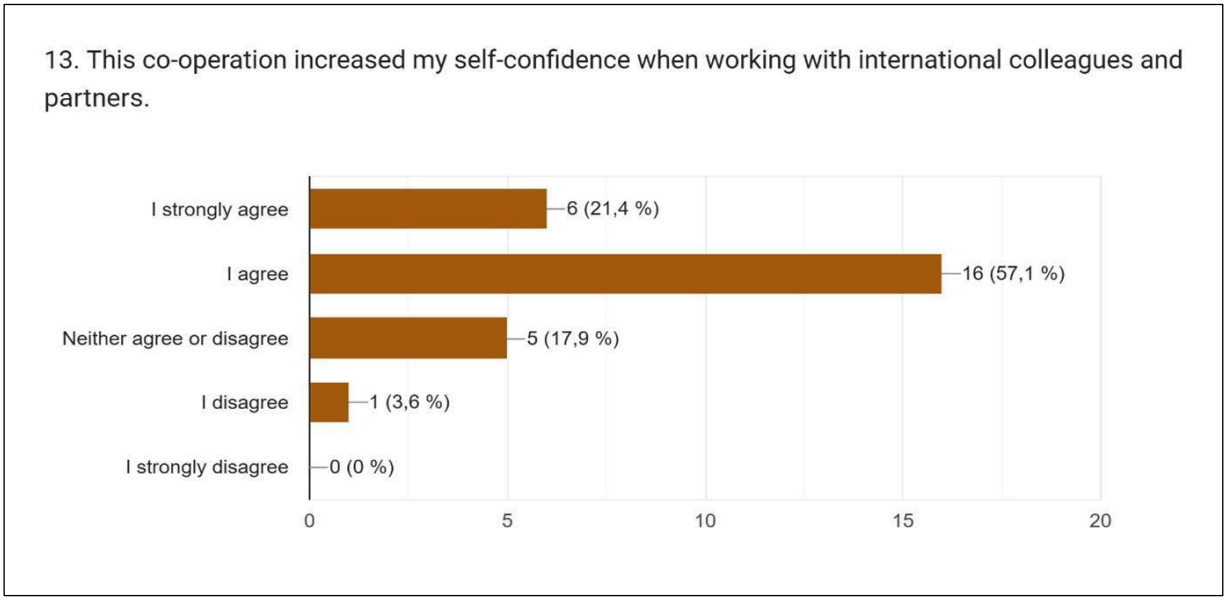

Figure 3. Student self-assessment on the increase in self-confidence while working with international colleagues

The responses to question 14 'How did this co-operation in the international team strengthen your work-life skills for the future? What did you learn about working virtually in international teams?' clearly highlighted four perspectives considered essential for skills needed in future careers. These were communication skills, intercultural skills, technical skills, and confidence and adaptability.

The learners appreciated that they could practice communication skills in a real, interactive, and professional situation and learn through practical work with peers.

> *"Gained experience in communicating in English in a work environment, which will definitely be beneficial in the future."*
> *"Engaging in discussions, asking clarifying questions, and actively listening without interrupting will also help enhance your communication skills."*

Learning intercultural skills was seen as becoming better prepared to meet and work with people you do not know in advance and who have different kinds of cultural backgrounds which may

also influence the use of English. Also practical issues, such as time zone differences and handling them, were seen as an intercultural skill.

”Cultures can differ from each other and it is worth remembering that.”
”This made me more comfortable in talking to strangers from different countries, and it is likely to be useful in the future.”
”Each country has its own accent.”
”Remember about time differences and set a meeting time that is clear to everyone.”

The COIL project highlighted the importance of technical skills when working virtually. The learners faced and had to solve technical problems (e.g. software-related choices and challenges, weak Internet connection, audio-related problems) together, virtually, in order to make the team work successful in the first place.

”How to deal with technical difficulties and organize group work across platforms.”
”*The first time was difficult, but I learned to use the communication app for the future.”*

The perspective of confidence and adaptability was strongly present in the responses. The learners valued the authentic context to practice their skills and to be able to gain the first professional intercultural encounter already during their studies, making them more prepared to face similar situations when employed.

“Thanks to this I could see that cooperation with other people from other countries is not that difficult and gives a lot of new opportunities.”
”It reminded me that sometimes I will have to meet new people and work with them; I think I might be more ready for that now.”
”I'm starting to think I'd really like to work within international teams in my career.”
”When I have my first online meeting in my working life, it is not my first time.”

3.3 Learners’ experiences in mobility readiness

All respondents were ready to recommend the COIL learning experience, a short-term informal virtual exchange, to other students (Question 18). They found several reasons why working in an intercultural team online, even for a short period of time, is supporting students in improving their language skills and soft skills necessary in working life. These reasons included personal development, English skills, social interaction skills and motivational factors that make learning enjoyable. The responses also indicate a slight change in the attitudes towards ERASMUS+ exchanges.

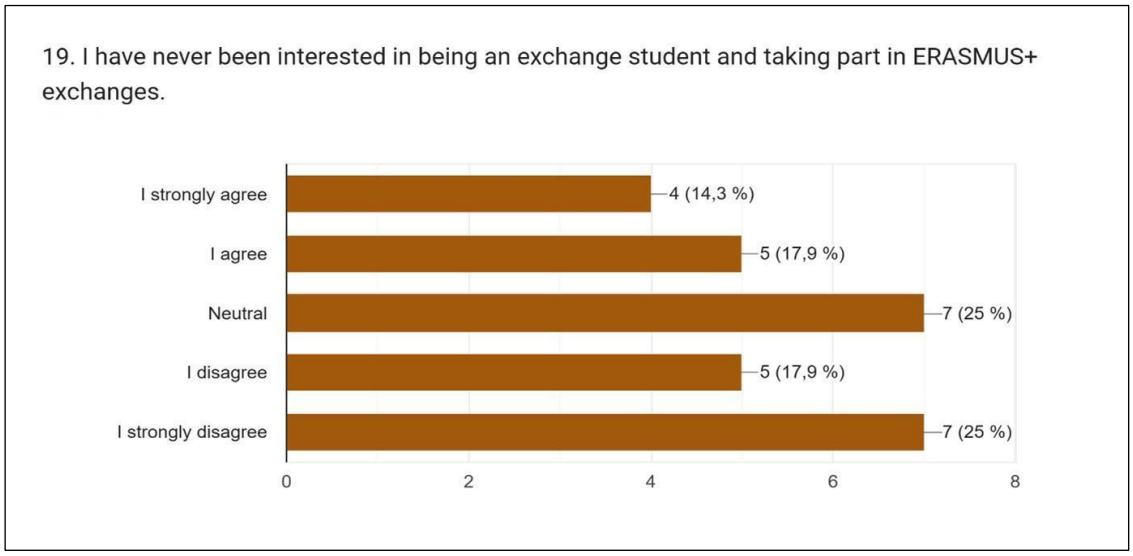

Figure 4. Students’ interest in ERASMUS + exchanges before the COIL project

Based on the responses, 9 respondents were not interested in being an exchange student before participating in the COIL pilot project. After the project experience, there were only 7 respondents who were not interested in exchange studies. The number of respondents (n=7) who had a neutral attitude towards mobility before the COIL pilot project grew by 4 responses (n = 11) when asked about the readiness for ERASMUS+ mobility after the COIL experience.

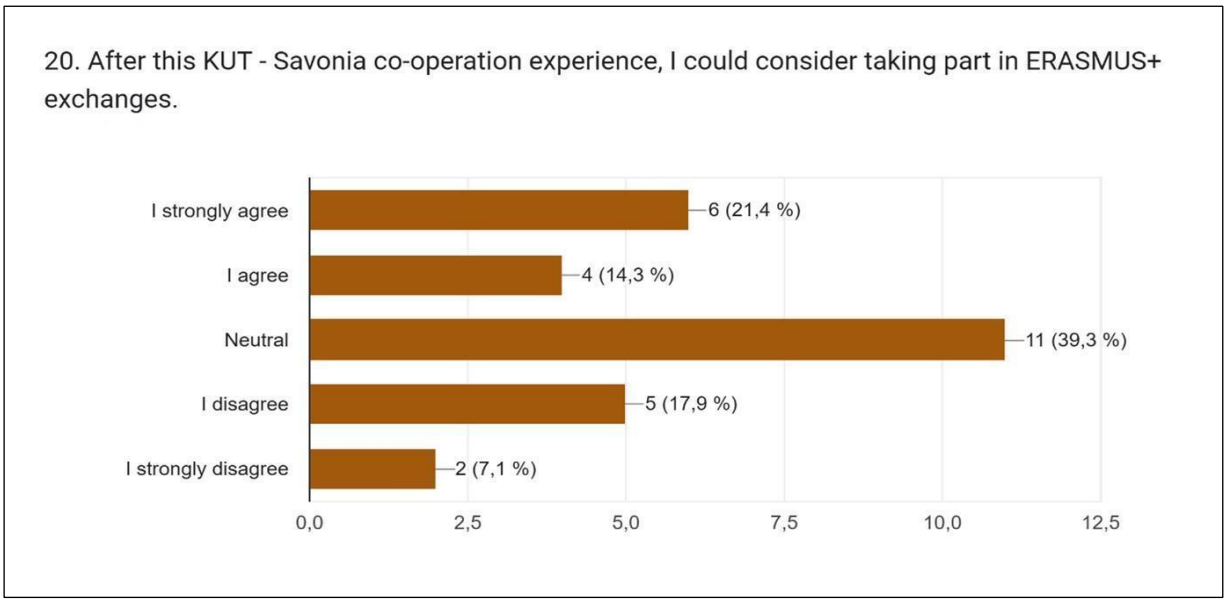

Figure 5. Students' interest in ERASMUS+ exchanges after the project

The changes in the response numbers were small. The number of neutral responses was higher after the COIL experience, but this does not necessarily indicate that the COIL assignments and projects stimulate automatic commitment to mobility readiness in higher education. More likely, the short duration of this COIL project yields only attitude softening.

As a future development idea in Question 22 "Anything else you want to say to the teachers, Joanna and Irene? Any development ideas for the co-operation in future?". The respondents strongly supported the continuation of such opportunities to practice team working in international contexts, seeing COIL as a useful and even enjoyable way of learning.

> *"I would like to have more such joint projects, this is a truly wonderful experience and it's a pity that this hasn't happened before"*
> *"The cooperation was a great learning experience. For the future, maybe more interactive sessions or smaller group discussions could help improve engagement and teamwork."*
> *"More of this kind of project would be good practice for students."*
> *"Taking part in such a project is very interesting and developing and it is worth continuing"*

4 Discussion

This research focused on three key research questions concerning 1) the impact of COIL virtual collaboration on increasing students' linguistic confidence and communication skills in international virtual teamwork, 2) the learners' experience of internationalisation at home and development of work-life skills for future careers through virtual international collaboration, and 3) whether COIL virtual collaboration could influence students' mobility readiness. These questions were studied through the COIL project pilot, which implemented project-based elements into an English curriculum, familiarising students with practical problem-solving skills while working in an international team during their English classes.

The results of the study show that there were several rewarding and informative aspects of the COIL project. Regarding RQ1, students' self-reported that linguistic confidence and communication skills increased as agreed by 78.5% of the respondents. It is crucial to mention that participants

considered the COIL project may influence their future career, which resonates with the comments students made in the survey (see section 3.2). These findings are in line with insights from the works of researchers like Helm (2015), Nokes-Malach at al. (2019), Nowak and Rążewska (2024) who studied students and educators' beliefs about the value of outcomes of virtual collaboration.

With reference to RQ2 on learners' experience of the COIL-based working in language classes, the respondents described the COIL learning experience positively if not enthusiastically (see section 3.3). This could imply that COIL-based learning and teaching methods could be important motivational factors to support students' learning processes, and perhaps even attract students to choose more language courses in their study program.

Whether COIL participation increased their mobility readiness, i.e., RQ3, the survey results do not conclusively show an increase in mobility readiness. This COIL project pilot provided, however, only a short-term experience, and changing student attitudes is a complex process influenced by various psychological and social factors which may take a long time. Nevertheless, COIL collaboration in teaching could be seen as an effective component influencing attitude change. It provides a structured, supported, and safe environment to practise and experience interaction in an international context.

As mentioned earlier, the teachers' observations during the COIL project pilot were not treated as research data. Nonetheless, we – the teachers designing and implementing this COIL project pilot – observed the students' enthusiasm and the positive outcomes in all learning activities included in the project pilot. Beyond the analysed survey data, through observation of student encounters during the online sessions and assessing their learning outputs, such as recordings of each team's meetings and their presentations, our teaching reflections suggested that synchronous virtual group interaction requires students to overcome shyness, reticence, and the tendency to rely on written notes and even dialogue scripts. Compared to traditional collaborative practice in monolingual groups, in a physical classroom with a teacher present all the time, this experience allowed students to face English language communication in practice without teachers' backup. While some discussions lacked fluency, they reflected real-life communication challenges with moments of silence, hesitation, anxiety, and misunderstandings.

Furthermore, it could be argued that short virtual COIL-based mobilities are more attainable and also prepare students for a world where 'more and more communication is at a distance, supported via the Internet, mobile communications technologies, video conferencing and multimedia presentations' (Pickford & Brown, 2006, p.61). Despite technological advancement and the acceleration of the introduction of online teaching tools at universities, the internet's stability and different levels of participants' digital competences may disrupt synchronous meetings. Thus, it is crucial for universities to invest in technological infrastructure and create support systems to address digital discrepancies for more inclusive virtual programmes which would attract students with financial and mobility constraints.

From the perspective of sustainable development and the economical use of resources, COIL teaching and learning could also be seen as a green option to foster mobility through internationalisation at home. Whether long- or short-term, but only virtual, COIL can offer several benefits of physical mobility, and it also simulates the authentic international work environment. However, it does not cause travel costs and has a lower carbon footprint.

As practical recommendations for the feasibility of future, teacher-led COIL projects in the EU4Dual alliance, we suggest planning the compatible available platforms for cooperation and more detailed instructions regarding the technical requirements for the tools used in virtual meetings, e.g., using headsets to prevent echo and to improve volume and sound quality. Also, conducting virtual cooperation in computer laboratories or webinar rooms could be considered. Additionally, video recordings could be favoured over audio recordings to further encourage students to engage in natural communication rather than reading comments prepared in advance.

As a recommendation for peer language teachers, we strongly encourage them to consider the alliance opportunities to include COIL methods in their teaching, either short- or long-term, taking into account different academic calendars, learning outcomes and time zones. The Language Portal, sub-task of EU4Dual Work Package 6, planned to be implemented as a part of the EU4Dual website might be a perfect platform to match language teachers interested in such cooperation both within regular classes or alternatively as elective language courses. For us, this COIL project pilot was an

invaluable opportunity to reflect on our own methodological, IT, and organisational skills in an international context. Investing time, effort, and resources is worthwhile, as it is a great opportunity to develop one's own professional language teacher identity. However, it must be noted that without mutual, cross-institutional, and personal understanding, this kind of cooperation might not be feasible. We are planning to continue our cooperation in 2026 and have shared the invitations for other language teachers via EU4Dual network. We also hope that publishing this study can be a valuable, practical and theoretical incentive. However, it should be mentioned that due to language teaching organisational differences within the alliance, the willingness of teachers themselves is the fundamental issue.

In light of the results, future research should focus on assessing the long-term impact of COIL projects on students' linguistic confidence, communication skills, and mobility readiness. This would help in understanding the lasting effects of virtual collaboration and internationalisation at home. In addition, comparative studies between short- and long-term COIL projects could provide insights into their respective benefits and challenges. This would help language educators in determining the optimal duration for such projects to maximise student engagement and learning outcomes. Finally, gathering more extensive and detailed feedback from both students and teachers involved in COIL projects would provide valuable insights into the practical challenges and benefits of such initiatives in language learning and teaching, or in any other field of education.

5 Conclusions

The results demonstrate that COIL virtual collaboration contributed positively to enhancing students' linguistic confidence and communication skills in international teamwork (RQ1), while also offering meaningful experiences of internationalisation at home and supporting the development of work-life skills relevant to future careers (RQ2). According to the respondents' feedback, such projects contribute significantly to these goals. They provide a chance to gain greater familiarity with working in authentic international work-life contexts. The quotes in 3.2 demonstrate that students acquired some transferable competencies, central to both professional and intercultural development, such as the value of "communicating in English in a work environment" and "the ability to engage in discussions, asking clarifying questions". The respondents also recognised that "cultures may differ from each other and it is worth remembering that" while developing greater ease while "talking to strangers from different countries". Furthermore, students described strengthening their technical skills "learning to deal with technical difficulties and organize teamwork across platforms" thus becoming more adept despite initial challenges. These self-reported observations indicate that this COIL project was a valuable contribution to building students' skill set. With regard to mobility readiness (RQ3), the findings were less definitive, indicating that repeated engagement in COIL initiatives may be required to generate changes in students' willingness and preparedness to participate in physical mobility programmes.

We also aimed to obtain students' opinions about the implementation of COIL at our home, and potentially other EU4Dual institutions. We wanted to identify potential challenges and refine the approach before further deployment. The project pilot experience confirmed that despite challenges such as technical issues, short-term COIL projects can be effectively integrated into regular language classes.

There are limitations to draw broad conclusions from the survey as the number of respondents was relatively small, the project duration quite short and the increase in linguistic confidence was self-reported. However, we view our attempt more as the presentation of a good practice rather than an in-depth analysis.

Overall, the project has demonstrated that stepping out of one's comfort zone can be an incentivising and motivating factor in both language learning and language teaching. Given the effort and time required from the educators to design and implement this interaction-based COIL pilot project, we conclude that COIL, as a teaching method, can also be a beneficial and instructive process for language teachers. It offers a simple way to enhance one's expertise and benchmark best professional practices in language teaching - whether across the Baltic Sea, within the EU4Dual alliance or throughout Europe.

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Appendix 1 - KUT-SAVONIA COIL projects' descriptions and sample questions

Project title	Project description	Sample project questions
1. Electric Vehicle (EV) fleet for wholesale groceries deliveries	Imagine you are helping a wholesale groceries make a decision whether to switch from gas-powered vehicles to electric ones in Koszalin or Kuopio. The wholesaler operates within a 100-km radius of the city. Your task is to discuss the advantages and disadvantages of such a solution	What are the incentives for purchasing EV vehicles in Poland/Finland? What's the cost of purchasing such vehicles? How far can the EVs travel before they need charging? Where are and where should charging stations be located?
2. Flood-stricken area rescue plan	A mountainous settlement has been severely affected by a flood. Because of the weather, the rescue action should be carried out quickly and efficiently. The approximate number of residents in the settlement is one hundred. Agree on the steps you should take as well and the most useful equipment. The place is not possible to be reached by road and the weather forecast for the night predicts severe winds. The following day's forecast is the same. The aim of the project is to prepare the plan to deliver assistance to the flood-stricken area and to transport the people to safe zones.	What equipment could be used to deliver help? (rescue boats, ropes, insulated blankets, stretches, snowmobiles, ATVs)? Who should be helped first and why? Are there any specific groups requiring urgent medical attention (e.g., toddlers, elderly)? What products should be delivered to the area? Where should the products be delivered? How will rescued individuals be transported to the safe zones? What might be alternative communication methods in case of equipment failure?
3.Managing an international team	You are working in an international company Solar World Ltd. You design and manufacture customized solar panels for European markets. The organization of the company was just restructured. Now, you are the new management group that is responsible for 3 new teams starting their work next month. The teams are: 1) electrical designing team in Kuopio (Finland), manufacturing team in Delhi (India) and distribution planning team in Koszalin (Poland). The teams need to work well together to create an efficient work flow and the best service for the customers.	What country culture-related things may cause problems in the co-operation of this global virtual team. Identify and discuss potential problems you foresee. How could you, as a team leader or manager, help to ease or solve these country culture related problems? What practical things may cause challenges, or need different ways to manage and lead the team, compared to a team that works only in one country, in the same location/ office? How could you, as a team leader or manager, help to ease or solve these practical problems related to teams

Project title	Project description	Sample project questions
	Most of the meetings and decision-making that these 3 teams organize take place virtually, which makes them a global virtual team.	working and managing them? The teams start their work & co-operation next month. Plan what you could do as managers to have a good start for the new restructured organization where every team member in all 3 locations feels they work together no matter where they are located.
4.Plan a perfect studio in a dorm	You have decided to enter a competition for the most ergonomic 1-person studio in a dorm. The studio is 12 square metres (3m x4m).	How to plan the layout ergonomically? Is it important to have lots of storage space or rather more space? Why? What furniture and accessories are a must in a dorm studio? Why? Where should the power points (sockets) and light switches be located and why? What colours should the studio be painted with and why?
5.Redundancies in a warehouse	The company, where you are the head of operations, has been implementing automation in the warehouse. The new system is working efficiently 24/7 so there is a need to make 3 people redundant. You have been asked by the human resources department to comment on 10 employees and decide who is dispensable from your perspective. A list of 10 employees' strengths and weaknesses along with their family situation was included.	Which factors should be prioritised when workers face dismissal from work? Their skills, qualifications, personality, family situation, age? Why would the people you choose find it easier to look for new job positions? What advice would you give to someone who is worried about re-entering the job market? Should dismissal be carried out face to face or by mail? Why?
6.Robotics implementation	PKC group (part of Motherson), an international company producing components for the automotive and transport industries, is based in Finland (Kempele) and Poland (Czaplinek). It handles many international orders, and its warehouses need optimization. Currently, components are picked from high shelves, packed, and transported, but human errors and damages occur. To fix this, PKC plans to	What do you do before you make a big purchase? What factors do you take into account? Which are the most important factors for choosing robot suppliers? Why are they important? What terms of delivery and maintenance should be reviewed and discussed before the purchase of robots? Why? What questions should be asked to the suppliers? What might be the potential risks and problems when

Project title	Project description	Sample project questions
	use robotics technology in its warehouses and prepare for choosing the best supplier. A list of 4 offers was included.	choosing a supplier? Delays, hidden costs?
7.Temperature-sensitive products transport	Transport of perishable goods and temperature-sensitive goods requires maintaining precise temperature control across the whole supply chain. Not all areas in the world have a power grid so such transport faces a lot of challenges. This project's aim is to discuss a system that operates also off the electricity grid and ensures stable temperatures ranging from -18°C to 0°C, which are critical for certain products e.g. vaccines. The temperature-sensitive product, the transportation route and proposed solutions for maintaining the required temperature in an off-grid system should be selected and discussed in your group.	What products are temperature-sensitive? Why? In which regions or scenarios can off-grid transport be necessary? How can an off-grid refrigeration system be designed and implemented? What temperature does your selected product require? How can temperature be continuously monitored, and what measures can mitigate deviations? Could the system include a tracking mechanism that integrates real-time monitoring of temperature, location, and estimated time of arrival? What are the potential risks and challenges for successful implementation of this type of transport?
8.Warehouse layout and electrical wiring	You have decided to set up an online shop with clothes. The shop will employ about 10 people who will take and complete orders as well as pack and dispatch the ordered items. You have just purchased a small warehouse (200 square metres) which has no furniture or electrical wiring.	How to plan the layout and electrical wiring effectively and ergonomically? What furniture and accessories are necessary in the warehouse apart from those suggested in the picture? Are all the power points at your home well-planned or do you need to use extension leads? Think about the number and location of power points (sockets), light switches or motion sensor lights, fuse boxes, circuit breakers, emergency power supplies, CCTV cameras.

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ENHANCING OBJECTIVE AND HOLISTIC ASSESSMENT IN DUAL HIGHER EDUCATION: A MULTIDIMENSIONAL RUBRIC APPROACH

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Abstract
Assessing student development in dual higher education faces challenges due to inconsistent evaluation practices and overly subjective appraisals. This study proposes a multidimensional rubric designed to standardise assessments while integrating diverse perspectives (student self-evaluation, co-assessment between academic and company tutors, and structured feedback) to ensure holistic and evidence-based evaluations. Initial validation shows improved grading consistency, stronger tutor collaboration, and enhanced student accountability.

1 Introduction

Dual Higher Education (DHE) is characterised by the combination of two places of learning: the Higher Education Institution (HEI) where the emphasis is on theory, and the workplace where the emphasis is on practice (Turk, 2023). Specific DHE models vary according to countries and their particular situations (Dragan & Hochrinner, 2024; Dupouy & Bakni, 2024a; Dupouy & Bakni, 2024b; Halista-Telus, 2023; Laukkanen et al., 2024; Merlo et al., 2023; Sági & Fülöp, 2024; Turk, 2023; Viklund & Elgundi, 2024a; Viklund & Elgundi, 2024b) but all face similar challenges, including collaboration and partnerships, balance between theory and practice, and evaluation of acquired skills (Montalto & Agius, 2024; Varga & Sági, 2024; Varga, 2024).

Objective assessment of student development in DHE poses an ongoing challenge, hampered by inconsistent assessment practices and a tendency towards overly positive grades in workplace-based training (Jackson, 2018). While traditional rubrics provide structure, they are often bureaucratic tools that prioritise compliance instead of truly helping students learn practical skills. Their complexity or lack of detailed criteria often leads to subjective interpretations (Panadero & Jonsson, 2020). Furthermore, the limited feedback mechanisms within existing frameworks fail to promote meaningful student development and alignment between academic and industry expectations.

This study responds to four systemic issues identified in current DHE assessment processes:

- Lack of uniformity and objectivity: differences in grading criteria between academic and industry panels, exacerbated by generic descriptions in assessment tools (Hand & Clewes, 2000).
- Grade inflation: a documented tendency towards overly positive assessments in the workplace, partly because the performance metrics lack necessary detail (Jackson, 2018).

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- Operational complexity: elaborate rubrics that prioritise compliance over pedagogical utility, creating administrative loads for tutors (Cockett & Jackson 2018).
- Feedback gaps: infrequent or unstructured feedback loops that limit opportunities for student reflection and refinement of skills (Carless, 2018).

To address these issues, the Engineering Faculty of Mondragon Unibertsitatea (MU) has reviewed the monitoring process of apprenticeships, and has developed a streamlined, multi-stakeholder rubric based on measurable observations and explicit competency benchmarks. The framework integrates three novel components:

- Student self-assessment, which promotes metacognitive awareness of skill development.
- Co-assessment between academic and company tutors, which ensures balanced assessment of theoretical and applied competencies.
- Structured feedback cycles embedded at critical milestones, which promotes continuous improvement.

The developed framework includes a consistent and progressive evaluation system across all academic levels. This ensures assessments are adapted to the knowledge and skills acquired at each stage. Crucially, this proposal acknowledges the essential role of tutor preparedness, a factor often overlooked in DHE literature (Fialho et al. 2023).

2 Methodology

The development of a new rubric to address the observed challenges in dual assessment requires a critical analysis of existing evaluation frameworks. This begins with a rigorous examination of current assessment protocols, including their procedures, criteria, and stakeholder engagement mechanisms. To define a new evaluation methodology and tools, evidence-based modifications and the introduction of novel strategies are proposed.

2.1 Dual programme of the Engineering Faculty of MU

The dual programme of the Engineering Faculty of MU is implemented in 10 bachelor's degrees and 10 master's degrees, and engages 800 students annually across more than 200 companies. The faculty promotes long term apprenticeships, divided into two stages in both the bachelor's and master's degrees, as shown in Figure 1.

The first stage is optional, and takes place in the 2nd and 3rd year of the bachelor's degree, and in the 1st year of the master's degree. In this stage students are studying and working part-time. On the other hand, the Degree Final Projects (second stage) are compulsory and are carried out full time.

In both stages, students receive financial remuneration based on the time dedicated to the apprenticeship, which is higher in the master's degree because of the greater level of expertise. Moreover, in the master's degrees remuneration is determined by the legally established minimum wage.

The grade of the dual activities significantly impacts the students' average mark, because of the number of ECTS assigned to this program in the curricula. MU is committed to increasing this credit recognition, which reflects the increasing prioritisation of dual apprenticeships as a critical component of higher education. Figure 1 illustrates the proposed breakdown of credits in the Engineering Faculty. The number of credits assigned to the dual activities is 6 and 9 ECTS in the part-time optional stage in the bachelor's degree, and 12 ECTS in the master's degree. In contrast, up to 60 and 30 ECTS are assigned to full-time degree final projects.

The percentage of students in the dual programme in each year ranges from 30 % to 50 % in the optional stage in the bachelor's degree, and up to 75 % in the master's degree. This percentage

rises to 100 % during the compulsory stage, reflecting universal participation as a fundamental requirement.

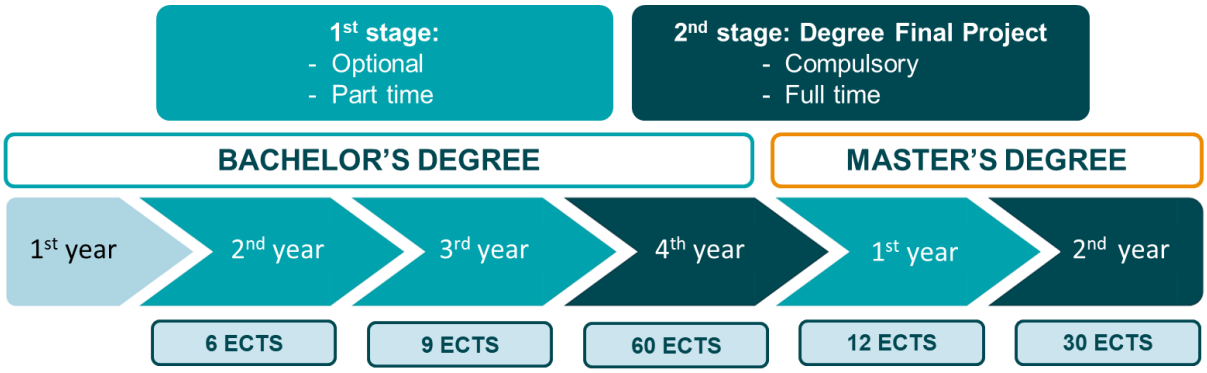

Figure 1. Dual program at the Engineering Faculty of Mondragon Unibertsitatea

2.2 Traditional dual monitoring and assessment in the Engineering Faculty of MU

Academic monitoring of the student throughout the apprenticeship is essential to ensure compliance with the training programme, and to collect evidence of integration into the company environment and their performance. The Engineering Faculty has three established milestones to carry out such monitoring:

1. Workplace integration. This takes place in the company during the first month after the apprenticeship starts. The student and tutors are introduced, and the training program is reviewed to check that the scope of the project is well understood. The academic tutor ensures that the student has received the necessary training in occupational health and safety. In addition, the work plan is reviewed to ensure that the work to be done is well aligned with the technical skills developed in the degree programme.
2. Mid-apprenticeship review. The student prepares a written report and an oral presentation of their achievements to date. The progress of the project is checked to forecast whether the planned objectives will be met within the established timeframe. Academic and company tutors carry out a qualitative assessment and then give feedback to the student, which offers insights for improvement during the remaining project period.
3. Final assessment. A panel composed of professionals from academia and companies, commonly including academic and company tutors, evaluates the final report and oral presentation of the project. This panel is responsible for determining the final grade of the dual apprenticeship.

All dual activities (at both optional and compulsory stages), irrespective of their dedication and duration, are assessed according to five dimensions. It is important to highlight that in addition to the technical skills of the apprentice, which covers the first dimension, soft skills are also integrated into the assessment. The breakdown of all dimensions is as follows:

1. Technical capacity.
2. Written communication.
3. Oral communication.
4. Work ethic & attitude.
5. Project impact analysis, from the economic, social, and environmental point of view.

In the rubrics used in the faculty, dimensions are evaluated by grading a number of given items, on a scale from 1 to 10, where 10 represents the maximum grade (Figure 2). However, no supporting evidence is indicated to ensure that the rating is objective and consistent. Tutors are asked to record written evidence to justify each mark, but doing so is not very common practice.

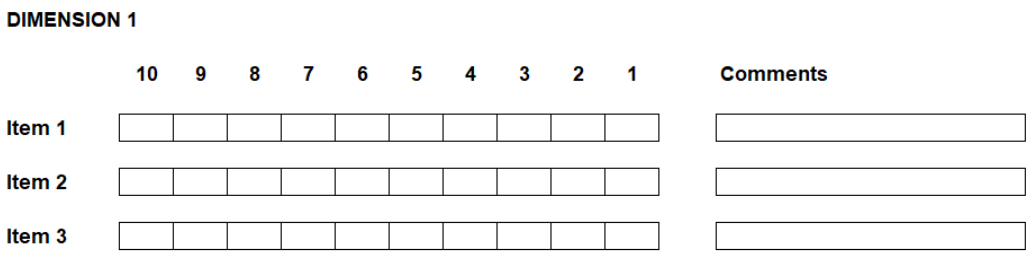

Figure 2. Traditional rubric at the Engineering Faculty of Mondragon Unibertsitatea

The final grade of the dual activity is calculated as the weighted average of the grade assigned to each dimension. This weight is 40 % for the technical skills, and 15 % for each of the other four dimensions. As stated in section 2.1, this grade carries significant weight in the overall assessment, demanding a fair, homogeneous, and evidence-based assessment for all students.

2.3 Assessment methodology and rubric proposal

A thorough and critical analysis was carried out of both the current student monitoring process, and the methodology and tools used for the assessment. The main key lines of work defined from this analysis are as follows:

1. Maintain the three milestones defined in the student monitoring process, and guarantee effective communication between the company tutor and the academic tutor. These milestones should prioritise face-to-face meetings or video-calls.
2. Maintain the five dimensions used in the assessment. The academic tutor must guarantee that they are used not only as a final evaluation, but also to give feedback, especially in the mid-apprenticeship review.
3. Review the items used to evaluate each dimension, and identify facts to uniquely assign a grade for each item. This helps to ensure that the mark is based on objective and measurable criteria, rather than individual subjective viewpoints.
4. Identify items that allow tracking a student's progress through successive stages of education, from bachelor's to master's degree.

The most significant change in the proposed rubrics lies in the revision of the items that correspond to each dimension, and the way they are assessed. Table 1 shows the items to evaluate each dimension.

Table 1. Items for grading assessment dimensions

Technical capacity	*Written communication*	*Oral communication*	*Work ethic & attitude*	*Project impact analysis*
Technical competence	Structure & content	Visual aids	Work management	Occupational health & safety analysis
Learning capacity	Format	Oral delivery	Creativity, initiative & motivation	Sustainable Development Goals (SDGs) analysis
	Style & communication	Defence of the project	Responsibility & personal commitment	Economic impact analysis
			Adaptability	

A list of facts was defined to describe what is expected of an apprentice in each item. Refinements were incorporated into the definitions of these facts, to grade students in the ranges 10-9, 8-7, 6-5, or below 5. Therefore, tutors are asked to locate the student at a range for each fact, depending on their performance, which ensures evidence-based grading. The grade for each item is determined by the average of the marks allocated for each fact.

Table 2 and Table 3 present examples of how facts are described to locate students in the grading ranges for the items “Style and communication” (“Written communication” dimension), and “Creativity, initiative, and motivation” (“Work ethic & attitude” dimension).

Table 2. Facts for assessing Style and communication item, in Written communication dimension

	10-9	*8-7*	*6-5*	*<5*
Fact 1	Excellent technical and formal language	Adequate technical and formal language	Appropriate language	Inappropriate language
Fact 2	Clear and precise communication	Clear communication	Somewhat ambiguous communication	Ambiguous and imprecise communication
Fact 3	Ideas well-organised and presented logically	Ideas organised and presented logically	Organisation and presentation of ideas could be improved	Inadequate organisation of ideas
Fact 4	No spelling or punctuation errors	No spelling or punctuation errors	Some spelling or punctuation errors	Spelling or punctuation errors

Table 3. Facts for assessing Creativity, initiative, and motivation item, in Work ethic & attitude dimension

	10-9	*8-7*	*6-5*	*<5*
Fact 1	Excellent at proposing ideas	Original in some aspects	Lacks original ideas	Does not propose own solutions
Fact 2	Works with enthusiasm	Works with enthusiasm	Poor enthusiasm	Does not show enthusiasm
Fact 3	Highly motivated	Motivated	Partially motivated	Not motivated

The rubric also considers a progressive assessment across all academic levels, from undergraduate apprenticeships to bachelor’s and master's degree final projects. This means that extra items are assessed in the master’s degrees, such as:

- Undertaking complex or multidisciplinary projects (“Technical capacity” dimension).
- Acquiring knowledge beyond their specialisation (“Technical capacity” dimension).
- Ensuring holistic vision (“Oral communication” dimension).
- Being aware of the impact of their work (“Work ethic & attitude” dimension).

As face-to-face evaluation of all the defined items could be lengthy in the final assessment, tutors prepare pre-analysed suggestions for the grading of each dimension. The company tutor is asked to take the responsibility of grading “Technical capacity” and “Work ethic & attitude” dimensions, given their close oversight of the student’s development. On the other hand, “Written communication” and “Project impact analysis”, owing to their academic focus, are most appropriately assessed by the academic tutor, who can ensure adherence to established benchmarks. Lastly, the “Oral communication” dimension is jointly assessed by both tutors in the evaluation session, after the student’s presentation takes place.

In addition, the student is required to self-assess their technical capacity. This evaluation is conducted on the basis of the planning established for the project, and takes into account the complexity of the tasks, the quality of the work performed, and the level of autonomy shown, which

enhances reflection and awareness of the student's own learning process. Self-assessment fulfils the following functions in the evaluation process: providing qualitative evidence of learning depth, enabling comparative analysis between student and tutors' perspectives, and enhancing feedback quality by revealing potential expectation gaps. While not directly influencing the quantitative assessment, this approach engages students as active participants in their evaluation and progress, and offers tutors valuable insights into workplace learning experiences.

With all this information, tutors collaboratively ratify the final grade for each dimension, integrating student self-assessment and tutor co-evaluation, to reach the overall final mark.

3 Results & Discussion

This methodology and assessment framework are currently undergoing validation by academic staff and industry-based company tutors. Preliminary feedback highlights significant improvements in both confidence and collaboration among stakeholders. Key outcomes emerging from the validation phase include:

1. Enhanced confidence in assessment consistency. Both academic and company tutors report a significant increase in confidence in the accuracy of the marking. This reflects the robustness of the rubrics for dual activities and the clarity of the co-assessment process.
2. Strengthened engagement of company tutors. The new framework reinforces the involvement of industry professionals in student training. Company tutors play a more active, structured role in mentoring and evaluation, integrating theoretical knowledge with workplace competencies.
3. Fostered academia-industry collaboration. The new methodology boosts stronger partnerships between academic institutions and the World of Work (WoW). Regular dialogue between tutors (grounded in shared rubrics and co-assessment practices) creates a coherent, reciprocal approach to student development. Co-assessment eliminates ambiguity because of sharing a common language between academia and industry partners, which benefits both students and curricula design.
4. Self-assessment as a tool for reflective learning. Student self-evaluation, integrated into the process, becomes instrumental in fostering metacognitive skills. Learners demonstrate greater awareness of their progress in dual competencies, aligning self-perception and tutor feedback.

Nevertheless, the specialised training of academic and business tutors was identified as a key element to ensure the effectiveness of the framework. Key components of the training include:

- Contextualisation of the pedagogical importance of dual training.
- Definition of the roles and responsibilities of each tutor.
- Key milestones in the process.
- Practical guidance and tools for giving constructive feedback.
- Guidelines and tools to ensure objective, consistent and evidence-based evaluation.

Effective tutor training, both in academic and workplace settings, substantially strengthens dual programmes by bridging academic and workplace culture and assessment practices. However, significant challenges persist in implementation. Company tutors frequently face time constraints as they combine mentoring responsibilities with their regular professional workload, inevitably limiting training availability. Furthermore, the varied educational backgrounds of company tutors demand highly adaptable training approaches to ensure effective engagement. To address these challenges, initiatives like the EU4Dual project (European Commission, 2023) are developing structured training modules that combine pedagogical foundations with practical tools and mentoring strategies, offering flexible formats as blended learning and micro-credentials.

Once the design phase of the rubric is completed, pilot implementation tests are planned to evaluate its added value in enhancing assessment quality, and to identify optimisation needs through real-case applications. A recognised consideration is whether the new rubric may impose additional workload demands on tutors. This aspect will be objectively evaluated during pilot testing through quantitative time-tracking measures and qualitative feedback. The goal of the proposed rubric is to save tutors time, not create extra work, by making assessments clearer and less tedious.

The preliminary findings confirm the potential of the methodology to reshape dual-activity assessment in higher education. By combining academic and industry perspectives, the framework not only increases the rigour of assessment, but also enriches the student experience and prepares learners to thrive in an evolving professional landscape.

4 Conclusions

The assessment of dual activities in higher education demands an approach that balances academic rigour with workplace relevance. This work proposes a methodology designed to address these complexities through three pillars:

1. A multi-dimensional assessment framework. By standardising criteria across five core dimensions (technical capacity, written and oral communication, work ethic and attitude, and project impact analysis) the proposed rubric ensures a comprehensive evaluation of student skills. This structure not only mitigates subjectivity but also aligns academic and industry expectations, guaranteeing grading consistency across assessment panels.
2. Evidence-based grading through identifiable benchmarks. The systematic identification of observable, evidence-supported facts for each assessment item has proven critical to objectivity. By anchoring grades to recorded data the methodology ensures homogeneity of assessments while providing transparent evidence for accountability.
3. Holistic and collaborative assessment. Integrating co-assessment (between academic and company tutors) with student self-evaluation creates a 360-degree view of apprentice progression. This triangulation of perspectives enriches the quality of feedback, enabling students to merge self-perception with external observations. Furthermore, continuous improvement loops are embedded into the process, ensuring iterative refinement of both student skills and assessment practices.

The success of the methodology relies on providing tutors with the resources to effectively engage with the combined academic and professional dimensions of the framework. Targeted training for both academic and industry tutors must address the pedagogical and professional significance of dual higher education, roles and responsibility of tutors, process milestones, assessment tools, and strategies and guidelines for feedback, among others.

Preliminary validation underscores the potential of the methodology to bridge the academia-industry gap, transforming dual-activity assessment a tool for student and institutional growth.

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UNDERSTANDING STUDENT DROPOUT IN HUNGARIAN TECHNICAL HIGHER EDUCATION: A MIXED-METHODS STUDY AT JOHN VON NEUMANN UNIVERSITY

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Abstract
Reducing dropout rates in higher education is a pressing issue globally. This study investigates the key causes of student dropout at John von Neumann University in Hungary, using a mixed-methods approach. Quantitative data were collected through a survey of 147 fourth-semester students, while qualitative insights were gained via eight in-depth interviews with students who had dropped out. The research aims to identify institutional and personal factors contributing to dropout and to formulate actionable recommendations. Findings suggest that financial pressures, academic challenges, and mismatches between student expectations and institutional demands are critical contributors. Dual higher education emerged as a potential mitigating factor. The study concludes with practical suggestions for institutional reforms and outlines directions for future research.

1 Introduction

In Hungary, as in many other countries, higher education institutions face increasing challenges related to student dropout. According to national statistics, approximately 100,000 students apply to Hungarian universities each year, of whom around 80,000 are admitted (Szemerszki, 2018). Despite these high enrolment rates, dropouts remain a major concern (Deuer et al., 2024). For instance, dropout rates in engineering BSc programs range between 40% and 44% (Demcsákné & Huszárik, 2020).

The consequences of student dropout are significant for both institutions and individuals. Students who live without completing their degrees lose time and resources, while institutions face reputational and funding challenges. Therefore, it is essential to understand the underlying causes of dropout in order to develop effective intervention strategies.

Dropout refers to students leaving their higher education institution without obtaining a degree, either within or beyond the designated study period. This outcome is detrimental not only to institutions but also to students, who may invest months or even years pursuing a goal they ultimately do not achieve.

John von Neumann University, located in Kecskemét, Hungary, is no exception. The institution makes significant efforts to ensure that enrolled students successfully complete their programs. One of the greatest challenges in this endeavour is maintaining academic standards without compromising quality. It would be reductive to assume that simply easing course requirements could resolve the issue. This is especially true because dropout is not solely the result of repeated academic failure.

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Multiple factors contribute to this phenomenon, with their significance varying depending on program type (BSc or MSc), study format (full-time, part-time, evening), funding model (state-funded or self-financed), and field of study (e.g., engineering, business, law, or medicine). Additional contributing factors must also be considered, and identifying and ranking them is an integral part of this study (Sági & Fülöp, 2024).

The issue of student dropout has been extensively studied since the 1970s, most notably through the work of Tinto (1975), who described dropout as a gradual process with identifiable early indicators. Tinto's theory emphasizes academic and social integration as key elements in student persistence. This framework, along with more recent European studies (Wollscheid et al., 2015; Deuer et al., 2024), serves as the theoretical foundation for this research.

Although the phenomenon has been examined for nearly five decades (Szemerszki, 2018), little is still known about the decision-making processes that lead to dropout, particularly as the underlying causes vary from one institution to another.

The aim of this study is to formulate recommendations for reducing student dropout at John von Neumann University. To achieve this, a literature review will first be conducted to examine dropout prevention measures implemented by domestic and international higher education institutions, as well as methods for identifying the causes of dropout. This will be followed by primary research involving student surveys aimed at uncovering the reasons why dropout is becoming increasingly prevalent. Both interviews and internal questionnaire-based surveys will be conducted, with survey questions largely informed by the literature review. Due to limitations in sample size for interviews, questionnaires will be distributed during lectures and completed using students' phones, tablets, or laptops. This approach facilitates the inclusion of a wider range of student groups and enhances the reliability of the findings.

Based on the results, institution-specific recommendations will be developed and proposed for implementation at John von Neumann University. In the short term, a decrease in dropout rates can be expected, likely materializing over two to three semesters. In the longer term, improvements in education quality and student satisfaction may contribute to an increase in the number of applicants. Globally, participation in higher education continues to rise. Whereas universities historically served to educate society's elite, this is no longer the case. Increasingly, students from disadvantaged backgrounds are also pursuing higher education, marking a shift that has prompted numerous internal transformations (Trow, 2007).

This study investigates the reasons behind student dropout using both primary and secondary research, with the aim of proposing practical, evidence-based solutions tailored to the institutional context.

1.1 Location

The continuously expanding and diversifying higher education sector clearly reflects a steady increase in equal opportunities, enabling institutions to attract a broader and more heterogeneous student population (Wollscheid et al., 2015). However, the growth in student enrolment also introduces new risk factors. According to the law of large numbers, dropout rates tend to increase in proportion to enrolment growth, often exceeding the average.

Herzog (2005) addressed this issue in his study, concluding that dropout is not solely the result of financial hardship or insufficient academic preparation. A significant contributing factor is the geographical distance between a student's residence and the institution. Consequently, some students prioritize the availability of dormitory accommodations when choosing a university or college, hoping to secure on-campus housing and thereby avoid the financial and logistical burdens of commuting or renting an apartment.

1.2 Student Enrolment

Kim and Kim (2018) reported notable findings in their study on the frequency of student dropout. Their first observation was that institutions with smaller student populations demonstrated better

student retention. This suggests that closer teacher–student relationships may form in such environments, making it easier for students to share their difficulties, complaints, or concerns.

Another key finding was that higher education institutions with greater emphasis on academic activities, such as research and publishing intended to exhibit higher dropout rates. A possible explanation is that the increased workload of faculty members may limit opportunities for meaningful engagement with students, thereby weakening the teacher–student relationship. This second finding reinforces their initial conclusion regarding the importance of interpersonal connection in student persistence.

This outcome is particularly intriguing in the Hungarian context, where the Scientific Student Conference (in Hungarian: Tudományos Diákköri Konferencia, TDK) is specifically designed to foster student interest in research and to strengthen bonds between students and faculty. However, Kim and Kim's results suggest that teaching and research activities do not always reinforce one another in practice, potentially highlighting a tension between institutional missions (Kim & Kim, 2018).

1.3 Family and Economic Background

Due to their economic, cultural, and educational backgrounds, some young people face significant barriers to entering higher education. In contrast, for students whose parents hold a university degree, pursuing post-secondary education is often considered a natural or even expected progression (Chen, 2008). Although this disparity persists, the gap between these two groups is gradually narrowing, as education is increasingly perceived as a long-term investment. In this context, student loans are often viewed as a rational financial decision.

Students from less privileged financial backgrounds frequently take on part-time jobs while attending university. When such employment is related to their field of study, it can provide opportunities to apply theoretical knowledge in real-world settings, potentially enhancing academic performance. Furthermore, acquiring relevant professional experience during one's university years can be a valuable asset in the labour market, strengthening one's résumé. However, while working alongside studying can offer certain benefits, in practice, most student jobs do not align with students' academic interests or career goals and thus fail to provide these advantages (Viklund & Elgundi, 2024).

1.4 Gender

Gender distribution in dropout rates presents another important dimension of the phenomenon (Newcomb, 2002). A survey conducted in Hungary found that female students enrolled in BSc programs are significantly more likely to complete their degrees (60–61%) compared to their male counterparts (44%). This gender gap is also observed internationally, where completion rates tend to be slightly higher overall.

When comparing international data with domestic figures, Hungary falls into the mid-range. In several countries, such as Lithuania, Ireland, Cyprus, Luxembourg, Sweden, Norway, and Switzerland, more than 50% of students successfully complete their degree programs. In contrast, Hungary's completion rate is approximately 30%, highlighting room for improvement (Fortina, Lessarda, & Marcotte, 2010).

1.5 New Environment: Transitioning from High School

Primary and secondary education differ significantly from university education. One of the main reasons for this is the transition to adulthood, as universities educate students who are already 18 years old and considered "adults." As a result, different teaching (and learning) methods and expectations are applied, and even the environment itself feels unfamiliar (Casanova, Gomes, Bernardo, & Núnez, 2021). This transition happens almost overnight for newly minted adults, further intensifying the challenges. Overall, these changes can be seen as stress factors, which are compounded by academic requirements. In this context, new students must learn to organize and manage their curricular and extracurricular activities (Tinto, 2017). Successful students regulate their own learning

by implementing a range of cognitive, metacognitive, and motivational strategies that enable them to become self-regulated learners and construct their knowledge effectively (Pintrich, 2004). What truly defines self-regulated learners is not merely their use of learning strategies but rather their personal initiative, persistence in tasks, and competencies (regardless of the learning context or assessment outcomes). Students with lower academic expectations or those who experience a mismatch between their initial expectations and reality may face greater frustration and stress during their adaptation to higher education (Diniz et al., 2018).

Another major change in students' lives is choosing a course that aligns with their personal and professional interests and goals (something that does not always happen for many incoming university students). University admission systems are based on scores, which are calculated from high school grades combined with additional points awarded for academic achievements, sports, or socio-economic disadvantages. During the admission process, students rank their preferred institutions in order. Those with higher scores are more likely to be accepted into their top-choice universities. However, if they are not admitted to their first-choice institution, they are automatically placed in their second, third, or subsequent choices. This “numerus clausus” system prevents some students from enrolling in their preferred university and program, which may initially lead to weaker academic performance and, in some cases, even dropout (Ferrao & Almeida, 2018).

2 The role of research in reducing dropout

The primary aim of this research is to investigate the underlying causes of student dropout in technical higher education at John von Neumann University and to propose effective strategies for its reduction. The study seeks to answer the following research questions:

1. What are the main factors contributing to student dropout at John von Neumann University?
2. How do current students perceive their own risk of dropping out?
3. What insights can be obtained from students who have already dropped out?
4. Can dual higher education serve as a viable solution to reduce dropout rates?

Addressing these questions requires acknowledging the complexity of dropout as a multifaceted phenomenon influenced by numerous interrelated factors. One significant challenge lies in defining and accessing the appropriate target population, particularly former students who have already left the institution. Their experiences are crucial yet reaching them poses logistical difficulties. To overcome this, the study targeted two distinct groups:

- Current BSc students in their fourth semester
- Former students who dropped out within the past two academic years

A quantitative survey was administered to the current student cohort, while qualitative data was collected through in-depth interviews with former students. Additionally, secondary data sources were consulted to provide further context and support the primary findings.

The effectiveness and validity of the research depend on selecting the most appropriate methodological approach for each research objective. To that end, the individual tasks, methods, and data sources are detailed separately. Central to this design is the categorization of research participants, which determines the selection of sampling and data collection strategies. The two main participant groups (current students and former dropouts) necessitate distinct methodological approaches and are therefore treated separately in the subsequent sections.

This study employs a mixed-methods research design that integrates both quantitative and qualitative data. Data collection was conducted during the 2023/2024 academic year. Ethical approval was granted by the Ethics Committee of John von Neumann University, and written informed consent was obtained from all participants prior to their involvement in the research.

2.1 Questionnaire survey

In this phase of the research, the target group consisted of students actively enrolled in their studies, whose opinions and experiences could most effectively be captured through a structured survey. As participation could neither be mandated nor coerced, sampling was conducted on a voluntary basis.

To maximize response rates, the survey was administered at the end of a lecture with the highest attendance among students following the standard fourth-semester curriculum. Fourth-semester students were selected intentionally, as they had already accumulated sufficient academic experience and were approaching the point of specialization selection, making them well-positioned to reflect on both past challenges and future academic decisions.

The questionnaire was distributed to 147 students during a scheduled lecture session. Participation was entirely voluntary, and responses were collected anonymously to ensure confidentiality and to encourage honest feedback. The survey, created using Microsoft Forms®, contained both closed and open-ended questions covering:

- Family background
- Education history
- Financial situation
- Student life and academic experience

The questionnaire consisted of several sections containing predefined response options to facilitate comparability during data analysis. These included a combination of binary (yes/no) questions, multiple-choice questions offering between two and six possible answers, and Likert-scale items spanning multiple statements. This structure aimed to ensure consistent and interpretable results across participants. The final two items in the survey were open-ended questions, designed to elicit students' individual perspectives. These questions were accompanied by the instruction "answer in a few sentences", providing guidance while still allowing for elaboration if desired. Students were allotted 45 minutes to complete the questionnaire, which was administered in-class and restricted to completion within the classroom environment. The survey was conducted anonymously to encourage candid responses and foster a sense of psychological safety in sharing personal experiences.

2.2 In-depth interview survey

To gain a deeper understanding of the personal factors contributing to student dropout, in-depth interviews were conducted with individuals who had discontinued their studies. The interviews aimed to explore the personalities, motivations, and specific circumstances underlying their decision to leave higher education, as well as to identify what changes, if any, they believed could have enabled them to complete their degree.

The email addresses of students who had withdrawn during the previous semester were provided by the Academic Office of John von Neumann University, which maintains official records of former students. A total of 58 email addresses were made available. These were handled with strict confidentiality, and the invitation to participate in the interviews was sent using blind carbon copy (BCC) to protect the recipients' identities.

Conducting in-depth interviews presents specific methodological challenges. To ensure that the conversations yielded rich, relevant insights, the interviewer needed to be well-prepared, concise, and approachable. For this reason, the interviews were conducted in the later stages of the research process. This allowed insights gained from the design and analysis of the quantitative survey to inform the development of a structured interview guide tailored to the research objectives.

The interviews followed the "funnel technique": each session began with general, informal conversation intended to put participants at ease. Once rapport was established, the discussion gradually transitioned to more focused questions relating to their academic experiences and reasons for dropout.

3 Results & Discussion

This chapter presents the analysis and evaluation of the data collected through questionnaire surveys and in-depth interviews. Quantitative data were processed using descriptive statistical methods and cross-tabulations to identify patterns and relationships so for example, the association between sources of income and students' perceived risk of dropout.

Qualitative data obtained from interviews were analyzed using thematic coding. The analysis focused on identifying recurring motives, personal narratives, and structural barriers that contributed to dropout decisions. By integrating both quantitative and qualitative findings, this chapter aims to provide a comprehensive understanding of the factors influencing student attrition at John von Neumann University.

3.1 Evaluation of the questionnaire survey

Survey results indicated that 78% of fourth-semester students still live with their parents and receive financial support from them, see Figure 1.

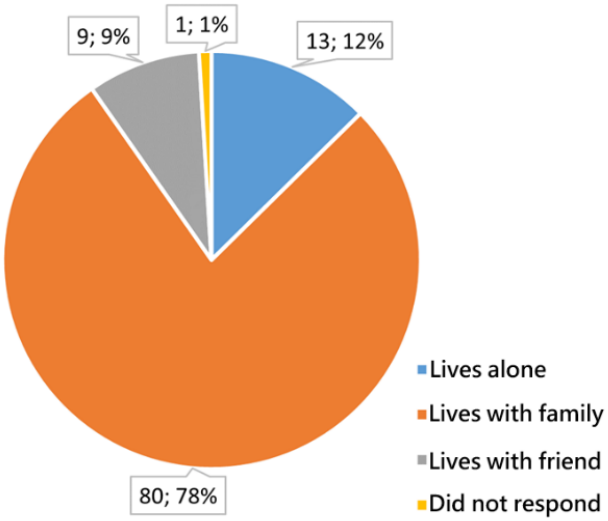

Figure 1. Who do the students live with?

The findings indicate that parental support continues to play a significant role in the lives of fourth-semester students. This conclusion is further supported by responses to the question, "How do you earn your income?" Participants were allowed to select multiple options from three categories: I work, I receive a scholarship, and My parents support me. A total of 59 students reported receiving financial support from their parents, with 14 selecting this as their sole source of income. These results underscore the continued importance of parental financial support. When combined with the observation that most students still live with their families, it becomes evident that greater attention should be given to engaging and informing parents in the educational journey.

Alarmingly, half of the students surveyed (51 respondents) reported that they had considered leaving university to enter the workforce or pursue vocational training. This concern is compounded by the fact that approximately two-thirds of respondents (65 students) stated that, if given the chance to apply again, they would opt for a dual higher education program. These findings suggest that many students are seeking alternatives that combine practical work experience with academic learning.

Regarding students' financial situations (specifically, their self-reported monthly budgets) no statistically significant correlation was found when compared with other variables. However, a few patterns emerged. Among students living on less than €100 per month, two-thirds rely on parental support. In contrast, among those managing more than €400 per month, less than half receive such support, indicating that higher-income students are more likely to be financially independent.

Additionally, a considerable proportion of students reported managing on less than €200 per month, and the number of students earning between €200 and €400 per month was roughly equal to those earning below €200.

A potential solution to these financial challenges could be the implementation of a high-value scholarship system. However, given current economic constraints and the fact that universities do not receive discretionary funding for direct student support, such a solution is currently not feasible. Therefore, alternative models must be considered, particularly those that benefit both students and their institutional or industry partners. One such model is the dual higher education program, which provides students with structured opportunities to gain professional experience while pursuing academic studies.

Notably, employment among students appears to increase as they progress through their studies. While approximately 50% of first-semester students were employed, this figure rose to 60% among fourth-semester students. This trend suggests that as students advance, the perceived or actual need to work while studying intensifies. Interestingly, even after just one semester, one-quarter of first-semester students were already considering leaving university to pursue vocational education, while nearly 40% expressed a preference for entering the workforce over continuing their studies. These findings further highlight the importance of the dual education model, in which students solve real-world industrial problems, often directly linked to their academic field.

Unfortunately, half of the students who completed the questionnaire (51 respondents) have already considered leaving the university to enter the workforce or pursue vocational training. This concern is further reinforced by the fact that two-thirds of the respondents (65 students) stated that, if given the opportunity to apply again, they would choose the dual education program.

As can be observed, there are cases in which it is difficult (or nearly impossible) to determine the most effective method for reducing student dropout. One of the survey questions asked, “Where did you complete your secondary education?”, to which students could respond by choosing either grammar school or vocational secondary school.

A review of historical data shows that, in the past, the majority of students came from vocational schools, while graduates of grammar schools were relatively rare. The reason for this was that grammar school students typically continued their studies at large urban universities (particularly in Budapest) pursuing degrees in law, medicine, or economics, or enrolling in engineering programs at the Budapest University of Technology and Economics (BME).

However, the current survey revealed a shift: 68 respondents had attended grammar schools, while only 34 came from vocational schools, exactly half as many. Several factors may explain this trend; one possibility is that the perceived value of a degree earned at the GAMF Faculty of Engineering and Computer Science, John von Neumann University has increased among students. Supporting this interpretation is the fact that, in response to the survey question “Why did you choose GAMF?”, most students selected options such as “I consider the program to be high-quality” and “I heard good things about the university.”

Naturally, investigating why an increasing number of grammar school graduates choose to enroll may be worthwhile from an admissions perspective, but it is largely irrelevant in the context of dropout analysis. What does pose a challenge, however, is that instructors at the GAMF Faculty have become accustomed to a certain baseline level of knowledge among incoming students. This shift in student background has significantly altered expectations, as grammar school graduates often lack the same level of preparation in mathematics and physics as those coming from vocational schools.

An additional challenge arises with students who were admitted to NJE but had originally applied to technical programs at other universities or, in worse cases, to non-technical programs. For the latter group, integrating into the technical academic environment may prove especially difficult and could further increase the risk of dropout.

Another interesting finding is that 15% of the survey respondents indicated that, if given the chance, they would no longer choose to pursue engineering. This is particularly noteworthy given that these same students also reported that they would recommend GAMF to their peers. This suggests that these students may have chosen the wrong career path. Supporting this interpretation is the fact that the majority of them answered yes to the question: “Have you ever considered transferring to another university or program?”

Taken together, the data suggest that financial independence, academic pressure, and a lack of clear expectations are major contributing factors to student dropout. The dual higher education model may offer a viable framework for addressing these challenges by integrating academic content with practical experience and income-generating opportunities.

3.2 Evaluation of the in-depth interview survey

Eight former students (aged 21–31) participated in the in-depth interview survey. Each of them was interviewed via Teams. The survey participants were women between the ages of 21 and 26, and men between the ages of 21 and 31. All of them had left university in the past year and none of them had continued their studies. Interviews followed a semi-structured guide using the funnel technique to build rapport. Each interview lasted approximately 30–45 minutes and was transcribed. Thematic analysis was conducted following Braun and Clarke's (2006) methodology. On average, each transcript comprised 4–6 pages.

An unexpected finding emerged from the interviews: of the eight former students who participated, only two were unmarried (a 24-year-old woman and a 21-year-old man) and five of them already had children. This is particularly noteworthy given that the majority cited family responsibilities as a major obstacle to continuing their studies. Based on these accounts, it can be inferred that students with families face a significantly higher risk of dropout, underscoring the need for targeted support mechanisms tailored to their needs.

The interviews revealed that five of the eight participants dropped out shortly after the COVID-19 pandemic. During the period of distance learning, these students were able to work while studying, benefiting from the flexibility that online education provided. However, once traditional in-person instruction resumed, they found it increasingly difficult to balance academic obligations with family and work responsibilities. All eight respondents left the university during the semester when normal classroom-based instruction was reinstated. One participant reflected on her experience as follows: *"My second semester was coming up, but I already felt that I wouldn't be able to attend, so it happened. I decided to drop out within two weeks."* (female, 24)

This case illustrates the importance of offering more flexible learning options, particularly for students with caregiving responsibilities. While full-time attendance may not be feasible for all, hybrid or part-time formats (including correspondence education and online lecture streaming) could provide a viable alternative. Implementing such measures could play a key role in reducing dropout among students with families.

About the students' future plans, several of them indicated that they would really like to continue studying because they feel the need to, but *"…no matter how much they want to, time doesn't allow it anymore."* (male, 26). Some of them stated that *"I still have the time and inclination, but I wouldn't be able to finance the training financially"* (male, 21).

Most of their suggestions for eliminating dropouts are useful, a list some of them:

- *Young people should teach in the practices, who follow the trend and technology* (male, 24).
- *Block correspondence courses and immediately after them in-person, exams should also be brought forward* (male, 31).
- *Reduce the number of daily classes and have a lunch break* (female, 24).
- *If there was online education, you would still have to go to write the papers* (male, 21).
- *The curriculum should be coordinated with the industry and updated so that we would be more willing to learn* (male, 26).
- *There should be only one platform, no need for Teams, so that information would flow more easily* (male, 24).

Among the proposed interventions, enhanced coordination with industry emerged as the most critical recommendation, clearly underscoring the relevance and potential of the dual higher education model. This form of cooperation not only supports students in applying theoretical knowledge in practical settings but also contributes to their financial stability and career development. The key

findings derived from the in-depth interviews are summarized in Table 1, which presents the most frequently cited reasons for dropout and potential institutional responses.

Table 1. Summary of the in-depth interview

Gender	*Age*	*Study Mode*	*When did they leave the university?*	*Did they seek help before leaving?*	*What should the university change?*	*Would they return to NJE?*
Female	24	Full-time	2022	Yes	More timely information	Yes
Male	21	Part-time	2022	Yes	Increase the number of midterms and schedule them earlier	Yes, if education is online
Female	21	Part-time	2021	Yes	Provide more detailed information about midterms	Yes
Male	23	Full-time	2021	Yes	Allow make-up exams for non-exam subjects in the cross-semester	Yes
Male	24	Full-time	2021	Yes	Increase and modernize practical sessions	Yes
Male	26	Part-time	2021	Yes	Instructors should inform students in time	No
Female	26	Full-time	2022	Yes	Offer tutoring or exam preparation for certain subjects	No
Male	31	Part-time	2021	Yes	Reinstate online education and consolidate subjects	Yes, if education is online

4 Conclusions & Recommendations

In contemporary higher education, a significant portion of students admitted to universities and colleges discontinue their studies before completing their degrees, so in other words, they drop out. While student attrition is not a new phenomenon, it has become increasingly prevalent in recent years. In the past, admission to higher education institutions was considerably more selective, which often motivated students to persist through challenges to avoid dismissal. Today, as admission criteria have become somewhat more accessible, a larger number of students pursue post-secondary education. However, many encounter a range of academic, financial, or personal obstacles that impede their progress and lead to early withdrawal.

All higher education institutions strive to reduce dropout rates, yet no universal solution has been identified. This is primarily because the factors contributing to dropout vary significantly from one institution to another. John von Neumann University is no exception: addressing its dropout rate effectively requires a thorough understanding of the specific factors influencing its student population. To identify these contributing factors and develop targeted interventions, both secondary and primary research methods must be employed. Secondary research provides general insights through the analysis of existing literature and national data, while primary research enables the collection of specific, institution-level information directly from students.

Current students represent a valuable source of information, as they are typically aware of the difficulties their peers face, as well as their own challenges. Given the large population size, quantitative surveys are well-suited to gather data from this group. In contrast, for students who have already dropped out—where the sample size is smaller—qualitative in-depth interviews are more appropriate. These interviews follow a semi-structured guide and offer a more personal, flexible format, allowing participants to share experiences and insights that might otherwise go unreported.

Survey results indicate that the majority of students still reside with their families. This raises the question of whether increased parental involvement in university communication might be beneficial, particularly given students' ongoing financial dependence. Although many students strive for independence, securing adequate financial resources remains a challenge. As a result, numerous

students take on part-time jobs, which can negatively affect their academic performance. One possible institutional response is to involve students in externally funded corporate projects. This approach would not only offer financial support but also provide meaningful, hands-on experience that enhances their academic learning and professional development.

Another noteworthy trend observed in the data is the changing composition of the student body. While the number of students entering from general secondary schools has doubled, the proportion of students from vocational schools has declined by half. This shift may indicate a lack of preparedness among some entrants, particularly in foundational subjects, thereby increasing their risk of academic failure. A potential solution could involve the introduction of preparatory courses for secondary school students, led by university instructors. Such courses could serve dual purposes: supporting students' readiness for higher education and acting as a criterion in the admissions process or as a component of early academic support strategies.

A total of eight former students participated in the in-depth interviews. While the sample size was limited, the insights obtained were particularly valuable. One key finding was that part-time students expressed a strong preference for online instruction which format implemented during the COVID-19 pandemic but discontinued shortly thereafter. The abrupt return to in-person learning was perceived negatively by many, with several participants citing this shift as a contributing factor in their decision to discontinue their studies. Overall, the in-depth interviews proved highly informative. As the interviews progressed, mutual trust frequently developed between interviewer and participants, allowing for open and candid discussions of sensitive topics that might otherwise have remained unspoken. To support this level of openness, it is essential that the interviewer be a neutral university staff member with no prior relationship or interaction with the interviewee. This approach fosters a sense of impartiality and confidentiality, which encourages honest and reflective responses.

Student dropout remains a complex and multifaceted challenge. At John von Neumann University, the combination of financial stress, rigid academic structures, and inadequate institutional support appears to be major drivers of attrition. Based on this research, the following recommendations are proposed:

- Implement more flexible learning formats, including online and hybrid classes.
- Expand the dual education program to enhance practical engagement and financial support.
- Improve institutional communication with both students and parents.
- Offer preparatory and remedial courses for students from disadvantaged educational backgrounds.

While this study offers valuable insights into the factors contributing to student dropout, it is not without limitations. The small sample size of the in-depth interviews limits the generalizability of the qualitative findings, and the study's focus on a single institution restricts the broader applicability of its conclusions. Future research should expand to include multiple higher education institutions and explore the longitudinal outcomes of implemented interventions to assess their sustained effectiveness. Reducing dropout rates is a complex and resource-intensive endeavor. Although some proposed solutions may involve significant costs or structural changes, their potential long-term benefits, such as improved student retention, enhanced academic performance, and increased institutional reputation may far outweigh the initial investment.

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