

THESES OF THE DOCTORAL (PhD) DISSERTATION

DUAL EDUCATION: EXPERIENCES AND DEVELOPMENT DIRECTIONS IN HIGHER EDUCATION

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1. THE BACKGROUND, OBJECTIVES AND HYPOTHESES OF THE RESEARCH

1.1. Background of the research

The focus of my research was on the characteristics of dual training, the results of its introduction so far, and the possibilities for further development. The similarities and differences between Hungarian and other foreign models were presented. It was collected the experiences of the two main actors of the dual system, students and partner organisations, and to draw lessons.

Hungarian higher education is often criticised for not providing sufficient opportunities for practice-oriented education in the traditional education system. This is not least due to the low number of teachers with business experience. A key role should therefore be played in adapting the structure of training to the actual needs of employers and in teaching professional skills that can be immediately applied in the workplace. In this process, a well-functioning dual education system can be of great help (POÓR et al., 2019). Gaps in the higher education system make it difficult for firms in the labour market to find the right skilled workers for their needs. The industry has formulated its expectations and one of the responses to this has been/can be the introduction of dual training (PALKOVICS, 2016). The good international and domestic experience in the higher education training system and the growing demand on the labour market have justified the introduction and regulation of the possibility of dual training as a special form of practice-oriented training in addition to practice-oriented training. In the 2015/2016 academic year, higher-level dual training courses in the fields of engineering, IT, agriculture and economics were launched by the institutions in cooperation with partner companies and other organisations (FOCUS IN HIGHER EDUCATION - 2015).

At the end of 2014, I learned firstabout the dual training, and in June 2015 we organised a Dual Training Information Day at the Faculty of Science and Technology, where we reviewed the characteristics of dual training and the possibilities of its introduction with the participating companies. Since then I have been following the history of dual training, collecting and analysing experiences of its introduction and operation. Based on these experiences, I decided to focus my doctoral research on this area.

1.2. Objectives of the research

C1 - Investigate whether a dual system can help alleviate skills shortages

C2 - Identify the lessons learned since its introduction

C3 - Identify the different ways in which the dual training system in higher education has been introduced by different higher education institutions and partner organisations

C4 - To assess the success of the introduction of the dual training system from the point of view of the actors involved

1.3. Research hypotheses

H1 - The partner organisations involved in dual training are primarily motivated by the need to solve their problems of labour shortages

H2 - Students choose dual training primarily for labour market reasons

H3 - Knowledge acquired at university and training in partner organisations complement each other to help the student during the training

H4 - Students in dual training will make significant progress in soft-skill skills in addition to professional knowledge

H5 - The type of tasks and the degree of mentoring received from the partner organisation will determine the success of the dual training from the student's point of view.

H6 - Overall, partner organisations do not regret their participation in the dual training, it has fulfilled their expectations.

H7 - The majority of students who graduated from dual training have found a job in a dual training place after graduation.

For the sake of clarity, I have prepared a table (**Table 1**) which presents the research objectives, the related hypotheses and the analytical methods used in the research.

1. table : Relationships between objectives, hypotheses and methods used

Goals	Hypotheses	Method
C1 - Investigate whether a dual system can help alleviate skills shortages	H1 - The partner organisations involved in dual training are primarily motivated by the need to solve their problems of labour shortages	Text mining, frequency ranking
	H2 - Students choose dual training primarily for labour market reasons	Text mining, frequency ranking
C2 - Identify the lessons learned since its introduction	H3 - The knowledge acquired at university and the training in the partner organisation mutually support the student during the training	Frequency analysis, two-sample t-test, statistical indicators
	H4 - Students participating in dual training will experience significant progress in soft-skill skills in addition to professional knowledge	Statistical indicators (measures of dispersion, means), Wilcoxon test
C3 - Identify the different ways in which the dual training system in higher education has been introduced by different higher education institutions and partner organisations	H5 - The type of tasks and the degree of mentoring received from the partner organisation will determine the success of the dual training from the student's point of view.	Kruskal-Wallis test and Dunn's post-hoc test
C4 - To assess the success of the introduction of the dual training system from the point of view of the actors involved	H6 - Overall, partner organisations do not regret their participation in the dual training, it has fulfilled their expectations.	Pearson correlation, frequency analysis
	H7 - The majority of students who graduated from dual training have found a job in a dual training place after graduation.	Ratios, statistical indicators, frequency analysis

Source: Author (2024)

2. DATABASE AND DESCRIPTION OF THE METHODS USED

One of my research methods was to review foreign and domestic literature and, with the help of this, to identify the trends of dual education. In the literature review, I first examined international dual systems, then the history of dual training in Hungary and the circumstances of its introduction. I also reviewed the legislation, the characteristics of the domestic dual system and the experience gained so far. I collected available data on the dual training system and its actors in Hungary.

After the literature review, the focus was on primary data collection. The research involved a questionnaire survey of students and partner organisations studying in a dual format.

Questionnaire surveys are one of the most common primary research methods. It is a method of direct data collection and analysis that is appropriate to the research objective. Its popularity is due to the fact that a large and representative amount of data can be obtained in a short period of time. An important element is the choice of the most appropriate survey questionnaire (Figure 1).

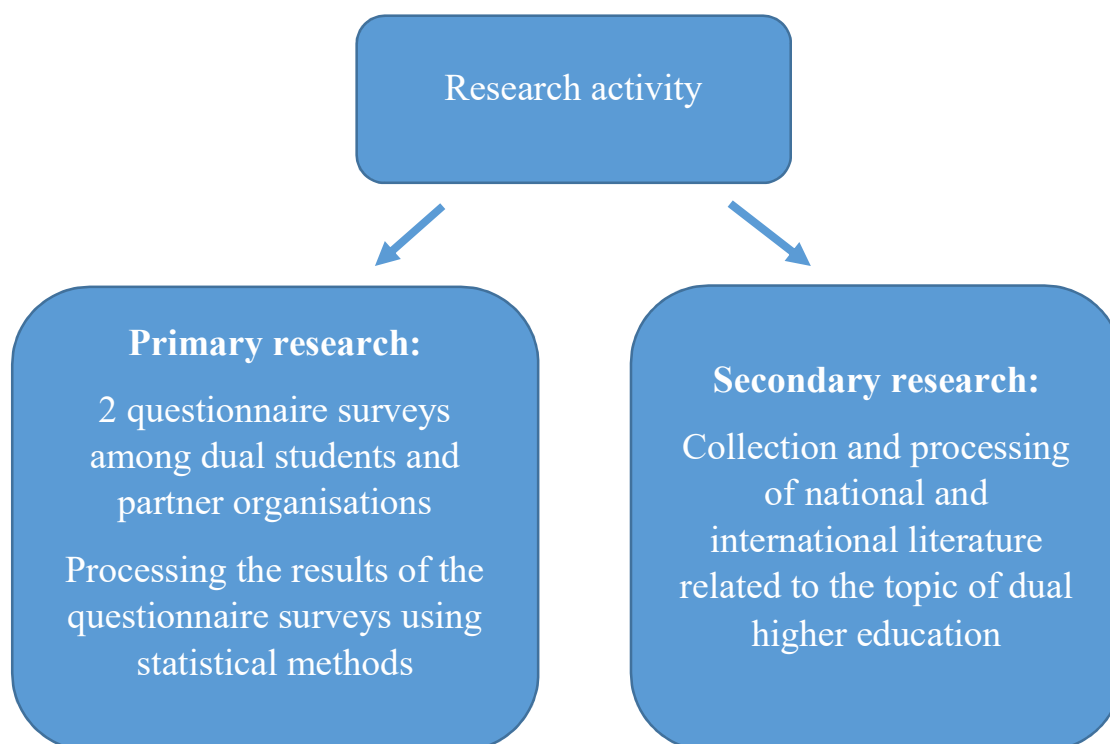


Figure 1 - Types of research used in the preparation of this thesis.

Source: Author (2024)

Typically, I conducted quantitative research, as I considered it important to collect and analyse a large amount of data and information, both in terms of literature and in terms of opinions and experiences. In line with this aim, I decided to use questionnaire surveys.

The responses to the questionnaires were summarised in an excel spreadsheet. SPSS Statistics version 24.0 was used for analysis, while tables and graphs were created using Microsoft Excel 2016 and RStudio Desktop.

2.1. Presentation of data related to the primary research

2.1.1. Data related to the student questionnaire survey

The database for the analysis was compiled through a questionnaire survey, which measured students' experiences of dual training in the first semester of 2022. The questionnaire was completed electronically by students on a voluntary basis. The questionnaire was sent to the students of 4 faculties of the University of Debrecen, which are the determining faculty for dual training, and they were asked to fill it in. The faculties concerned are. The call was sent to students via the Neptun Study System, a total of 348 students. 156 responded to the questions.

The majority of students who completed the questionnaire were accounting majors (nearly 20%), followed by management and organization majors (14.7%). There were equal proportions of electrical engineering and supply chain management students (10.2%), while there were also a larger number of chemical and mechanical engineering students (9.6% and 7.0%). The remaining students were mixed across other majors.

Of the 156 respondents, 45% were women, 47% were men, while the remaining nearly 8% were unspecified or did not respond. Most lived in a city or county town (34-35%), while 18% lived in a village.

The father's education was predominantly secondary (59%), while the mother's was tertiary (50%). 2.6% of parents had primary education.

2.1.2. Data related to the partner organisation questionnaire survey

The database for the analysis was compiled through a questionnaire survey to measure partner organisations' experiences of dual training in the second half of 2022. The questionnaire was completed voluntarily by the partner organisations either electronically or by phone with the help of a survey officer. The list of partner organisations to be contacted was compiled on the basis of the database of felvi.hu. The database contains the data of enterprises and institutions registered in Hungary and involved in dual training, with a view to ensuring that the sample covers the widest possible range of dual training. 400 partner organisations were successfully contacted and completed the questionnaire.

Organisations involved in dual training operate in a wide variety of sectors. By economic sector, a significant proportion of the partner organisations (221, 55%) were active in industry, while the remainder (142, 35%) in services and R&D and agriculture (37, 9%).

Most partner organisations were involved in other industrial activities. In this category, those who did not clearly indicate what kind of industrial activity they were engaged in (they only indicated "industry") and those who described their activity as "manufacturing" participated. In addition, all firms for which it was not possible to create a multi-actor category were included (e.g. paint production and coal activities were also included in this category, as the number of items was very low).

The second most common category was agriculture, which included forestry and game management. This included fragments that referred to agriculture (e.g. wine, pigs, game, forest, biology) in addition to the traditional 'agriculture' designation.

Many of the dual partner companies were engaged in other service activities, which included all the names where only the word "services" was used. They also included communication, creative activities, design and production services, warehousing services, tourism and passenger transport, consultancy, education, and other services such as air transport, civil activities, district heating services or newspaper publishing, for example. The other categories were characterised by a relatively simpler delineation. Common categories included tourism and hospitality, machinery and automotive, and food services. The difference between the machinery and automotive categories was that automotive was usually named, whereas machinery was listed as a sector, while machinery, engine or turbine manufacture was listed as a sector.

The remaining categories were relatively well classified, but therefore included fewer enterprises. IT and financial services, construction, electronics and energy, and distributive trades also appeared here.

It is important to point out that there may be some overlap between some categories and that a different grouping system could change the order somewhat, as in a significant number of cases the sector designation was not clear.

According to the average statistical size of respondents, 10% of firms have less than 10 employees (41), 23% have between 10 and 50 employees (92), 9% have between 51 and 100 employees (37), 33% have between 101 and 500 employees (131) and 25% of respondents have more than 500 employees (99).

We also looked at firms by the number of employees with tertiary education. The number of employees with tertiary education was below 10 in 93 firms (23%), between 10 and 50 in 169 partner firms (42%), between 51 and 100 in 43 firms (11%) and over 100 in 95 dual partners (24%).

2.2. *Presentation of the methodology for the primary research*

In the primary research I conducted 2 questionnaire surveys. Both questionnaires were of my own design, based on my experience gathered during the literature review. The ***student questionnaire*** consists of 16 questions. The aim was not to make it too long and not to require them to give explanatory answers, thus increasing their willingness to complete it. The introductory block of the questionnaire asked for information on the respondent's identity (degree, gender, type of residence and parents' education), followed by questions on the circumstances of his/her entry into dual training and his/her experience of dual training. An important part was the self-assessment of soft-skill skills, and finally we asked about future plans for dual training.

The ***partner organisation questionnaire*** consists of 21 questions. As this survey was designed using interviewers, more complex questions were included in the questionnaire. This questionnaire also collects general data and information from the companies in the first block (sector, turnover, statistical headcount, number of graduates). In the next block we start from a more distant point, generally asking about their expectations of graduates, followed by questions on dual training. This is followed by an assessment of the knowledge

acquired at university and the skills of the students. The last block of the questionnaire focused on satisfaction with the training and employment of graduates.

2.2.1. Methodology for processing the student questionnaire

The questions included formulated statements, which belong to the closed question type group, within which several sub-types can be found in the questionnaire. The questionnaire included single-answer questions, such as questions on the main activity of the enterprise and turnover, and on the students recruited. We used Likert-scale questions, for example, on the skills of the dual students and the usefulness of the knowledge they acquired at university. The Likert scale is a measurement scale between two extreme values, we defined the extreme values from 1 to 5, and a value of 0 represents the answer "don't know". In addition to the statements, the respondents have to select the answer that is real in their case from the range between "burden for the company" and "feels important", "does not have" and "has", and "not developed" and "developed" using numbers.

In order to examine the reliability of the questionnaire, our analyses focused on exploring the structure of the questionnaire and the reliability of the variable blocks, for which we used the Cronbach's alpha index. Cronbach's alpha is a method of assessing reliability that compares the amount of common variables, or covariance, among the many items that make up the instrument to the amount of total variables. If the instrument is reliable, there should be a lot of covariance among all items relative to the variance.

Calculated for Likert scale responses, this means 20 variables and 153 respondents (blanks are excluded). Cronbach's alpha: 0.934, which means excellent internal consistency. Thus, we can conclude that internal consistency was OK.

When processing the questionnaires, we not only examined the answers to each question separately, we also examined the relationships between the different variables.

There are several aspects to consider when choosing the right statistical test:

1. What are the measurement levels of our variables?
2. How many samples in the statistical test?
3. Is our sample related, paired or independent?

The Kruskal-Wallis test, the Dunn post-hoc test and the Chi-squared test were used to process the responses to the questionnaire questions to identify associations.

- Using the Kruskal-Wallis test, we examine whether the medians of a variable of at least ordinal level are equal in three or more groups.

Kruskal-Wallis test allows the assessment of statistically significant differences between different groups. It has been used, for example, to investigate whether the type of tasks that students perform is related to how they feel about the dual partner organisation (NÉMETH, 2018). If the result of the Kruskal-Wallis test is statistically significant, it is useful to perform a Dunn test to determine exactly which groups differ from each other.

The Dunn's test makes pairwise comparisons between independent groups and tells which groups differ statistically significantly from each other at a certain α level (ACS, 2014). The Dunn's post hoc test uses the same rank order as the Kruskal-Wallis test and applies the same common variance as the null hypothesis of the Kruskal-Wallis test. Thus, it uses the same data as the Kruskal-Wallis test to examine differences between two groups (JANACSEK, 2008). The Chi-square test is used for nominal data when we want to examine correlations and variances, also called cross-tabulation analysis. For nominal data, it is the only test that can be used, regardless of the type of research. Observations must be independent, which means that no respondent can be included in two or more categories/cells at the same time (NÉMETH, 2018).

2.2.2. Methodology for processing the partner organisation questionnaire

The database contains the data of enterprises and institutions registered in Hungary that are involved in dual training, with a view to ensuring that the sample covers the widest possible range of dual training. Our aim is to examine the results of the introduction so far and to identify the factors that need to be taken into account for further development. The questionnaire was completed voluntarily by the partner organisations, either electronically or by telephone, with the assistance of a survey officer.

The questions included formulated statements, which belong to the closed question type group, within which several sub-types can be found in the questionnaire. In the questionnaire, we formulated single-answer questions and used Likert-scale questions. The Likert scale has already been described in the previous chapter.

When processing the questionnaires, we not only examined the answers to each question separately, we also examined the relationships between the different variables.

The ANOVA test, the Kruskal - Wallis test, the Wilcoxon test and the Dunn test were used to detect associations.

I have already written about the Kruskal-Wallis test and the Dunn test, so now I would like to briefly describe the ANOVA and Wilcoxon tests.

- ANOVA test - One-way ANOVA (Analyze -> Compare Means -> One-Way) is a statistical method used to test for significant differences between means of groups of data. The test is also known as a one-way analysis of variance. It compares more than two groups/samples on the basis of a common continuous variable (data measured on an interval scale). The number of groups is not fixed, but can be any number. It tests whether there is a difference between groups in the mean of a given variable (NÉMETH, 2018).
- Wilcoxon test - Used for ranked data in self-controlled studies. This test is also used if the normality test performed before the one-sample t-test is negative for the variable in question, i.e. the sample is not normally distributed (NÉMETH, 2018).

2.3. Presentation of secondary research methodology

Secondary research involves the collection and analysis of already published, documented data and information. The collection of literature has several functions during the research process: it helps to delimit the problem, avoid repetition, re-confirmation of previously proven correlations, formulation of hypotheses. It contributes to the choice of effective research methods and tools and helps to interpret research results appropriately.

Accordingly, in Chapter 2 of my thesis I presented the relevant literature, the history and characteristics of dual training.

- I have collected national and international examples and experiences in order to learn about dual training through a wide range of information and data.
- I reviewed the legal framework in Hungary and looked at the websites of Hungarian dual higher education institutions.

Most of the databases providing data are available free of charge, such as online sources, felvi.hu, the Education Office, the Dual Training Council. Publications related to my objectives were collected using Google Scholar, ResearchGate, Matarka search databases. The next step was to define the search keywords.

Our keywords were in Hungarian: dual training, practice-oriented education, dual partner, company-specific knowledge, soft-skill skills, cooperation, partner organisation, practical training; keywords in English: dual training, practice-oriented education, dual partner, company-specific knowledge, soft-skills, cooperation, partner organisation, practical training. The publications and related literature collected in this way can be diverse, so as a further step it is worthwhile to select and filter out irrelevant material.

After collecting, processing and synthesising the literature, I defined my hypotheses and compiled the questionnaires.

3. MAIN FINDINGS OF THE THESIS

The main objective of my doctoral research was to map the characteristics and results of the introduction of dual training in Hungary, and, based on the information collected, to identify possible directions for development.

The main aim of *my secondary research* was to get to know the domestic and international dual systems and the practices of different countries in this field.

During the literature review I collected the characteristics, history and legal background of the Hungarian dual system. I focused on the experiences of the introduction and operation of dual training, including the experiences of domestic higher education institutions, the opinions of partner organisations, international dual systems and experiences, the evaluation of dual students and the processing and synthesis of publications and websites on the possibilities of developing the dual training system.

Overall, it can be concluded that the introduction of dual training is beneficial for universities, training partner organisations and students, as confirmed by research in all three areas (BERÁCS, 2017; DERÉNYI and KOVÁTS, 2023; KOMÁR, 2018; POGÁTSNIK, 2023; RAJNAI, 2016). For companies, dual training is mainly a means of supplying a workforce shaped according to their needs; for higher education, it is an opportunity to increase the number of students, to maintain competitiveness and to develop industrial relations. Even for the State, dual training is very useful as a priority tool for the development of vocational training. Last but not least, a very important benefit of this form of training is that, according to the results of surveys, those enrolled in dual training are more motivated, perform better, have lower drop-out rates and are therefore more successful on the labour market. Looking at practices in different countries, we can see that there are common motives. For example, the 'learning contract' with students and the alternation between university and company stages, albeit with different structures.

One form is to spend the study period at the university and the exam period and breaks at the partner organisation. Another common model is where x days of a given week are spent at the HEI and y days at the company, with the number of company days being 1 or 2, 2021; DKT - PRINCIPLES OF DUAL HIGHER EDUCATION).

It was found that in the countries studied, the introduction of dual training was generally motivated by industrial needs and economic challenges, and in many cases the German

model was the leading example. This is why the systems introduced in the different countries are similar.

In Hungary, the system is quite flexible, leaving it up to the institutions to organise their dual training within the set framework. Within an institution, it is also common to use different models, depending on the specialisation and the needs of the partner organisations (DKT - A DUEVERSHIP OF HIGHER EDUCATION; HOMICSKÓ et al., 2021; DKT - A DUAL HIGHER EDUCATION - SECTIONS).

The research shows that the majority of Hungarian higher education institutions consider dual training to be successful and that it has fulfilled their expectations. In some cases, however, it has not really taken off (DERÉNYI and KOVÁTS, 2023). Dual training has triggered important changes in higher education and in the life of companies. A significant factor is that both sides need to be more open and receptive towards the other (KOVÁCS and TÖRÖK, 2016). In higher education, this means that signals and criticisms from industry are heard and taken into account in both education and research. Curricula are being modernised, more applied research projects are being launched. The same openness and acceptance on the part of companies can be observed. Seeing the positive attitude of higher education, support for training by companies has started (BALÁZSNÉ and ZSUPANEKNÉ, 2019; KERÜLŐ and NYILAS, 2019; KOCSIS et al., 2017; KOCSIS and PUSZTAI, 2021; KOZÁK et al., 2020; POGÁTSNIK, 2018, VARGA, 2018).

Looking at the domestic and international dual training systems, we can conclude that the introduction of this type of training has brought about important changes in higher education and in the life of companies at both domestic and international level. A very important benefit of the system is that it can create a much closer and more effective relationship between higher education institutions and companies, which can extend beyond training and curriculum development to research and innovation. It is important that both parties should be more open and inclusive towards the other (ASNUL and SALINA, 2017; FLEK and UGNICH, 2023; JACQUES and LANGMANN, 2016; KOCSIS et al., 2017; KERÜLŐ and NYILAS, 2019).

Experience shows that recent graduates of dual training are more prepared for the world of work, more up-to-date with technological developments and have acquired soft-skills (VARGA, 2019).

Based on the studies reviewed, it can be concluded that dual training can be a solution to the problem of supplying high-quality labour to firms (BALÁZSNÉ and ZSUPANEKNÉ, 2019). *In my primary research*, I used 2 questionnaire surveys to seek confirmation of my hypothesis.

The skills of professionals have always followed the technological evolution of industry. At the beginning of the industrial era, in the late 18th century, many unskilled workers and craftsmen were needed. At the beginning of the 19th century and with the introduction of the assembly line, the so-called 2nd industrial revolution, many unskilled workers trained in only a few trades were needed. As the complexity of manufacturing processes increased, skilled workers had to take care of critical production steps.

In many countries, the training of these skilled workers follows a specific pathway - dual vocational training, which has given rise to university dual training (JACQUES and LANGMANN, 2016).

It is very important for companies that fresh graduates are up to date with the latest technology, because this knowledge can improve the quality of work. Through the participation of firms, the training of workers in industries is based on the needs of the industry and it has been found that there is a link between increased productivity and dual training (ASNUL and SALINA, 2017). Companies that provide apprenticeships, through the use of a specific, professionally certified company curriculum, contribute significantly to increasing the professional competence of students, expanding their knowledge of the company and strengthening their work culture through the knowledge and experience gained during their time in the company. Through this training system, a workforce emerges from higher education that no longer needs a long training period and can start work as ready workers. The driving force for companies partnering in dual training is the acquisition of well-trained, value-creating professionals who understand innovative processes (HOMICSKÓ et al., 2021). This can be a quick and effective way to address quality labour shortages (BALÁZSNÉ and ZSUPANEKNÉ, 2019; SZABÓ, 2017).

Based on the above findings, I formulated the following hypothesis:

H1 - The partner organisations involved in dual training are primarily motivated by the need to solve their problems of labour shortages

Question 7 of the partner organisation questionnaire asks what was the main motivation for entering into the dual training. The results show that the most important reason for entering dual training was clearly to replace the workforce (87.0%), followed relatively close behind by active contact with higher education (44.5%), increasing the prestige of the company (31.3%), the opportunity to learn (24.0%) and other factors (4.2%). The responses to the questionnaire support the findings of the literature review (Figure 2).

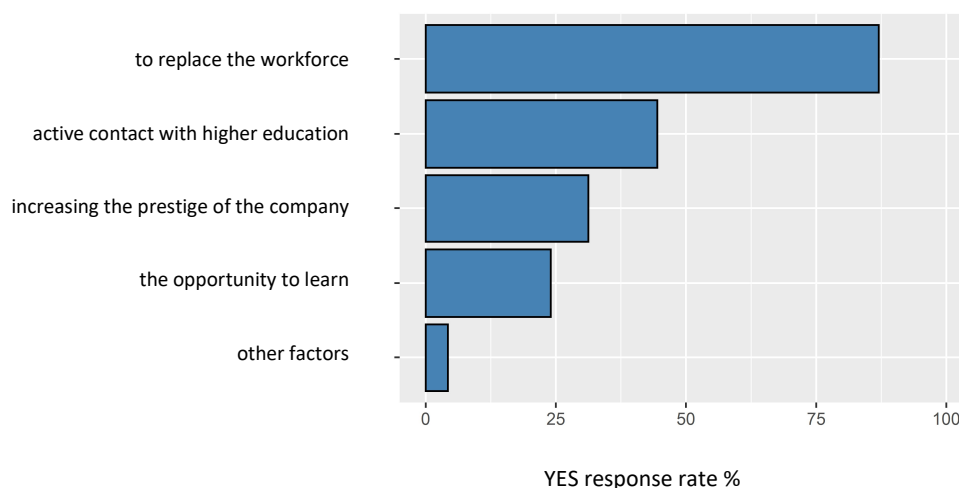


Figure 2: 7. Why did you enter dual training?

Source: own calculation based on questionnaire survey data

Based on the above results, my hypothesis H1 is confirmed.

Dual training allows students to get to know the world of work directly during their training, to participate in work processes and to spend much more time practising professional competences than in traditional training (BALÁZSNÉ and ZSUPANEKNÉ, 2019). The advantage of the dual training format is that students can acquire specific and modern knowledge specific to the practical partner organisation and can integrate more easily into the labour market through practice-oriented education (VARGA, 2018). Changes in the labour market, opportunities and needs make career choices a complex task for prospective students. Building a career is the primary driver of prospective students' further education plans, in addition to avoiding unemployment (VARGA, 2018; MAKSZIM et al., 2021). Several studies have focused on the motivation of students to enter education. They have explored the short- and long-term perceptions and motivations of students enrolled in dual training, as well as their reasons for choosing a dual training company. Most of the dual students interviewed chose this form of training because they wanted to gain work experience during their studies, while gaining professional knowledge. In terms of their

longer-term plans, almost half of the sample expect to be able to find a job in the training location or in a professional, financially and socially advantageous job after completing the training, with the work experience gained (TÖRÖK et al., 2014; ZIMÁNYI, 2016; AILER, 2017; POGÁTSNIK 2018; BADINSZKY et al., 2022)

On this basis, I have formulated the following hypothesis:

H2 - Students choose dual training primarily for labour market reasons

Question 5 of the student questionnaire asks about the factors influencing students' entry into dual training. Of the 156 respondents, 123 ticked the options labour market opportunity - mainly professional and 71 ticked the options labour market opportunity - mainly financial (respondents were allowed to tick more than one option for this question) (Figure 3).

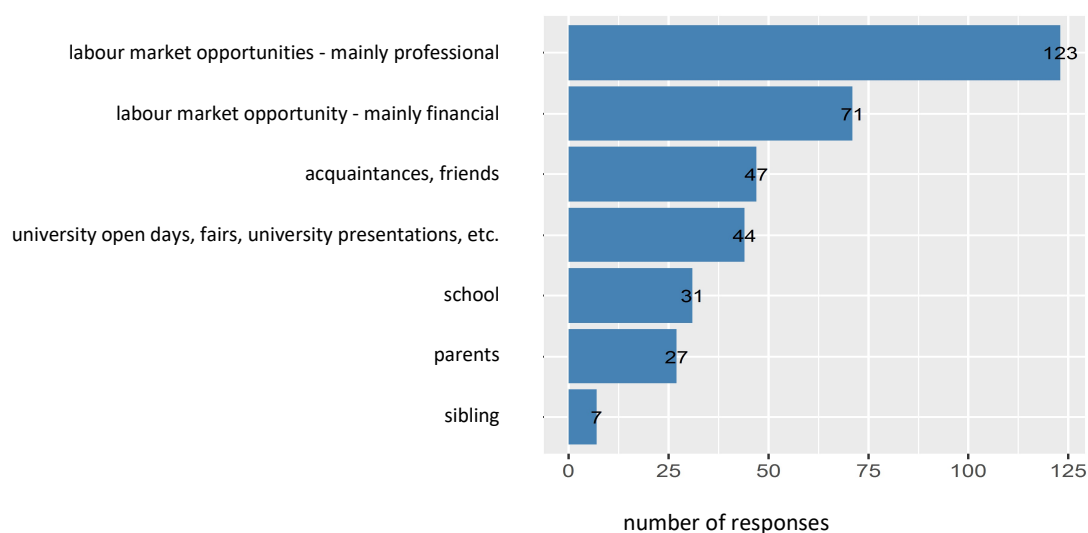


Figure 3: 5. What factors influenced your decision to do dual training?

Source: own calculation based on questionnaire survey data

This result supports and confirms my hypothesis H2.

Dual training is a challenge for all participants, an extra task and a long-term commitment for both the company and the student. Company professionals express their needs in terms of the knowledge they wish to acquire from the university by referring to their day-to-day operations and industry-specific processes, while the university aims to provide a comprehensive, multi-purpose set of competences, taking into account the relevant educational regulations, the available academic literature and the teaching and working experience of the university lecturer.

Because of these different approaches, the divergence of views between the actors - academic stakeholders and participating companies - is reasonable and understandable. In the alignment process, specific, profession-driven or company-specific requirements should be integrated into the set of competences and skills in such a way that they do not overwhelm the overall requirements. A healthy balance is needed, as universities need to prepare students for different company profiles (JUHÁSZ et al., (2022)). It is important for students to acquire both theoretical and practical knowledge. Students attach particular importance to acquiring up-to-date knowledge in the context of theoretical education within the framework of high-quality, high-quality teaching. The most important expectation for students in practical education is to gain high-quality professional experience (KOCSIS, 2020).

Based on the observations described above, I formulated the following hypothesis:

H3 - Knowledge acquired at university and training in partner organisations complement each other and help the student during the training

In the case of hypothesis 3, I considered that the opinions of partner organisations and students are also relevant in the verification process.

In general, half of the students thought that university education provided a good basis for dual training (56% gave a rating of 4 or better). We also looked at whether there was a difference between the responses of those who would stay in their current company after graduation and those who would not. The analysis shows that there is no difference between the average ratings.

The processing of the results of the partner organisation questionnaire also did not provide clear evidence for my hypothesis. I wanted to know how satisfied businesses were, on average, with the knowledge they had acquired at university and within what range.

I looked at the following factors:

k13_01 = A university graduate is a great employee for our company.

k13_02 = It doesn't really matter what kind of skills you have, because we train you to work in our company.

k13_03 = We would like to be more actively involved in shaping university education, so we would be happy to be guest speakers or even lead seminars.

k13_04 = We would welcome the occasional involvement of university lecturers and researchers in practical training (e.g. visits, joint discussions) (Figure 4)

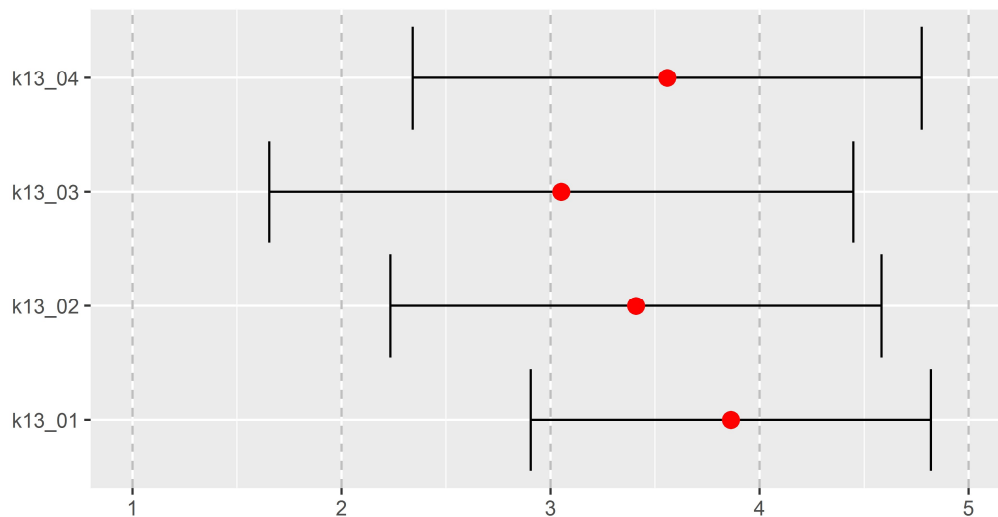


Figure 4: Mean (red circle) and standard deviation +/- 1 of satisfaction with the knowledge acquired at university

Source: own calculation based on questionnaire survey data

The mean of the four factors ranged from 3.05 to 3.86, with the highest mean for factor k13_01 and the lowest mean for factor k13_03 (also the highest variance). This suggests that responses are spread across enterprises.

Based on the above results, it can be concluded that hypothesis H3 is not confirmed.

Studies have found that dual students have significantly better university entrance scores, more positive self-perceptions in terms of mathematical skills, economic skills and problem-solving skills, and higher ratings in interdisciplinary competences of willingness to learn and autonomy (WEICH et al., 2017).

The impact of dual training on student outcomes has been examined in a number of studies. Studies have shown that students in dual training have, on average, higher levels of cognitive ability and motivation than their counterparts in traditional training. This is probably due to the fact that to enter dual training, students have to go through a more rigorous, multi-stage selection process, in which companies use a variety of methods (e.g. job interview, psychological test). Compared to the traditional selection process, this more rigorous selection process results in students who already have better learning abilities. The difference in academic performance is therefore mainly due to the initial aptitude of the students and not to differences in the training format.

Students with similar aptitudes who are not in dual education also have similar academic success, suggesting that, in addition to personal aptitudes, the social environment and motivation to learn also play an important role in learning success (BALÁZSNÉ and ZSUPANEKNÉ, 2019, KOCSIS et al., 2017; KRAVCHENKO et al., 2023).

Surveys conducted in different disciplines and institutions consistently show that students participating in dual training develop significantly, especially in personal competences (e.g. openness, commitment, responsibility, autonomy). The development of professional skills, although also important, is less marked, as they are primarily acquired through university education. This finding fits well with the essence of dual training, which aims to align theoretical university education with the practical needs of the labour market (KOCSIS et al., 2017; KERÜLŐ and NYILAS, 2019). Based on the above, my hypothesis is as follows:

H4 - Students participating in dual training will experience significant progress in soft-skills in addition to professional knowledge

I have also examined the support for this hypothesis from the point of view of two dual actors. On the one hand, from the perspective of the students and, on the other hand, from the perspective of the partner organisations.

The students were asked to rate whether they had developed certain skills during their dual training. 20 different skills were asked, and they were rated on a scale of 1 to 5. The results show that the average score ranged from 3 to 4.5. The results showed that the negative ratings were more dispersed. The students considered that their ability to work independently had improved the most, as well as their ability to work accurately, practical professional skills, interpersonal and communication skills, ability to work in a team and a strong work ethic.

The most unfavourable scores were given to the improvement of foreign language skills, social skills, the ability to solve numerical and computational problems and to navigate the internet.

I examined whether there was a correlation between the type of tasks (administrative tasks vs. project or professional tasks) the students performed in the company and whether their skills developed. For each of these skills, it appears that students perceived that if they were

involved in project or professional work, their skills developed more than if they were involved in administrative work.

Skills development was also compared according to whether the student wanted to stay with the company. In most cases there was a significant difference between those who wanted to stay with the company and those who did not. The results show that the significant difference was clearly due to the fact that those who would like to stay with the company in all cases rated their skills development higher.

The companies were asked to rate the level of certain skills of their dual students. The average scores were typically between 3 and 4, while the margin of error (standard deviation) was the same for all questions (around 1.2 and 1.3). The highest score was for the use of technical and computer tools (3.94), meaning that the digital skills of dual students are relatively good. Among the factors that received a positive rating were, for example, the ability to navigate the internet (3.94), the ability to work in a team (3.84) and the ability to self-educate (3.83). Among the factors that received a negative rating were practical professional skills (3.41), organisational skills (3.42) and theoretical professional skills (3.43).

I asked how students doing non-dual work placements in companies are judged on the same skills. The factors that received the most favourable ratings were the ability to navigate the internet (3.25), the use of technical and computer tools (3.24) and the ability to work in a team (3.16). The lowest scores were given to practical professional skills (2.72), the ability to analyse and organise (2.79) and the ability to organise (2.80). The results obtained indicate that the students' soft-skills have developed to a greater extent during the dual training.

Overall, I believe that the results obtained support my hypothesis that students participating in dual training experience a significant improvement in soft-skills in addition to professional knowledge.

The period since its introduction in 2015 has been examined in a number of institutions where dual training has been applied. The results of these studies have several common features. Research has covered students enrolled in dual training and those who have already graduated, with non-dual students also surveyed for comparison (BALÁZSNÉ and

ZSUPANEKNÉ, 2019; DERÉNYI and KOVÁTS, 2023b; KERÜLŐ and NYILAS, 2019; KOCSIS et al, 2017; KOCSIS and PUSZTAI, 2021; KOZÁK et al., 2020; POGÁTSNIK, 2018; POGÁTSNIK, 2019; VARGA, 2018). They surveyed the partner organisations of the dual training, typically industrial companies, interviewed their HR professionals and mentors. Some studies have collected and analysed the experiences of higher education institutions (BERÁCS, 2017; DERÉNYI and KOVÁTS, 2023a; KERÜLŐ and NYILAS, 2019). The expectations of dual students regarding their training are clear: they want to acquire theoretical knowledge and gain practical experience. However, the survey also showed that students' experiences are not only positive. Overwork, problems with mentors and difficulties in meeting curricular expectations overshadow the training (BALÁZSNÉ and ZSUPANEKNÉ, 2019; DERÉNYI and KOVÁTS, 2023a; KERÜLŐ and NYILAS, 2019; KOZÁK et al., 2020). Mentoring is one of many activities grouped under the broader concept of professional development. Mentors can play an important role in the training of prospective professionals; although their personal and professional development is influenced by a range of activities and opportunities throughout their career (SCHWARTS and BRYAN, 1998).

There are significant differences in the size of companies in terms of the success of dual training. Larger companies often have a dedicated member of staff who works with the dual students, providing them with the support and professional development opportunities they need. In smaller companies, students are usually managed by the HR department, and mentoring is often the responsibility of an existing professional manager who has limited time for the students' personal development. Despite this, there are many examples of successful dual training in smaller firms, where students can be given more serious tasks sooner, which contribute to their rapid professional development (KOCSIS, 2020a; FENYVES et al., 2020).

Based on the observations described above, I formulated the following hypothesis:

H5 - The type of tasks and the degree of mentoring received from the partner organisation will determine the success of the dual training from the student's point of view.

I looked at the following factors for the students: how they are engaged with the company, what kind of tasks they do, how important they feel they are to the company, again. 53% of

the students who responded had a designated mentor at the company, while 29% said that they were always assigned to another colleague. A separate department was reported by around 18%.

Half of the students (54%) had specific professional tasks, 22% project tasks and 24% administrative tasks.

Based on the responses received, 63% of students felt important in the company.

The completion of tasks may be related to how important the students feel they are to the company. The Kruskal-Wallis test shows that there is a difference of only 10% significance level between the ratings of question 11 (How important do you feel at the company?) ($p = 0.0789$). The Dunn post-hoc test showed a difference between the groups who performed specific professional tasks and those who only performed administrative tasks. In contrast, there was no difference between the ratings of specific professional work and project work. These two categories can be treated as one category on the basis of the results obtained, since both of them represent a professional task (Table 2)

Table 2: Q11 = 11. How important do you feel you are in the company? How important are you in your job at the company? compared to the 13.

N		KW test statistics		df	p-value	
156		5,08		2	0,0789	

Groups		N1 and N2		Dunn test statistics	p and corrected p	
1	2	34	85	0,85	0,39	0,52
1	3	34	37	-1,13	0,26	0,52
2	3	85	37	-2,24	0,025	0,07

Note: N1 and N2 are the sample element numbers of the groups compared.

Source: own calculation based on questionnaire survey data

When comparing the answers to the questions on how important they felt and whether they would stay with the company after graduation, the comparison showed that there was a correlation between how important they felt and whether they would stay with the company after graduation.

I have taken the 15. Would you still choose the dual training option? and 16. Would you like to stay with this company after graduation? / How do you plan for the future? the relationship between questions. There was a significant correlation between questions 15 and 16 ($p\text{-value} = 0.00$) (Table 3)

**Table 3: Would you still choose a dual training pathway in 15th grade? Would you like to stay with this company after graduation? / How do you plan for the future?
Relationship between question**

χ^2	df	p-value
54,837	1	0,00

Note: The categorisation here also followed the pattern of would like to stay = yes, I would like to stay with them and yes, but I would also like to continue my studies, no would like to stay = no, because I would like to continue my studies and no, I would like to work elsewhere.

Source: own calculation based on questionnaire survey data

This was due to the fact that there were more people than expected who would stay in the company after graduation and who would choose to do the dual training again in the same company, and more people than expected who would not stay after graduation and would choose to do the dual training again, but in a different company.

Overall, the results obtained support the hypothesis H5 - The type of tasks and the degree of mentoring received in the partner organisation determine the success of the dual training from the student's point of view.

Partner organisations are constantly looking for ways to ensure a supply of new staff in the face of changing labour market conditions. The introduction of dual training could be one solution to this challenge. For business organisations, dual training is mainly a means to supply a self-trained workforce (BERÉNYI and KRAICINÉ, 2017). However, for effective training, close cooperation between higher education institutions and business partners is needed. This can also have a positive impact on the embedding of training in the labour market (ZIMÁNYI, 2016). In the literature on dual training, a number of studies also examine the views of partner organisations. The organisations surveyed by generally gave a positive assessment of this form of training, mentioning some difficulties in the delivery of training (e.g. knowledge level of students, liaising with higher education institutions, motivating own colleagues) (BADINSZKY et al., 2022; KERÜLŐ and NYILAS, 2019). Based on these findings, I put forward the following hypothesis:

H6 - Overall, partner organisations do not regret their participation in the dual training, it has fulfilled their expectations.

The 400 partners surveyed gave the following answers to the question of whether the dual training had lived up to their expectations (Table 4)

Table 4: Did dual training meet your expectations? answers to question 4

Answers	Number of responses given	Percentage distribution of responses
Yes, absolutely, we would do it again	248	62,00%
Yes, but I'm not sure we'd start now	88	22,00%
No, that's not what we were expecting, we were thinking of a different form	55	13,75%
No, we will definitely not accept any more students	9	2,25%

Source: own calculation based on questionnaire survey data

I examined whether there was a significant correlation between the average statistical size of firms and how they perceived dual training. The result shows a significant correlation ($p = 0.00$). It is observed that fewer firms with the largest number of employees said that dual training did not meet their expectations. For the other categories, there was no significant difference compared to expectations, so it can be said that there was no real difference between the size categories in terms of whether dual training had fulfilled their expectations. *We can see that 84% of companies answered yes and 62% would do it again. Thus, we can say that this hypothesis is confirmed.*

Some of the research on dual training has included how students in dual training envisage their future after completing their training, and whether they would like to work for their dual partner organisation. A significant proportion of students who complete a dual programme aim to gain work experience and develop a strong network of professional contacts. Nearly three quarters also aim to find a job in their dual placement after graduation. However, universities do not follow up the fate of graduates in a targeted way. Several higher education institutions have not yet developed a career tracking system for graduates of duals, but where they have already developed such a system, data show that the majority of them have found a job at their dual partner institution (ANDÓ, 2023; MAKSZIM and BARABÁS, 2022; KOVÁTS and DERÉNYI, 2023; POGÁTSNIK, 2023). Based on the above, I formulate the following hypothesis:

H7 - The majority of students who graduated from dual training have found a job in the dual training place after graduation.

The partner organisations surveyed have graduated 2,480 students since they started their dual training and 1,502 of them have been employed. This means that 60.56% of the students who graduated in the dual format were employed in their dual training place. This placement rate is lower than expected. It meets the majority condition, but not by a very high margin. For this reason, further analysis was carried out using the results of the two questionnaire surveys.

I thought it was worth looking into the reasons for not hiring a graduate student. This could significantly cloud the picture. After all, it was clear from the results of the student questionnaire that 34% of the students surveyed had no plans to work in their dual training place in the future. One reason for this is that they want to continue their studies and another is that they want to start working for another company after graduation (Table 5)

One of the questions in the partner organisation questionnaire was about the reasons for not hiring a graduate. Most companies indicated that the reason was that the graduate did not want to stay (51.2%) or that there was no suitable position (23.8%). This is in line with the results of the student questionnaire.

In the light of the above data and information, I consider that the majority of the students who graduated from the dual training programme found a job in the dual training centre after graduation, thus the hypothesis is confirmed.

4. NEW OR NOVEL RESULTS OF THE THESIS

1. It has been shown that partner organisations in dual training are primarily motivated by the need to solve their problems of labour shortages. The results of my primary research showed that 87% of partner organisations said that their main motivation was to replace their workforce.
2. There is evidence that students choose dual training primarily for labour market reasons. 78.8% of the responding students in dual training indicated that labour market reasons of a professional nature influenced their choice of training.
3. I found that there was no evidence that the knowledge acquired at university and the training in the partner organisation would help the student during the training. The opinions of students and partner organisations were also strongly divided in this area. This suggests that this is an area of dual training where improvements and changes are needed.
4. It has been proven that students in dual training make significant progress in soft-skills in addition to professional knowledge. Students who were assigned to professional tasks in their dual placement showed greater improvement than those who were assigned to administrative tasks.
5. It has been shown that the type of tasks and the degree of mentoring received in the partner organisation determine the success of the dual training from the student's point of view. For a student to feel successful in their training, several aspects need to be taken into account. Firstly, the grade to which they feel valued by the company, that has been shown to be influenced by the form of mentoring and the type of tasks they receive. Another factor to take into account is how the student envisages his/her future, whether he/she would like to stay with the dual company, which is also a measure of success.
6. It has been demonstrated that, overall, the partner organisations do not regret their participation in the dual training and that it has fulfilled their expectations. 84% of respondents said that it had fulfilled their expectations. However, some of those who answered yes are not sure they would do it again. Finding out the reasons for this could also form the basis for a new survey.

7. Evidence shows that the majority of students who completed a dual training programme found a job in a dual training centre after graduation. However, the result of 60, 56% was below my preliminary expectation. For this reason, I conducted further analyses to find out the possible reasons. In the majority of cases, the students did not want to stay with the company, in a smaller part of the cases, there were no vacancies or the students were not satisfied with the company. The reasons given by the students that further education came to the fore or they envisaged their future in another company.

5. THE PRACTICAL USE OF THE RESULTS

Studying the literature and evaluating the responses to the questionnaires can help us to further develop this relatively young form of training by taking into account the experiences of students and partner organisations.

In the future, in cooperation with the companies involved in the training, the provision of a mentoring system and the strengthening of training with appropriate professional tasks should be developed. In cooperation with the Education Office, it would be an effective solution to develop specific regulations in this area. Although the Agreed Dual Training Programme contains the curriculum of the partner organisation, I would suggest regulating the type of tasks that students can carry out during the company phases. Suggestions should be made to companies on the form and organisational framework in which the mentoring and training of students should take place. In some cases, students may feel like a burden on the company, which in turn is a predictor of failure.

We have also received confirmation in the promotion of dual training that we need to address prospective students directly, approach dual training from a professional perspective and reach potential applicants through professional events and open days. In terms of enrolment, the presence of dual training in an institution is a supportive element, as it demonstrates that there is a demand for the course. It is particularly important in the case of where there has been a downward trend in recent years, such as science.

In the field of developing dual training in higher education, I propose to broaden the range of actors, as it is becoming more and more common for partner organisations to enter dual training in secondary education and to channel students who have excelled in this field towards dual training in higher education. Both in the field of training development and in the field of enrolment, results can be achieved by involving the secondary schools concerned in the cooperation schemes.

Cooperation between partner organisations and higher education institutions should be strengthened. Although progress has been made, the results show that equal partnership has not yet been achieved. There is a need to create forums, expand existing channels and opportunities for open communication. This could include workshops, conferences, partner meetings, etc. By improving cooperation, both sides can gain additional information and

valuable knowledge, which can lead to significant changes on their own training side. This will help and support the success of the alternating training phases. As a result, greater satisfaction on the student side can be achieved, thus increasing the placement rate in the partner organisation.

It is worth looking further into the reasons why a student may not be employed by their partner organisation after graduation. The phenomenon should be examined from both the student and partner organisation side. This is relevant for companies, as the main reason for entering the dual form is to ensure a good quality workforce.

Although the process has only started a few years ago and we are experiencing many positive effects, I am sure that in the long run this form of training can trigger changes that will affect the whole economy and society.

6. PUBLICATIONS ON THE SUBJECT OF THE THESIS



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PhD Publication List

Candidate: Katalin Kozma-Tóth

Doctoral School: Doctoral School of Management and Business

MTMT ID: 10081140

List of publications related to the dissertation

Articles, studies (4)

1. **Kozma-Tóth, K.:** A duális képzés magyarországi bevezetésének tapasztalatai a partnerszervezetek szemszögéből.
Competitio. közlésre elfogadva (-), [1-29], 2025. ISSN: 1588-9645.
2. **Kozma-Tóth, K.,** Bácsné Bába, É., Fenyves, V.: Experiences of the Dual Training Based on the Opinion of Students Participating in the Training at the University of Debrecen.
European Journal of Contemporary Education. 13 (3), 545-557, 2024. EISSN: 2305-6746.
DOI: <http://dx.doi.org/10.13187/ejced.2024.3.545>
IF: 1.1 (2023)
3. **Kozma-Tóth, K.:** A duális képzés bevezetésének nemzetközi tapasztalatai néhány ország példáján keresztül.
International Journal of Engineering and Management Sciences. 7 (1), 84-94, 2022. EISSN: 2498-700X.
DOI: <http://dx.doi.org/10.21791/IJEMS.2022.1.7>.
4. **Kozma-Tóth, K.:** Miért előnyös a duális képzés a résztvevők számára?
Economica. 12 (1-2), 51-59, 2021. ISSN: 1585-6216.
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The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of the Journal Citation Report (Impact Factor) database.



20 December, 2024

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