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Dual education: connecting education and the labor market

Introduction

The dual education is a kind of hybrid training: the students are full time students at a Vocational Education or Higher Education Institute and trainee at a company. Domestic and international experience highlights the effectiveness of dual training (Yu, 2012; Melin, 2016; Kovács & Török, 2016; Holik & Pogatsnik, 2016; Kocsis, 2020; Tastanbekova, 2021). Dual training increases professional competences and allows students to convert their theoretical knowledge into practice and enter the labor market as strong contenders. Research findings (Hermann et al, 2016) show that a rigorous selection process of apprentices, well-thought-out vocational education and career planning, integration into the world of work, incentive schemes and corporate social responsibility contribute to effective dual training.

In Vocational Education in Hungary, the dual training place must have a training program for specialized education, which includes the curriculum elements taught by the dual training place and the related practical knowledge, supervised and independent practical tasks, as well as competence and skill development, according to the curriculum of the given profession (Matlne et al, 2020). The dual trainer should plan the path to learning outcomes and help the learner with different solutions in this path. The training program shall specify the rules for the preparation, organization, and delivery of specialized education. The dual training site should also develop assessment and qualification criteria for the assessment and qualification of the trainee.

In the case of organizations providing dual training in VET, the law stipulates the requirement for mandatory practical instructor training and examinations for professionals involved in the training of students, thus helping to achieve efficient, effective, and high-quality training. The full-scale training and examination of the practical instructors is organized by the chamber of commerce. The practical training and examination of the chamber ensures the right to teach the professional qualification. Exemption from passing the Chamber's practical teaching examination shall be granted to a person who holds a master's examination or has a specialized higher education qualification corresponding to the profession undertaken by the dual training place and at least two years of specialized professional experience, or a higher education degree and specialized secondary qualification, and at least five years' professional experience.

Those who choose the dual form **in Higher Education**, in addition to studying at university or college as full-time students, do regular internships at a company and acquire expertise that meets the needs of the company. A university student in dual education participates in much more internships than a student in a normal, non-dual form. After graduation, they enter the labor market as career starters who are professional with experience and have up-to-date knowledge of the company. Dual education in higher education provides an opportunity for companies to shape the student's knowledge according to their own needs during the university and college years. The companies intend to educate future professionals who will become prepared employees immediately after graduation. This form of training can also moderate recruitment costs.

The participation in dual education at university level is an opportunity for those students, who choose this form of education, it is not compulsory. Higher education dual training is the responsibility of the higher education institution, which organizes and implements the training together with the partners based on a cooperation agreement concluded with professionally qualified companies. In the teaching-learning process, practical trainings increase students' professional competence, knowledge of corporate operations and corporate culture due to their curriculum content, structure, and the number of hours they must spend in companies.

Benefits of the dual training

A competitive economy is based on the competitiveness of economic organizations, companies, and enterprises (Nogueira, 2014). Competitive vocational training and higher education are also essential for this. The economy and vocational training are inseparable, and their performance mutually influences the results of the other sector (Baethge, Wolter, 2015). The same inseparability and interdependence are evident in the dual training itself. This is because dual training can take place through close cooperation between the productive economy and the school system.

The dual training is highly dependent on the places provided by the business community in the context of apprenticeships. In times of economic instability or recession, the number of places on offer may decrease while the demand from students remains unchanged. Students need to find an employer who is willing to provide them with apprenticeship training that requires certain skills. At the same time, they need to prove very quickly that they have the basic behaviors and attitudes expected in the workplace (Modláné, 2015).

Dual training has many benefits for students and companies involved in training. Young people find it easier to get a job because the companies that employ them are contented to see a professional trained in their own needs and who know their own technologies and job expectations. The student can become acquainted with the corporate culture (Jahantab, 2020), be a member of a real workplace team, where they can meet new professional tasks and challenges every day. The company benefits from a dual form of training because they can get a young workforce relatively quickly.

Dual training benefits the learner:

- students socialize in a work environment during their school years,
- their skills will meet the technological challenges of the age and the expectations of the labor market,
- they will be able to develop continuously,
- a higher proportion of employment is expected,
- by practice-oriented quality training, their practical skills increase,
- a competent, and immediately available workforce for companies,
- the apprenticeship contract is a good basis for the employment contract and salary, as well as providing an environment for social status and financial independence.

Dual training benefits the companies:

- ensures the professional needs of the companies,
- reduces training costs, raises the appropriate supply of human resources,
- the student integrates into the company's work culture,
- the student learns the processes, the technology, the staff, the goals,
- it increases motivation and loyalty,
- provides the appropriate level of professional qualifications.

From a European dimension, dual training is also beneficial:

- dual training could be the central pillar of European vocational training systems,
- it is one of the important tools for reducing unemployment,
- it can reduce the gap between education and the world of work,
- vocational learning in the workplace is more efficient and effective, and the professional and skills profile is developed as a result of learning.

The goal is to develop the dual training system.

One way to develop a dual training system is to ***strengthen the role of large companies***. Several large companies recognized the situation that they could only ensure their labor supply continuously if they participated intensively in vocational training. Nowadays, large companies are already involved in

career guidance, trying to address primary school children in cooperation with vocational schools and universities. They join the experience-based shows of professions and participate in the Professions' Night, the Researchers' Night, and the Modern Factories.

The development of dual training has been promoted in Hungary by the government with targeted support in recent years. Non-refundable support in proportion to the number of students trained in dual form can be claimed for large companies for the costs of construction and acquisition of equipment related to the establishment of a workshop. As a result of the program, the commitment of large companies to practical training has significantly developed, their training infrastructure has improved, and the preparedness of human resources for training has improved.

The dual training place is entitled to a tax relief reducing the obligation to contribute to vocational training for the students it employs under the new Vocational Training Act. The amount of the tax credit depends on several factors (e.g., the training takes place under an apprenticeship contract or a vocational training employment contract, what profession the student is studying in). Regarding higher education, it is possible to enforce a vocational training contribution discount for students in dual training.

Most **SMEs have labor problems**, and they find it difficult to fill vacancies, and have serious shortcomings in their professional skills and competencies in the case of new employees. To improve the situation, more and more SMEs could take part in dual training. SMEs are generally unprepared and reluctant to teach basic professional skills, therefore students should obtain a basic practice at sectoral level in modern school workshops. If the conditions are met, Sector Training Centers (ÁKK) can provide basic training. The special vocational training can be carried out cost-effectively in a group of 8-12 students, under the guidance of a trained specialist. The tools are provided jointly by the vocational training center and the participating companies. Higher education and research and development can also appear in the Hungarian ÁKK system. As a pilot program, the Balatonfüred Knowledge Academy will be established by Budapest University of Technology and Economics, where in cooperation with 12 SMEs operating in the region, with the support of the local government, it will form a training base where different professional courses will take place. Local governments can also play a role in supporting Sector Training Centers (ÁKKs) to contribute to the development of the regional economy by improving the efficiency of dual training. Based on this model, the "Industrial Park" in Veszprém was designed, which could be one of the emerging Sectoral Training Centers. Their aim is to enable VET learners to learn in an infrastructural environment that adapts to the economic challenges of the 21st century, enabling students to master their profession at the highest level and to do so on state-of-the-art technology. The development of the equipment of the existing training center in Zalaegerszeg, with the involvement of SMEs is also a good example, the special cooperation of which is in the Zalaegerszeg test track development program.

In addition to the development of training places, introducing STEM careers and professions to young people is also a key issue. In addition to the **development of career guidance**, a system of tertiary counseling needs to be developed, which has a key role to play before dual training begins. It is necessary to coordinate the work of the organizations participating in career guidance, to precisely define the tasks and competencies of the actors, and to plan the processes of the career guidance system as a multi-year process. There is a need to launch intensive marketing communication campaigns that can reach the "Z" generation, to appear on channels where Generation "Z" is also present and speak in the style they like and follow.

The current career orientation is "big event" -focused, where the main goal is to present schools and provide information materials. For career-choosing young people belonging to the "Z" generation, these situations are not the most important in choosing the right career. Instead of large career choice events, experiential career counseling is suitable for trying out individual fields / professions should be strengthened. The career orientation period should be rescheduled to more years before the career choice, instead of the last academic year. Opportunities for experiential career counseling include digital creative

workshops, the organization of professional circles for students choosing a career, the organization of thematic summer camps for students, a role model program, the “One Day at Work” program.

Students choosing vocational training should be provided with predictable career opportunities. In the new training structure, all students can move from vocational training to higher education. For the number of talented young people who have acquired a technical qualification, there is a direct path from vocational training institutions to the university, recognizing their previously acquired professional knowledge and considering the results of their professional examination. Those attending the technical school will be much more motivated to complete the 5th professional year. This is important because, 46% of students in vocational high schools currently graduate without a vocational degree.

From September 2021, the technical training with diploma will start, which will open a new path to higher education. Students can obtain a profession and a high school diploma on the basis of a joint, advanced professional program of the cooperating vocational training and higher education institutions, and students can continue their studies at the given specialty university even without admission. The new form of training allows young people to acquire the highest level of expertise, including pre-defined credits, in even a shorter period of time. The program provides an opportunity to harmonize not only secondary and higher education content, but also dual training. Thus, students can also automatically pursue higher dual training at the company where they have previously worked under a vocational training contract. The vocational training system provides a unique opportunity for a young person from the age of 16 to gain an internship in a real corporate environment, to gain their own income and, ultimately, to obtain a higher education degree. For students, diploma technician training means a consciously planned career, predictable job opportunities, and for business organizations it is a more effective tool for recruitment.

This common pathway planning requires higher education institutions and VET institutions to better coordinate their training. There are currently two general problems that present different challenges: One is that for those coming from vocational high schools (especially those who have completed their 5th year), in many cases today part of the university curriculum is in many respects a repetition of what they have learned before, at a slightly higher level, but at the same time the overlapping contents appear scattered, so their crediting and recognition with credit is difficult, in most cases impossible. Therefore, the training contents must be harmonized, the overlaps must be identified, so that those coming from the technical school can be exempted from certain subjects and units during their university studies. The other problem is just the opposite, that is, when the secondary institution is quite different from a university in some fields of study. In connection with this, it is necessary to strive for better cooperation between specialized higher education and secondary education, for the harmonization of the content of trainings and for building on each other. From time to time, teachers from the university must come to the technical schools as guest lecturers. These visits can be lectures and practices promoting higher education training in the given field and the given higher education institution. At the same time, the visits provide an opportunity for university lecturers to get to know the teaching staff, human resources, and infrastructure of the given technical school. In the case of reverse visits, the lecturers at the technical schools get to know the conditions, equipment, and lecturers at the given university.

There is also a need for coordination in the case of dual training: a student starting dual training at secondary level at a given company should have the opportunity to continue at higher education level. This requires further cooperation with the given companies and organizations.

The secret to a good dual training site? Interviews with dual training sites and education institutions

Dual Training at Harman Becker Ltd.

Harman Becker Ltd. has been operating in Székesfehérvár for more than 20 years, they are engaged in the production and development of premium category audio, navigation, and entertainment information systems. They are developing the future of mobile communication technology in several

international locations: from high-end audio systems to complete infotainment stations with navigation, voice control, Internet, e-mail, MP3, TV, DVD, and video functions. They deliver premium products to the largest players in the automotive industry. In Székesfehérvár, they employ more than 2,500 people at two sites.

Harman Becker Ltd. in Székesfehérvár has been successfully training dual students in higher and secondary education since 2015. At that time, there were significant developments at the company with a need for specialists, so they decided that the best solution was to educate their future colleagues. With the increase in the number of students, there was a need to establish a workshop in the Székesfehérvár factory unit, which has been continuously developed and expanded ever since.

At present, a total of sixty-two university students and thirty secondary TVET students participate in HARMAN Hungary's factory units in the secondary and tertiary dual vocational training program. The company needs highly qualified professionals, as they produce high-quality products using advanced technologies, which requires deep theoretical knowledge, as well as automation, pneumatics, IT, and mechanical knowledge. Their main goal is to provide students not only with practical knowledge, but also to provide them with a vision of their future career. Many of the graduating students still work for the company, and several former technical students have continued their studies, and have also participated in dual higher education at Harman Becker Ltd. as university students.

According to Tibor Németh, the workshop manager of Harman Becker Ltd., one of the key elements of a successful dual training is the close relationship with dual students. In the case of outstanding students in dual vocational training, they were given support and motivation to continue their studies in higher education and at the same time to stay with the company as dual students.

It is also very important that the company devotes resources to training. In the opinion of Tibor Németh, it is less functional if, in the case of a company, the HR area handles dual training similarly to the organization of other trainings. The big difference compared to a shorter training is that it is a multi-year long-term process with young students. For many companies, there is still a lack of recognition that the need for good professionals cannot be met immediately, and time and resources need to be invested in this. It is never early enough to start attracting the future workforce, it is worth organizing career presentation programs from the 5th grade of primary school.

Mentors at the company play a key role in Harman's dual training. The further training of mentors and the development of mentoring competencies are considered very important.

Dual Training at IBM

IBM Client Innovation Centre in Székesfehérvár and Budapest provides IT services, server operation, system management and development, and cloud-based services. IBM has been participating in higher education dual training since 2015, and from the beginning it launched its dual training program in Engineering Informatics BSc in Székesfehérvár and Budapest. 12 people have already graduated in the first two years, 51 people are still in training. The company decided to join the dual training because it wanted to ensure its continuous IT supply. University students, who study with them for 3 and a half years, learn about the company culture, join the IBM framework, and participate in the work of the departments. According to Martina Pergel-Schramek, Skill Development Project Manager in support of IBM, the company's dual training manager, one of the key elements of a well-functioning dual training is strong support from top management.

At the beginning of the dual training in 2015 at IBM, a program was developed in which students were introduced to a new field every six months to gain information and knowledge from as many fields as possible. As a result, they could not commit to any of the areas, they could not get involved in the projects because half a year was not enough to acquire a thorough knowledge of it. In 2019, they decided to redesign, according to which a new program put all students in a specific area. After 2 years it is possible to change areas. They try to tailor the program to students, regularly conducting surveys among participating dual students.

The organization of the semester project work caused difficulties during the Covid pandemic because the planned projects were partly related to onsite work, however, the company's employees, and with them the dual students, have been working in the home office since March 2020. Surprisingly, these first-year students who have begun their dual training in the home office that is the most agile and proactive.

Dual experiences of the István Széchenyi Secondary Technical School

The István Széchenyi Secondary Technical School has many years of experience with industrial internships. For more than 80 years, the school has been training professionals to meet the requirements of the age in the fields of mechanical engineering, electrical industry, and electronics, as well as information technology. The 2020/2021 school year brought radical changes, with the renewal of secondary vocational education. The primary goal of the transformation was to create a high-quality vocational training system that is much more flexible and adaptable to the needs of the labor market.

In the earlier Hungarian vocational training system only the technical grade students had the opportunity to complete an internship in an external industrial environment within the framework of a cooperation agreement or apprenticeship. The 13th and 14th grade students of the István Széchenyi Secondary Technical School were able to complete the mid-year internships at 39 different corporate partners. The companies agreed with the school about the curriculum content as the outcome of the internship was to pass the exam. In the case, when the company selected the students as trainees, post-graduate placement at the same firm was 90-95%. The external internships gave students a greater insight into industrial technologies, manufacturing processes, and the world of work. The companies, after one or two years of acquaintance, were able to select their employees of the future.

According to Lajos Zoltán Horváth, the school principal of the Széchenyi István Technical School, which was a clear negative experience, that the students' 2 company days per week alternated with 3 days of schooling. This, according to most corporate partners, has led to serious problems and even a loss of motivation for the company to get involved in vocational training. The problem was mainly that by the time the student could get involved in a work process, they had to come back to school and the following week the company was in a completely different process, so it was impossible for the student to be involved in certain projects and technologies.

The new Vocational Training Act of 2019 fundamentally changed the possibilities, in a very positive direction. Technical students first participate in a 2-year sectoral basic program at their technical school, during this period they do not go out in a corporate environment. From the grade 11 they must spend a part or all their specialized education in a corporate industrial environment. The alternative option is 1.5-year post-graduate courses, which also starts with sectoral basic education, but lasts only 4 months from September and around the beginning of mid-December students / trainees will appear in the company environment for the duration of their specialized education. In both forms (with and without general knowledge), basic education ends with a basic professional examination, so the company selection process can begin with these results.

The István Széchenyi Secondary Technical School is currently negotiating with 52 companies and holding workshops on the new system, which will start in the 2021/2022 school year, but this first year only affects the participants in the 1,5-year technical training without general knowledge. Based on the preliminary consultations, the companies also need trainers and rooms, laboratories, workshops, as there is not always enough capacity in their corporate environment, so the negotiations also affect these areas. The Vocational Training Act also specifies the in-service training of trainers in a corporate-industrial environment, which will also be provided on this basis.

The training output requirement in the future is based on learning outcomes. This is accompanied by the program curriculum, which mandatorily specifies the total number of professional hours and makes recommendations for subjects from which it is possible to deviate company – specifically, only the total hours are mandatory. As regulators require the company to have a training program, the István Széchenyi Secondary Technical School offered to review the regulatory documents in consultation with their professional staff, identify sector-specific areas that are exclusively school-

based (if any) and which can be acquired at the company. They develop a joint training program with the companies.

In conclusion, the strengthening of project education should also be mentioned. During the projects, they define the activities that the learner should encounter during their training. Students will start the projects in grade 9-10, in their basic professional education section with involving the companies. It allows the companies to have an insight into the skills of the students prior the dual vocational training starts.

Dual experiences of the Óbuda University

Óbuda University is a higher education institution located in Budapest with one faculty in Székesfehérvár. The university provides learning in the fields of engineering, informatics, science, economics, and teacher training. The strategic goal of the Óbuda University is to train professionals with excellent human qualities with immediately usable practical knowledge. As a domestic center of practice-oriented technical training, it pays special attention to the launch and development of dual trainings implemented jointly with economic partners.

In 2015, the dual training in the engineering informatics BSc course started as a pilot project at the Faculty of Engineering of Alba Regia of Óbuda University in Székesfehérvár. In 2021, 212 students participate in dual training, in 10 different undergraduate courses and 7 faculties. In January 2021, the 3rd dual year students have passed the final exam, and they were able to take their dual degree in their hands. There are currently 55 dual partner companies that actively employ dual students.

The dual students similarly to the regular full-time students fulfill academic assignments during the study or academic period for 14 weeks per semester. After this period, they participate in the practical training, lasting for 8 weeks in winter and 16 weeks in summer after each academic term at an enterprise, which has a cooperation contract with the university. During the academic period, if it does not conflict with the education, the student can participate in an on-the-job internship, one day a week.

In the case of dual and traditional students who participated in a 3-year longitudinal study, we examined the correlations between study outcome and placement. To date, 56 graduates have joined the study, of whom 29 (52%) have completed dual engineering and 27 (48%) have completed engineering studies in traditional training. Participants are BSc students in surveying engineering, in mechanical engineering, in engineering informatics, in technical management and in electrical engineering. 46% of the participants in the research graduated from a secondary technical school and 54% from a secondary grammar school.

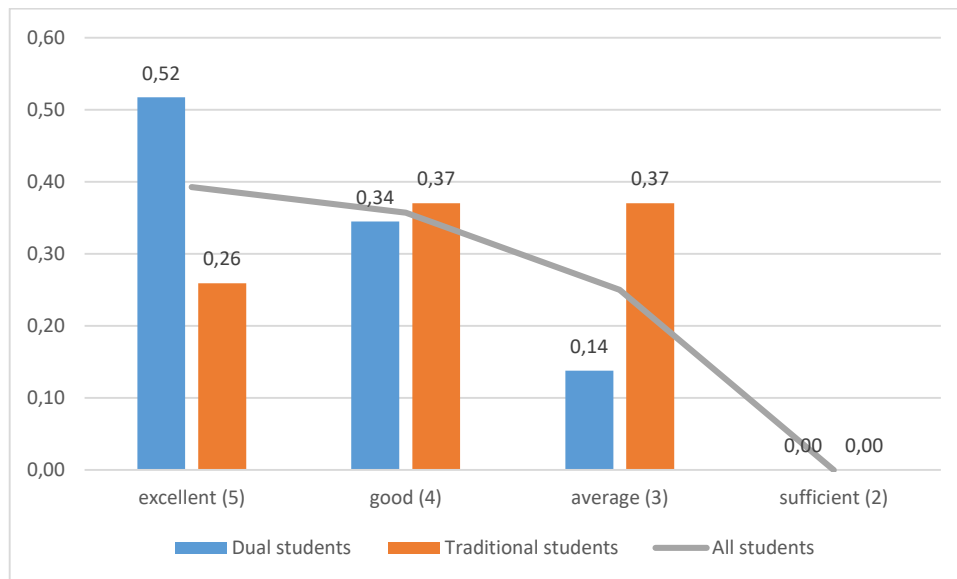
1. Table.: Study time until graduation (number of active semesters / number of students)

SEMESTER	DUAL STUDENTS	TRADITIONAL STUDENTS
7	25	18
8	0	0
9	4	6
10	0	1
11	0	1
12	0	1
Average study period (semester)	7,28	7,89

According to the curriculum, the undergraduate education of the examined BSc students is 7 semesters. Some students are unable to finish their degree requirements by that period, so their training takes longer. As shown in Table 1, there are more students in dual training who graduate on time. One year is the maximum extension that occurred among dual students, while for traditional students, there is also a multi-year extension in some cases. Among the students surveyed, there was no one who took a passive semester during their studies. Dual students are more motivated to graduate on time, not to postpone their studies, and their workplace also encourages them to do so.

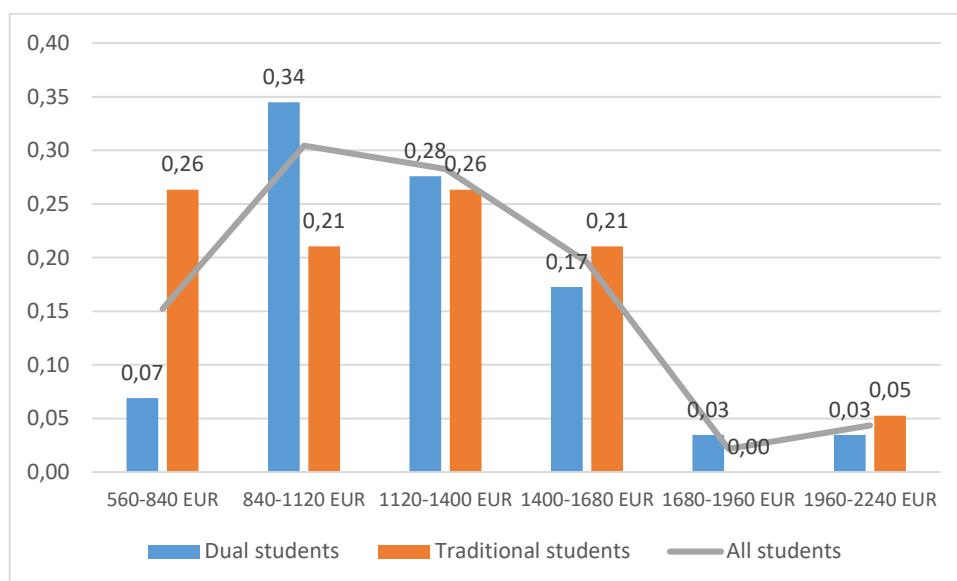
A dual internship that works well provide additional motivation for students during their studies, including completing their training on time.

1. Figure: Relative frequency of the quality of final examination results



There is a significant difference in the results of the final exam between students in dual and traditional training (Figure 1). Dual students graduate with excellent results in the highest proportion, and no one received a moderate or sufficient degree in the sample. Among traditional students, fewer have an excellent diploma, and a higher proportion have passed the final exam with good or average results. The quality of the dissertation plays an important role in this. In the case of dual students, in a real industrial environment, as participants in real industrial projects, much more thoroughly developed excellent works are prepared. In relation to the theoretical part of the final exam, the experience is that those students who have acquired a thorough proficiency in the practical applicability of the theory during their multi-year internship perform better.

2. Figure: Fresh Graduate Salaries (frequency of fresh graduates in each payment band)



The lowest starting salary category has a much higher number of graduates in traditional training (Figure 2). The proportion of dual students is higher in the middle categories. In the exceptionally high starting salary band, there is not much difference between students in dual and traditional education.

If we examine who are those who fall into this outstanding category, they are dual students or traditional students with other types of internships (non-dual training) or part-time jobs in the last period of university.

Based on the 6-year dual training practice of the Óbuda University, it can be said that there are partner organizations where dual training has been successful for years, but there are also those where it works less well. Successful internships are more likely in larger companies, where there is an opportunity to dedicate human resources to dealing with dual students as a corporate coordinator, and students also have a dedicated mentors at the company who is responsible for his or her professional development.

In smaller companies, the dual trainees are managed by the HR department and assigned to one of the company's few senior executives, who often do not have enough time to mentor. Nevertheless, even smaller companies have several success stories, because here a student may get a more serious professional task sooner, which often gives wings to a student of good ability and can be expected as a full-fledged employee already in the last two years of his / her studies.

Conclusion

Dual training is a response to bring school education closer to industrial practice. In the very fast-changing world of the 21st century, students thus have the opportunity to learn about state-of-the-art technologies in a real industrial environment, not only through the previous few weeks of practice, but through their full training. In addition to professional knowledge, on-the-job practice provides an additional opportunity to develop soft skills that are highly valued by employers nowadays. These are skills that can best be developed during activities e.g., communication skills, cooperation skills, networking, etc.

In our study, we set out to find examples of what it takes for a dual training to work well, examples of good dual practice. For the first time, we reviewed the main features, advantages, and difficulties of dual training in the field of vocational and higher education in Hungary. In interviews with corporate and institutional actors in the field, we examined what is the secret of their dual training, which has been operating successfully for years.

As a very important factor for successful dual training was found the high level of commitment of the management, the responsible human resources spent by the companies, the commitment and competence of the mentors. The same two basic elements can be essential for trainers. It is necessary that the appropriate responsible coordinating staff is involved in the process at the education institutions, who liaises with students and companies, helps to develop training plans, is available to both students and companies, and has the necessary information.

A well-functioning dual training is a long-term investment for the companies. Both presented corporate experience in this study supports the finding, it is a good opportunity to attract an experienced, immediately deployable young workforce. Dual students who have already graduated can, through their experience, become corporate mentors for the dual students of the future.

The benefits of dual training have also been reported by educational institutions. Dual students graduated from university with better results and are less characterized by procrastination and extended study time during their studies.

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