

Dual Education: The Win-Win Model of Collaboration between Universities and Industry

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Abstract—The purpose of this paper is to describe the new experiences of the dual training model in engineering education in Hungary. This new model has been introduced recently in the higher education and has become a focus of interest. This is a favorable program for the students to experience the real industry environment prior to graduation and it is a good tool to motivate them to study harder. The dual education students study in the institutional academic period together with the regular full-time students at their higher education institute, and parallel to their academic education they participate in the practical training. It gives the students an opportunity to join a specific training program at an enterprise. Being involved in specific "operational" practical tasks and project-oriented work enhances independent work, learning soft skills and experiencing the culture of work. Our objectives are to analyze the benefits of the dual training for all three parties: the student, the company and university. The study confirms earlier results from prior studies which show, for example, that students who choose the dual option achieve better program outcomes.

Keywords—higher education, dual education model, learning by doing, soft skills, motivation.

1 Introduction

Hungarian Universities introduced the dual study model based on German experiences in 2015. The Hungarian Higher Education Act was amended in 2014 and it defined the role and place of this new form of training in higher education.

Dual education as a special type of cooperative education combines classroom instructions with work experience in corporations. 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 (Fig. 1.). During the corporate period the dual students gain specific professional knowledge and practical working practice at the enterprise as trainees according to their contract. [1]

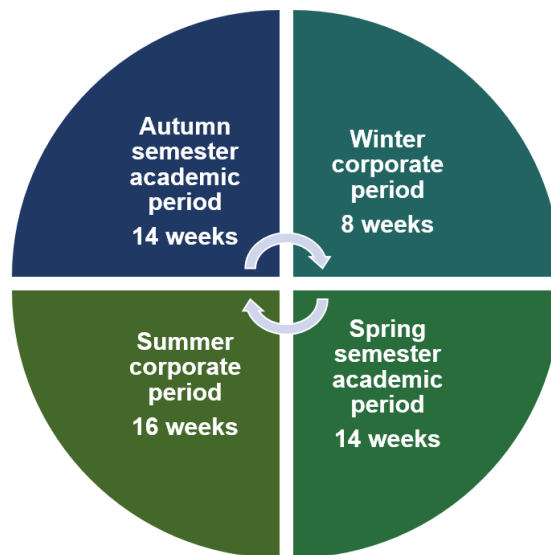


Fig. 1. The Hungarian dual study model

Domestic and international experience highlight the effectiveness of dual training [2] [3] [4]. Dual training increases professional competences. The knowledge base is obtained in the company environment, by integrating the established curriculum content, structure, a sufficient internship period and the practical experience gathered from professionally qualified companies [5]. It allows students to convert their theoretical knowledge into practice and enter the labor market as strong contenders eliminating the years of extra training and additional financial expenses.

The dual form of training can be beneficial for all three parties: the student, the company and the university. The students can gain practical knowledge during their studies facilitating better job prospects after the training, and their income can ease financing their training as well. However, it is important to note that participation in this type of training requires a certain degree of maturity, high level of motivation, because the coordination of work and study is difficult. For companies, this form of training allows fulfilling their demand for well-trained labor, and the transfer of knowledge ensures professional recruitment [6]. Universities expect more motivated students, regular lively cooperation with enterprises, higher level of social awareness, recognition and increased interest.

An investigation of the International Company, IBM, in Germany, demonstrates that cooperative education graduates show rapid career advancement. An interesting aspect of this observation is the fact that, dual students at IBM, have higher salaries and hold higher positions as opposed to students from traditional universities. [7]

Further international studies [8] [9] [10] report on the benefits of cooperative education in the engineering education. The studies present that students who choose cooperative education have higher Grade Point Average and higher starting salaries.

According to Burns and Chopra [11] successful industry engagement provides students with different experiences in networking connections with professionals who can potentially provide employment references and future job positions for them. The practical experience of observing and applying the methods and theories learned in classroom to real-world scenarios, allows students to gain experience in their prospective career path, and improves students' professional communication skills.

2 The dual study model, learning by doing in the higher education

The model of the situated learning is based on the traditions of the historical guild education. Apprenticeship is a way of learning for a newcomer, the strength of which is introducing their members to the "learning in community" practice, which is a cornerstone of workplace training for professionals in the field of knowledge creation and professional development [12]. According to Lave and Wenger [13], learning is not just the transfer of abstract and decontextualized knowledge from one person to another, but a social process in which knowledge is jointly built. They think that such learning can be defined in a particular environment, embedded in a particular social and physical environment. Knowledge is nothing but a highly valued competence, and acquiring this knowledge depends on participating in a group whose members already have this competence and who are willing to allow the learner to gradually become more involved in their community (as in the Middle Ages it happened in guilds). With time-controlled observation and practice, where hidden knowledge is important, the students are moving from the periphery towards the center by increasing their participation in the community of practice. By doing so, learning is merged with work.

It is commonly criticized that university engineering training is not able to train professionals who fully meet the industry's expectations being far from the world of industry. In the world of permanent changes today, due to the constantly changing economic and social environment, industry requires practitioners with experience-oriented training (Fig. 2.). Due to its structure, the current traditional two-stage Hungarian university training does not offer sufficient opportunities for practical training. One reason of it is there are less university instructors with up-to-date industrial skills. Another reason is the insufficient acquisition of the so called soft skills (i.e. leadership skills, co-operation skills, corporate culture, etc.) in the higher education institutions [6].

These expectations justified the introduction of dual training in the technical higher education. The strong theoretical knowledge acquired during the academic semester in dual training is immediately applied at the companies during the corporate period. In addition to the curriculum related to a particular discipline, students also acquire theoretical and practical knowledge of the skills required at the company. The knowledge of the students participating in the training meets the needs of the companies they work at, so the societal return of the training is significantly faster. Dual training responds to the labor market expectations much faster than traditional engineering training.

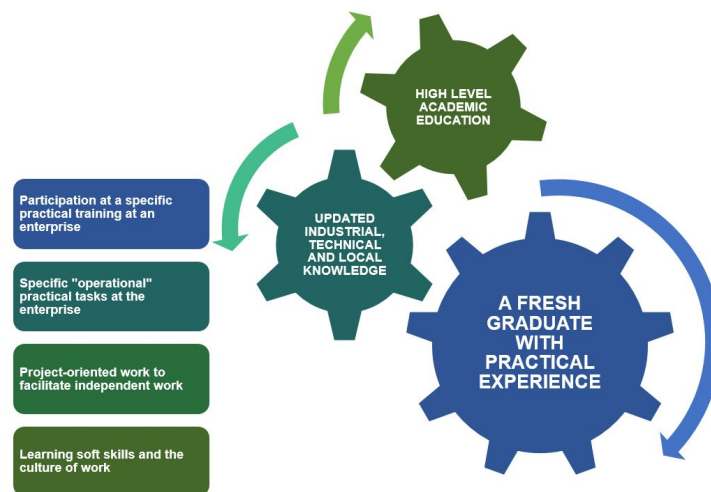


Fig. 2. The elements of dual training

3 The benefits of the dual training

3.1 Benefits of the dual training for students

In our empirical research we examined the special features of dual training compared to traditional training in one chosen topic, the entrepreneurship knowledge. There are more courses engineering students take part in during their studies relating to entrepreneurship: Business Economics, Management, Quality Assurance, Energy Management and Environmental Protection, Legal Knowledge, Human Resource Management, Logistics etc.

The dual student has the opportunity to understand the interrelation among different enterprise subsystems, instead of seeing them as separate subjects at a course. It is possible to present them the system as a whole, the connection points among controlling, accounting, marketing, HR, procurement, logistics etc. During the lectures dual students are more active, they show more interest toward the different entrepreneurship knowledge areas. They share their experiences gathered in the business context and check the areas they learned about at the academic institution.

Participants in the student research were 32 students majoring mechanical engineering and technical management, all first-year students of the Obuda University. Their mean age was 20 years (SD 1.6). 59% (N=19) were dual students, 41% (N=13) were non-dual students. 59% (N=19) were majoring mechanical engineering, 41% (N=13) were majoring technical management. All students attended Business Economics course in the spring semester of 2017 and have just written their end-of-term test in the subject before the research was done.

The student research had two parts. First all participants completed a questionnaire, secondly all students participated in one of the three focus groups, which could reveal more detailed information and deep insight in their views.

The questionnaire measured the prior knowledge of business topics of the Business Economics course and the prior business experience (knowledge acquired in a dual practice, knowledge gained from other work experience such as summer student work, secondary school practicum etc.). We measured the prior business experience in 5 topics (entrepreneurial forms (1), financial report (2), sales process (3), pricing (4), marketing mix (5)). We also measured to what extent their corporate experience has helped to understand and acquire the course curriculum. (confidence from (‘C’) “1 absolutely not” to “5 greatly helped”).

Table 1 shows the measures and the headcount indicators of the students’ experiences (‘N’). The results show more and deeper prior experience among dual students (dual student indicator(‘N’) in all topics is an average of 41%, confidence (‘C’) 30%, and traditional student indicator (‘N’) 18%, confidence (‘C’) 10%).

Table 1. Prior knowledge of business topics (N=number of positive answers, C=sum of the confidence values, the indicator values are headcount proportional values)

	1.topic		2.topic		3.topic		4.topic		5.topic		All topics average	
	N	C	N	C	N	C	N	C	N	C	N	C
All students	14	50	3	7	15	52	12	43	7	25	51	177
All students' average indicator (%)	44	31	9	4	47	33	38	27	22	16	32	22
Dual student	10	38	3	7	11	41	11	40	4	18	39	144
Dual student average indicator (%)	53	40	16	7	58	43	58	42	21	19	41	30
Traditional student	4	12	0	0	4	11	1	3	3	7	12	33
Traditional student average indicator (%)	31	18	0	0	31	17	8	5	23	11	18	10

The second part of our research was the focus group discussion, where the participants were divided into three focus groups of 10-15 students. First we reviewed the work place experience of the participants. As mentioned earlier among the 32 students were 19 first-year dual students, who had at least a half year workplace experience at their dual company. The dual training was the first workplace experience for 21% (N=4) of the dual students. The others 79% (N=15) had other previous experience, mainly summer jobs at enterprises not relating to their learned profession (work in a kiosk, movie ticket inspector etc.). There was only one student with absolutely no previous work experience. 92% (N=12) of the non-dual students also had some short term work experiences.

After the introductory question the focus group discussion went on to find out how the company experience helped in understanding the subject of corporate economics and which areas the students discovered at the company. The dual students reported about their first term experience, when they spent a few days shadowing at different

departments at their company, understanding the company structure and had an overview of the context of the operation of the organizational units. Financing, quality assurance, project management, procurement, design, assembly, production, sales, market research, customer searching, customer relations, logistics, pricing, preparation of quotations were the most mentioned areas, where dual students had experience at their dual company. Non-dual students had less experience at their short-term summer student workplace, they had no overview of the operation of the business they worked for.

The last part of the focus group conversation tried to reveal the students' opinions about the dual study model in general. The most mentioned benefits were the following:

- The possibility to apply learned academic knowledge and skills in the work environment.
- The possibility to work in a team.
- The possibility to successfully complete industrial tasks and contribute to the company.
- The possibility to gain and develop soft skills.
- Experiences in networking connections with professionals.
- Develop personal management skills related to time, organization.
- Better job prospects after the training.
- Monthly regular income from the company.

The most mentioned difficulty for students was the coordination of work and study. The dual students have to pass their exams during the corporate period. They work and learn parallelly, which needs a high degree of maturity in managing tasks and the time.

3.2 Benefits of the dual training for companies

In the second part of our research 33 in-depth interviews were done with dual coordinators and mentors at the partner companies of the Obuda University.

According to the company representatives, the lack of skilled workers is planned to be eliminated by dual training. There is not enough labor supply, they find it very difficult to recruit. The role of dual training is seen in ensuring new labor, which may help to explore the areas to focus on.

The interviewed organizations expect a lot from dual training. They hope to improve the quality of workforce, easier recruitment and cost-effectiveness. Through the cooperation they can form the curriculum. But even more important is for them the opportunity of deeper human and professional relationships.

Companies' expectations from a student differs from those of an active experienced colleague. The students' full integration is the most important for them: professional, human, peer, and community integration. They find that a young, open person has fresh mind, new perspectives and approaches. Students can help the company in reformation, companies expect the young new colleagues to come up with ideas and suggestions, to be curious, because creativity has added value. Today's university

students possess a level of technological knowledge, as they are the so called "Z generation", they are the digital natives. They should pass this socialization knowledge on to "older" colleagues, while elder staff members should focus on passing company-specific knowledge and experience, the corporate culture, and "networking".

The active, collaborative relationship between the company and the university is another good impact of the dual training. The regular and formalized contacts can go beyond dual training and include joint innovation and research projects.

3.3 Benefits of the dual training for universities

In the last section of our research, we performed in-depth interviews with 8 teachers of the Obuda University to discover their opinion of the dual training. The university has a lot of new coordination tasks due to this dual model, as facilitators of the contacts between the students and the partner companies.

The educators' opinions are positive despite the additional tasks. The three most mentioned advantages are: the motivating effects on the students; the regular lively cooperation with the enterprise, which can bring more R+D cooperation to the university; and the PR value, which increases social awareness, recognition and interest toward this type of education.

Teachers indicate, as the best thing in dual education, that the practical knowledge students acquire at their dual company helps them a lot to understand the importance of the academic curriculum. This understanding is an excellent motivational tool, students put more effort in learning, because they understand the utility of the different topics. It is often mentioned, that dual students compared to the traditional students are more creative, because they get a lot of extra knowledge at the company, which supplements the knowledge acquired at the university. Due to the students' presentations about their company experience, they bring the latest practice back to their academic institution, which is a very useful experience even for the teachers.

The disadvantage the teachers mainly mention is that the dual students have extra load, especially during the exam period, because they have to work and parallelly prepare for their exams

4 Conclusion

In our research we intended to capture the main features of the dual training through examining the results and the views of the three parties, the students, the companies and the university. We used different parallel quantitative and qualitative methods, such as the questionnaire, focus group interviews and in-depth interviews to discover the main characteristics.

The dual study model is a quite new experience in the Hungarian Higher Education. The first two years have proven the expected results, but the topic needs continuous further research.

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