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Development of dual high education model in Serbia

Contacts: Prof. Dr. Mirko Savić, savic.mirko@ef.uns.ac.rs
Dr. Branimir Kalaš, branimir.kalas@ef.uns.ac.rs



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Abstract	The report shows the level of development of dual education in Serbia. A review of the Law on Dual Education is given, as well as the accreditation process, and the specifics of the developed model are presented. As a case study, a model of dual education development at a higher education institution is given.
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ABBREVIATIONS

UNS:	University of Novi Sad
FES:	Faculty of Economics in Subotica
ECTS:	European Credits Transfer System
MDHE:	Models of dual higher education
HEI:	Higher Education Institution
LF-DHE:	Model of the legal framework of dual higher education
GF-MDHE:	Generic and flexible model of dual higher education
VISER:	School of Electrical and Computer Engineering of Applied Studies in Belgrade



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Objectives

The main goal of the document is to present the state and level of development of the model of dual education in Serbia, both through the legal framework and through the generic and flexible model of dual higher education in Serbia. Also, the implementation of the model of dual education in one higher education institution - VISER will be presented.



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1. Introduction

The introduction of dual education in the higher education system of Serbia began in 2017, when the ERASMUS+ project *Implementation of Dual Education in Higher Education of Serbia* started, which included the adoption of a legislative framework and the implementation of a dual education model in several higher education institutions in Serbia.

Two years later, the Law on Dual Education was adopted (SG RS, No. 66/2019), which provided the legal framework for applying the dual education model. Also, within the project, an overview of the standards for accreditation of dual study programs is given, which are of course in line with the Law on Higher Education of Serbia and Law on Dual Education.

The document describes the generic and flexible model of dual higher education in Serbia, as well as an example of the application of the dual education model in Serbia at a higher education institution - VISER.

The basis for this document is the Law on Dual Education, as well as the report *Development of the Generic and Flexible Model of Dual Higher Education in Serbia* and the document *Proposal of standards for accreditation of dual study programs* given within the Erasmus+ project *Implementation of Dual Education in Higher Education in Serbia*.



2. The model of the legal framework of dual higher education in Serbia

The legal framework for establishing dual education in Serbia was established in September 2019, with the adoption of the Law on Dual Education (SG RS, No. 66/2019). The law regulates all aspects of organizing studies according to the dual model. The first part defines the terms relevant to the dual education model, such as the dual model of study, employer, learning through work, a mentor with the employer, academic mentor, and teaching plan. Also, the goals of MDHE are stated, so the emphasis is placed on the development of competencies and easier employment of graduates.

The part related to the realization of the dual model defines the method of accreditation, which can be in the form of an independent study program or a module within the study program. It is envisaged that all forms of active teaching, as well as learning through work should be represented by at least 450 hours per year on average at the level of the entire study program. It is also envisaged that part of the learning through work can be realized at the higher education institution itself or with third parties, provided that they have to prove the possession of material, technical and personnel conditions for performing this type of learning. This section also defines the conditions for conducting learning through work with employers. The conditions that the employer must meet are foreseen, which primarily refers to the activity he performs and the possession of an appropriate number of mentors, as well as technical, material, and other conditions.

The mutual relations between the higher education institution, employers and students are specially defined. They are regulated by: 1. Contracts on the dual model, which is concluded between the higher education institution and the employer, and 2. Contract in learning through work, which is concluded between the employer and the student. These contracts provide for the rights and obligations of the signatories, as well as the conditions for termination of the contract. An important element of the Law is the regulation of a mentor's status with an employer who is required to have competencies for the realization of learning through work. The type and manner of checking competencies is regulated by the higher education institution's general act, which is regulated in the form of student assessment.

What is especially important is that the Law on Dual Education provides material and financial security for students. According to him, the employer is obliged to provide



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financial compensation to students, in addition to the necessary protective equipment, transportation and food costs, as well as insurance. This compensation can be paid in different amounts according to the years of study, according to the level of knowledge of students in the range of 30-70%, provided that the total salary of the employee is not less than 50% of the basic salary of the employee engaged in the same or similar jobs. It is envisaged that the compensation will be paid on a monthly basis for each hour spent on learning through work. The employer can also bear the costs of tuition, provided that he has the opportunity to reduce the compensation to the amount of tuition. Students' envisaged financial security is very important, especially for students who pay tuition fees, as this model of studying will significantly ease the material situation during their studies.

Every study program conducted in Serbia must go through a very strict accreditation process by the National Entity for Accreditation and Quality Assurance in Higher Education. Accreditation is a very complicated process that involves a very detailed description of the staff and material capacity of the higher education institution as well as a description of the study program itself, while domestic and international reviewers do the review. In the current accreditation standards, no special standard for accreditation of the dual study model was envisaged. Only with the legislative framework's adoption, conditions were created for the implementation of standards related to this way of studying.

The working group within the project *Implementation of Dual Education in Higher Education in Serbia* proposed introducing a new standard (Standard 13) which is fully in line with the Law on Higher Education of Serbia and Law on Dual Education. In addition to all relevant data on the study program, this standard also provides for the submission of data on the employer where the learning through work is performed. Namely, it is envisaged to submit proof that the employer with whom the higher education institution has concluded a contract meets the conditions for performing learning through work, as well as the manner of checking the competencies of the mentor with the employer. Also, in the case that learning through work is realized through a wound at the higher education institution or with a third party, it is planned to submit proof that they have the material, technical and personnel conditions.



3. The generic and flexible model of dual higher education in Serbia

The Generic and Flexible Model of Dual Higher Education aims to help HEIs and companies specify their own dual higher education models. This task presupposes that the model of dual higher education should be *generic*, providing that all specific models based on the generic one satisfy some basic and important features of dual higher education and that the model should also be *flexible* to allow the implementation of very different variants of specific MDHEs.

Every specific MDHE describes an implementation of dual higher education in a specific context as an approximation of a real implementation of DHE. The model usually cannot include all possible factors (or dimensions) of a practical implementation of DHE agreed between a company and a HEI. The GF-MDHE should include the most relevant and important factors, providing guidance for a HEI and a company on how to specify their specific implementation of DHE. A specific MDHE is a category of GF-DHE that contains a subset of factors specified by the GF-DHE. So, many specific MDHEs may be specified from the GF-MDHE by selecting some of its factors. When a HEI and a company agree to implement a specific MDHE, they usually find that they need one or more factors not included in the specific MDHE and GF-MDHE and need to add them to their implementation of their specific MDHE. A specific MDHE has to be flexible and allow partners to add factors that are not listed in GF-MDHE and in specific MDHE.

In order to minimize efforts of HEIs and companies in the process of specification of their specific MDHE, it is recommended that the generic and flexible MDHE includes as many factors as it is feasible. The list shows the proposed GF-MDHE with 38 factors (or dimensions). This model will be tested to refine and improve it according to the experience gained during its pilot implementations by HEIs – project partners from Serbia. This initial proposal of the GF-MDHE will be further improved in this period according to proposals of different stakeholders expressed on forums and conferences planned to be organized by DualEdu project team, where the model will be presented and discussed. So, the GF-MDHE presented here is just the first, initial version of the GF-MDHE, and it is most likely that its final version, specified by the end of the DualEdu project, will be different and better.

The generic and flexible MDHE (GF-MDHE) specification is constrained by the national legal framework of dual higher education (LF-DHE). Once the legislation of DHE is



officially specified, the presented FD-MDHE will be modified in order to be in line with the DHE legislation. When a HEI and a company want to specify the specific MDHE the most convenient for them, they can choose alternative specifications, specific implementation aspects, and recommendations. If DHE partners find that the list does not provide a factor, and if the factor's inclusion is not violating any requirement specified by the national DHE legislation, they can add the factor and extend the GF-MDHE. In this way, it is expected that the GF-MDHE will be more comprehensive and more complex, and more flexible than the initial version specified in this report, as it provides more factors.

This list includes following specific factors:

1. Geographical and economic issues

- the geographical restrictions
- the needs of local economic structure (for the certain type of qualified professionals)

2. Study program

- the academic level of dual education and program to be implemented (BA, MA or Ph.D.)
- duration of the study (standard or prolonged)
- teaching language
- international mobility of the dual program
- support of students' mobility (administrative, legal and financial)
- the competences to be acquired and the contents (agreement between university and company)

3. Contracts

- between the HEI and the company
- between the company and the student (start of work, duration of the working contract, type of the paid work)

4. Working time

- the period of student's time distribution and rhythm (different alternations of the work-study relation (hourly, daily, weekly, monthly, quarterly, semestral or some specific combination)
- start of work in the company (first or second year)
- work distribution of time allocation at the university and in the company (fixed or variable)
- possibility of change of companies in the working period

5. Selection of candidates

- the admission criteria and the selection process



- publishing of jobs for dual students by companies
- evaluation and selection of the candidates

6. Tutorship

- tutorship realization
- the company's tutor profile
- the collaboration of company tutors with students

7. Teaching-learning process

- type of lecturers
- evaluation of the company by the student
- evaluation of the student by the company
- assessment of the ability of the company to match the acknowledged degree requirements
- assessment of the ability of the university to implement active pedagogy
- assessment of the ability of the university to implement didactic approach

8. Active educational design

- implemented pedagogy
- the e-portfolio (electronic formalization of experience)
- students monthly meeting minutes
- regular contracts

9. Assessment of dual students

- learning outcomes and success indicators
- the decision about who performs the evaluation (company tutor, university tutor, or jointly)
- the decision about the subject of evaluation
- kind of evaluation to be taken
- number of allowed evaluation attempts



4. Specific MDHE developed at VISER

School of Electrical and Computer Engineering of Applied Studies in Belgrade (VISER) provides students with three-year undergraduate studies (180 ECTS), as well as two-year master studies (120 ECTS) for further education, and for a start it was the master studies, which duration is four semesters, that was chosen to be the field of implementation of the dual-education program. Over the course of their two-year studies, it was planned that students should go through practical forms of learning by being directly hired by an employer with whom VISER has an Agreement on Business and Technical Cooperation. Learning through an apprenticeship in this study program was realized in four activities: Internship 1 (2nd semester, 180 hours, 6 ECTS), Internship 2 (3rd semester, 180 hours, 6 ECTS), applied research (3rd semester, 240 hours, 8 ECTS), and master thesis (4th semester, 480 hours, 16 ECTS). In this way, throughout their studies, students obtained 120 ECTS, 36 ECTS of which are obtained in the process of work-based learning, which in sum equals 1080 of working hours.

Classes were realized in a period of no more than 15 weeks per semester. Work-based learning in a period when there were no classes could be realized in a range of 100 to 170 hours per month, until the time the student has met all his/her obligations at the employer's, finished his/her work on Applied Research and completed his/her Master Thesis.

To realize Internship 1, as agreed with the course teacher, a student had received a request for the realization of Internship 1 in an organization that worked in the field studied in the student's study program and had an agreement on business and technical cooperation with VISER. After completing the internship, the student submitted a verified confirmation that he/she finalized the internship and took the corresponding exam, but was also obliged to submit his/her internship journal. Each student who has taken part in some form of work-related engagement, submitted a verified confirmation of the engagement with a description of the work done, in alignment with his/her study program.

To realize Internship 2, as agreed with the course teacher, a student could receive a request for the realization of Internship 2 at the company with which VISER had an agreement on business and technical cooperation. The agreement stipulated that the employer must designate a mentor from the organization who monitors the student's work and verifies the internship journal as successfully finalized, bearing in mind the



objectives and outcomes of the course. When taking the exam Internship 2, the student evaluated, with the course teacher, whether the conditions have been met for the realization of AR and MT with the internship employer and was guided towards choosing a mentor at VISER as well as a narrower field of expertise for the student's AR and MT. The student and teacher gauged whether the realization of AR and MT would make an academic contribution at this level of studies (in terms of innovation, creativity, expert contribution, practical applicability for the employer). It was also evaluated to what extent the student is capable of realizing his/her AR and MT (based on the student's ability to identify and methodologically structure their work by researching professional issues, based on the acquired theoretical and practical knowledge, theoretical and empirical research in the field related to the student's master study program, and the ability to professionally interpret and present research results, as well as make the results practically applicable). If an employer had no employee(s) who meet the legal conditions to be a mentor at the organization, the employer could hire a person from another organization who met the conditions and had the necessary knowledge for a successful realization of AR and MT in a field of expertise related to the study program at VISER. The employer filed a decision designating a mentor from the organization for the realization of AR and MT. VISER signed an agreement with the mentor designated by the employer, obligating thereby him/her to send the reports on the realization of AR and MT and participate in the defense of MT, confirming therein that the MT has been realized at the employer's, that it was applicable and that its content was appropriate.

Work on master thesis consisted of student's practical research in which the student applied the knowledge gained in electrical engineering, computer engineering and multimedia engineering, as well as research methodology. Student's research was a project in which he/she solved a practical problem from a relevant field, approved by the corresponding organization and higher education institution where the student studies. All accomplishments (for instance, patents and technical solutions, the recommended expert solution to a practical problem) remained in the ownership of the organization where the MT was realized, while two-party agreements regulated the mutual rights of students and employers. All the MT's recommended solutions are tested at the organization, while all documentation remained at the employer's. In his/her MT, the student presented research analysis and described his/her methodological approach, not disclosing any details that may be considered a business secret. The mentor from the organization confirmed the validity of the analysis while taking care of organization's interests. The mentor from HEI makes sure that all research results were at a certain academic level and met VISER's criteria.



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After his/her thesis topic had been approved, the student worked on a research project approved by his/her teacher mentor. In his/her AR, the student carried out research and wrote a report on it in the form of a paper. After passing the exam in his/her AR course, the student wrote a master thesis. Before his/her thesis defense, the student filed a signed confirmation of academic integrity to prevent any instances of plagiarism and disclosure of business secrets regarding the organization where the research was realized. After finishing the thesis, the student, in coordination with his/her mentor, presented his/her thesis results in front of a VISER defense commission. The commission typically consisted of two teachers from VISER (mentor and head of the commission) as well as a mentor from the organization where the thesis was realized. The commission evaluated the student's entire engagement, based on the written material, his/her oral presentation, and his/her responses to the commission's questions during the defense.