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**Introducing Problem Based Learning in Moldova:
Toward Enhancing Students' Competitiveness and
Employability**

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Work Package 4

Consolidated report

Development and implementation of PBL in pilot study programmes

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Executive Summary

This report consolidates the process and findings included in the reports of the universities of the Republic of Moldova, member of the project, and comprises the overview of the universities' vision on PBL-based study programmes; identification of performance indicators with reference to the development/implementation of the PBL model by each University; analysis of these indicators; conclusions from the analysis made in reference to the development and implementation of PBL-based pilot study programmes.

The report concerned provides the consolidation of the reports drawn up by each university in part on its characteristic Bachelor's degree study programme that are annexed to this report

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1. Introduction

The purpose of this report is to conduct an analysis of the process of development and implementation of pilot programmes with the application of problem-based learning (PBL) within the partner universities of the Republic of Moldova. In this report we rely on the findings elucidated in Work Packages 2 and 3 developed by universities in the period 2015-2017, but also on the results of the Work Package 4, presented at the beginning of the year 2018.

In order to have a broader view of the process we have specified three stages of the project deployment: the stage of preparation or development of pilot programmes, the stage of implementation of these programmes and the stage of achievement of student mobility. The first stage included training sessions in Moldova offered by the project partners in the European Union, as well as visits, and academic mobilities at EU partner universities where academic staff from the universities of RM gained experience and formed the necessary competences to prepare and launch pilot programmes with PBL application in the previously selected field. This stage also included the elaboration of new study programmes with the application of the PBL or adaptation, by the corresponding amendments, to this method of existing programmes, the approval of educational plans, the promotion of pilot programmes for high school graduates and the conduct of admission to these programmes.

The implementation stage consists of the direct conduct of pilot programmes, joint co-teaching with EU partners and the conduct of the mobility of academic staff from the universities in the RM to universities in the EU.

The third stage refers to students' academic mobility, enrolled in the pilot programmes offered by universities in the Republic of Moldova to the EU's higher education institutions, partners in this project.

For the purpose of conducting the proposed analysis it was necessary to identify qualitative and quantitative indicators – performance indicators.

2. Analysis of key performance indicators

2.1 Overview of universities on the study programmes implemented

PBL is a student-centred, research-based training model in which students undertake to solve an authentic, poorly structured problem that requires more thorough research (Jonassen & Hung, 2008). Students identify gaps in their knowledge, conduct research and apply what they learned to develop solutions and present their discoveries (Barrows, 1996). Through collaboration and research, students can cultivate problem solving (Norman & Schmidt, 1992), metacognitive abilities (Gijbels et al., 2005), commitment to learning (Dochy et al., 2003) and intrinsic motivation.

Starting from the above, and following the study of the teaching methods centred on the student in several universities in the European Union, each University in Moldova, partner in the project, aimed at introducing these methods in the study programme included as a pilot in the project. A gradual implementation of the problem-based learning (PBL) was to be carried out within the respective pilot programme.

Each university either developed or modified an educational plan, taking into account the requirements of the PBL, as well as the normative acts in force in the Republic of Moldova. These programmes have been implemented since 1 September 2017.

The general purpose of the pilot programme consists in the training of specialists with multiple competences in the field of training, able to identify problems in the field in which they will work, to form teams in which to solve them, to be able to work in the team, in a competitive economic environment in a permanent change. The theoretical and applicative competences offered by the programme will facilitate the integration of future graduates into the labour market. For this purpose, it will be passed from classical (theorized) education, where the teacher is a provider of information, and the student is the receiver of the information, to PBL (problem-based learning).

Updating the curricular support and revision of teaching methods in the pilot programmes is the key to their success, contributing to the achievement of the mission and objectives of the study programme. Achieving these goals will be done gradually, from one semester to the next, from simple learning tasks to complex ones.

In this respect, each pilot programme was structured on semesters (6 or 8 depending on the specifics of the programme). A theme has been identified for each semester. According to this, there have been determined those modules or courses to be included in order to ensure the intended outcomes and to achieve the objectives proposed. The detailed information on the semester structuring of the pilot programmes implemented are found in the final reports for the Work Package 4 conducted by universities (Appendixes 1-6).

The developed or modified educational plans were approved by the Senates of the universities, and in some cases by the Ministry of Education, Culture and Research (MECC) - *Business and Administration* programme at AESM, the *Software Engineering* programme at TUM; by MECC and the Ministry of Health, Labour and Social Protection - *Public Health* programme at SUMPh. These documents shall be found in Appendixes 1-6 to this report.

One important, necessary, but difficult thing that universities have done was to promote pilot programmes with the application of the PBL method and information on the possibilities for application to the 2017 admission, and then the admission 2018 to these programmes. In this respect, various methods were used: high school visits, information placed on the university's website, on the university's Facebook page, etc. Also, each university developed flyers to promote the study programme under the PBL. These promotional materials are presented in Appendixes 1-6 to this report.

Each university enrolled a certain number of students in the pilot programme (Table 1) and, starting on 1 September 2017, there was initiated the implementation of the PBL through activities specific to a student-centred education process.

2.2 Identification and analysis of key performance indicators

When designing the Pilot Programme with the application of the problem-based learning (PBL), each university in Moldova took into account the diversity of the degree and models of implementation of the PBL method in the EU partner universities visited and the experience that has been studied, including the use of other active teaching methods. Each university has its own specificity and an individual approach per programme on the use of active methods of teaching, in general, and PBL in particular.

In order to achieve the intended purpose, we have identified in this report a series of indicators, reflecting the performance of the implementation of the problem-based learning, based on which we synthesized the information for each university in the Republic of Moldova, partner in the project. The result of this synthesis is shown in Table 1.

Table 1: Key performance indicators

Indicators	AESM	USARB	CSU	MSU	SUMPh	TUM
PBL implementation level	Study programme "Business and Administration"	Study programme "Public Administration"	Study programme "Entrepreneurship and Business Administration" (Business and Administration)	Study programme "Law"	Discipline "Neuroscience"	Study programme "Software Engineering"
PBL: Traditional ratio	40:60	60:40	65:35	15:85	50:50	50:50
Language of instruction	Rom. - Eng.	Rom.	Rom.	Eng.	Rom.	Eng.
Number of staff from the universities - members of the Consortium - trained in RM by EU partners (development period/programme implementation period)	65/33	26/20	30/21	30/20	36/23	61/43
Number of staff from universities in the RM, members of the project, involved in study visits to EU Universities (development/implementation)	8/6	8/4	8/4	8/7	11/4	19/12
Number of mobilities of academic staff in the EU (development/implementation)	15/2	11/4	13/2	12/7	5/8	11/11
Approved study programme	Approved by the Senate, Minutes no. 10 of 4.05.2017 Coordinated with ME 06.06.2017,	Approved by the Senate, Minutes no. 21 of 30.05.2017	Approved by the Senate, Minutes no. 8 of 27.04.2017	Approved by the Senate, Protocol no. 1 of 30.08.2017	Approved by the Senate, Minutes no. 3/2 of 05.06.2017 Coordinated with MH	Approved by the Senate, Minutes no. 4 of 27.12.2016 Coordinated with ME

	No. ISÎ-01-18120				June 2017 ME 20.07.2017 ISÎ –01-18126	24.07.2017 ISÎ-01-18130
Number of students enrolled in the programme: 2017/2018	31/29	15/6	25/15	26/24	28/26	55/60
Number of visits of EU partners for training, co-teaching, evaluation (development/implementation)	31/26					
Student mobility: autumn/spring	1/5	0/0	0/0	6/6	0/4	3/9
Extending PBL implementation to other study programmes	Bachelor's degree study programmes: World Economy and International Economic Relations; Marketing and Logistics;	Bachelor's degree study programmes: Law	Bachelor's degree study programmes: Accounting; Computer Science; Engineering and management in food industry	Master's degree study programmes: Public policies and services; Marketing studies; Hotel and tourism management and marketing; Landscape design and green spaces; Labour and organisational psychology	Bachelor's degree study programme „Optometry”	MSc Information Technology MSc Information Security MSc Computers and Information Networks Prof.master IT for business

- **Indicator *PBL implementation level***. At the project initiation stage, each partner university in the RM established the level of implementation of the PBL method. Five universities - Academy of Economic Studies of Moldova (AESM), State University „Alec Russo” of Bălți (USARB), State University of Cahul (CSU), State University of Moldova (MSU) and Technical University of Moldova (TUM) - chose the implementation at the study programme level, the first cycle, Bachelor’s degree (these programmes are mentioned in Table 1). The University of Medicine and Pharmacy „Nicolae Testimitanu” decided to implement the PBL at discipline level: *Neuroscience* in the „Public health” Bachelor’s degree programme. Universities modified the existing educational plans to form interdisciplinary modules, in order to introduce projects to specific disciplines.
- **Indicator *PBL:Traditional ratio***. At the moment, problem-based learning is being implemented in the programmes selected in the project. Since the course and degree of implementation of the PBL method differs from university to university, we have tried to reflect how each university in the consortium succeeded in introducing PBLs in the study process for that programme. This indicator characterizes the ratio of the number of ECTS for PBL-based courses to the number of ECTS for traditional courses. In the context of this ratio, a fully PBL-based study programme provides a share of about 50:50 of ECTS for projects and face-to-face activities (such as lectures, seminars, workshops, laboratories and experiments). The responsibility for the correctness of the data with reference to this indicator belongs to each university. In general, however, this sharing is questionable. Of course, there are several variants of sharing of training activities with the application of PBL to traditional, face to face ones; the reference version of this project being 50:50 for the entire duration of the study programme. Table 1 shows that the situation is different at different universities. However, we admit that not all universities correctly perceived how to share these two components.
- **Indicator *Language of instruction*** of the study programmes is: Romanian - for the programme „Public administration” at USARB, „Public health” programme at SUMPh, „Entrepreneurship and business administration” at CSU; English - „Law” programme at MSU and „Software engineering’ at TUM; Romanian and English – „Business and administration” programme at AESM. The English language of instruction allows to also enrol foreign citizens to studies.
- **Indicator *Number of staff from the universities - members of the Consortium - trained in RM by EU partners (development period/programme implementation period)***. The training took place at various trainings organized mostly at the Technical University of Moldova, but also at other universities. The number of trained staff was calculated on the basis of the registration lists to the training. In the case of a few days training, each participant was counted once. The staff who participated in many trainings was taken into account every time. The number of trained staff is divided into two groups: the development period (from the start of the project - October 2015 to September 1, 2017) and the programme implementation period, starting September 1, 2017 when PBL programmes started to be implemented, until the report is drawn up.

- **Indicator *Number of staff from universities in the RM, members of the project, involved in study visits to EU Universities (development/implementation)***. There are shown the number of visits of didactic staff from Moldovan universities to universities in the European Union: Aalborg University, Denmark - 61 visits, University of Gloucester, UK - 8 visits, Royal University (KTH) in Stockholm, Sweden - 11 visits University of Siegen, Germany - 13 visits, University of Plymouth, UK - 6 visits. Visits to the University of Plymouth were made by the SUMPh team. All study visits are divided, as in the case of the above indicator, into two components: development and implementation.
- **Indicator *Number of mobilities of academic staff in the EU (development/implementation)***. The development of the PBLMD project at the universities of the Republic of Moldova can be divided into two periods, namely the development (elaboration / modification) of the Bachelor's degree study programmes by applying the problem-based method (PBL) at selected specialties and the implementation period of these programmes. In both periods, academic staff from local universities went on mobility to partner universities in the EU.
The mobility in the development period was aimed at acquiring knowledge and skills on how the PBL method works in an open university environment, familiarizing with the level and model of implementation of the PBL method at EU partner universities, enhancing teaching skills tailored to the PBL, but also to research different teaching methods according to the PBL principles within the different areas of professional training.
During the implementation period, the purpose of the mobility made by teaching staff from the Moldovan universities was to research the experience of partner universities with regard to the development of the PBL-based curriculum, the development of analytical programmes on the disciplines based on the application of this method, and the existing practice on conceptualizing a continuous training programme centred on PBL for university professors.
- **Indicator *Approved study programme***. This indicator reflects the level at which the pilot study programmes were approved, taking into account the level of modification of the educational plan, but also the own decision of the higher education institution. Thus, the TUM's „Software engineering” pilot programme was approved by the TUM's Senate and coordinated with the MECC, the latter being a mandatory condition, given that the programme was developed and launched with its inclusion in the 2017 Nomenclature. AESM and SUMPh decided to undergo through the same procedure as TUM even though the educational plans for the pilot programmes of these institutions have not been modified so as to require such an action. The SUMPh, being subordinated to both the MECC and the Ministry of Health, Labour and Social Protection, coordinated its study programme „Public health” with both ministries. According to the MECC regulations that do not impose compulsory co-ordination of bachelor's degree educational plans in the case of minor changes, the other universities approved the pilot programmes at their University Senates.
- **Indicator *Number of students enrolled in the programme: 2017/2018***. During the course of the project, the partner universities in the Republic of Moldova have already

succeeded in conducting two admissions to studies to the pilot programmes. This indicator reflects the number of students enrolled in each pilot programme in the academic year 2017-2018 and, by slash, the number of students enrolled in the same programmes in the academic year 2018-2019.

- **Indicator *Number of visits of EU partners for training, co-teaching, evaluation (development/implementation)***. During the development and implementation of the pilot programmes, the EU partners made a series of visits to the universities of the Republic of Moldova with the purpose of carrying out PBL-specific training activities together with the academic staff from the Moldovan universities (co-teaching). The indicator reflects the number of such visits made to partner universities in Moldova during the respective periods.
- **Indicator *Student mobility: autumn/spring***. The PBLMD project also included a separate budget (Special Mobility Strand) to support the mobility of students from the Republic of Moldova, enrolled in pilot programmes, to partner universities in the EU. Each partner university in the Republic of Moldova had 15 student mobilities that could be used starting with September 2018, the second year of pilot programmes' implementation. All student mobilities were done in the study year 2018-2019, the autumn and spring semesters, the mandatory condition of participation being the student's registration in the second year of study at the pilot programme of the respective university. The indicator provides the number of mobilities made by the students of each partner university in the Republic of Moldova.
- **Indicator *Extending PBL implementation to other study programmes***. During the implementation of pilot programmes with PBL application, teachers have gained the experience that has allowed them to extend the use of this method to other Bachelor's or Master's degree programmes. Also, teachers who have not been involved in the pilot programmes but have participated in the training provided by European Union's teachers or internal trainers have begun to implement PBL in other groups and / or programmes. Thus, each university presented the level of extension of PBL implementation to other study programmes.

3. Final remarks

The implementation of the problem-based learning in the universities of the Republic of Moldova, as pilot programmes, implies a revolutionizing of the study process in these programmes. We started from the fact that learning outcomes should not only provide knowledge but also develop skills and competences both professional and personal. We recognize that today the programmes offered by universities in Moldova often fail especially when it comes to developing professional skills and competences, as well as certain personal skills (interpersonal communication, professional orientation and employability, and adaptation to the labour market). Activities that should lead to the development of skills and competences (case studies, projects, internship) are irrelevant or formally carried out (e.g. students' internship).

We want, by the implementation of the PBL, to bring students closer to the real life and the problems faced by economic agents, to facilitate student mobility by deepening the knowledge of English, in particular, in specialty disciplines, but also by providing quality training, closer to the one offered in European universities.

Obviously, all these will take time and effort from both the teachers and the university, but also the economic agents, the local public administration, which we want to fully involve in the training activity through different activities carried out jointly. We want, in partnership with economic agents, to propose a considerable number of topics of Bachelor/Master's degree project or joint research topics annually. We consider it necessary to develop the involvement of economic agents in such activities as students' internships, students' research activities, case studies, projects and other activities included in the study programme.

By implementing the PBL we want to ensure the stimulation of innovation and creativity, including entrepreneurship.

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Appendix 1. Work package 4 AESM

Appendix 2. Work package 4 USARB

Appendix 3. Work package 4 CSU

Appendix 4. Work package 4 SUMPh

Appendix 5. Work package 4 MSU

Appendix 6. Work package 4 TUM

