Learning outcomes and diploma supplements

Despite being a part of a package related to the Bologna process, learning outcomes represent foundations for other approaches, procedures, methods and documents mentioned in this context: comparability of qualifications and qualification frameworks, student centered education, curriculum develpment, ECTS, recognition of previously acquired knowledge, quality assurance in education, diploma supplemets etc. For this reason learning outcomes are accepted as a common language of the "Bologna" approach to education. They figure prominently in all the communiques of the ministers responsible for higher educations from all the signatory countries of the Bologna Declaration since the Berlin communique in 2003. By way of example, in the communique from the ministerial conference held in 2012 in Bucharest the countries that signed the Bologna Declaration are called on to "ensure that qualification frameworks, ECTS and diploma supplements are based on learning outcomes." However, learning outcomes-based approach to higher education is not to be found only in the European higher education but has been consistenly implemented in Australia, USA, Canada as well as some African and South American countries. Theoretical basis of learning outcomes was laid down in the 1960's in USA .[1]

In numerous European and international documents and manuals learning outcomes are most often defined as *statements of what a learner is expected to know, understand, or be able to do at the end of a learning process*.[2] By achieving learning outcomes students acquire not only competencies enhancing their employability but also high quality personal and social life. Competencies are therefore divided into **professional competencies**, connected with a specific field, and **generic competencies** (transversal, key, *soft*), that have to be included in all curricula, comprising basics of literacy (language, mathematical, informatics), communication and conceptual skills, and quite often stances on civic engagemnet and social responsibility.

In February 2013 the Croatian Parliament adopted the Croatian Qualification Framework Act based on the use of learning outcomes for all levels of education, from elementary school to doctorate study. The law uses the following definitions: *Learning Outcomes* are competences acquired by an individual through learning and assessed upon its completion. *Competences* refer to a set of knowledge and skills, as well as relevant autonomy and responsibility. However, irrespective of definition, some important facts are readily observable:

Learning outcomes have to be clearly defined and their achievement assessed and evaluated.

Learning outcomes describe students' achievements and not expectations of teachers or institutions that provide education (these are defined by learning objectives).
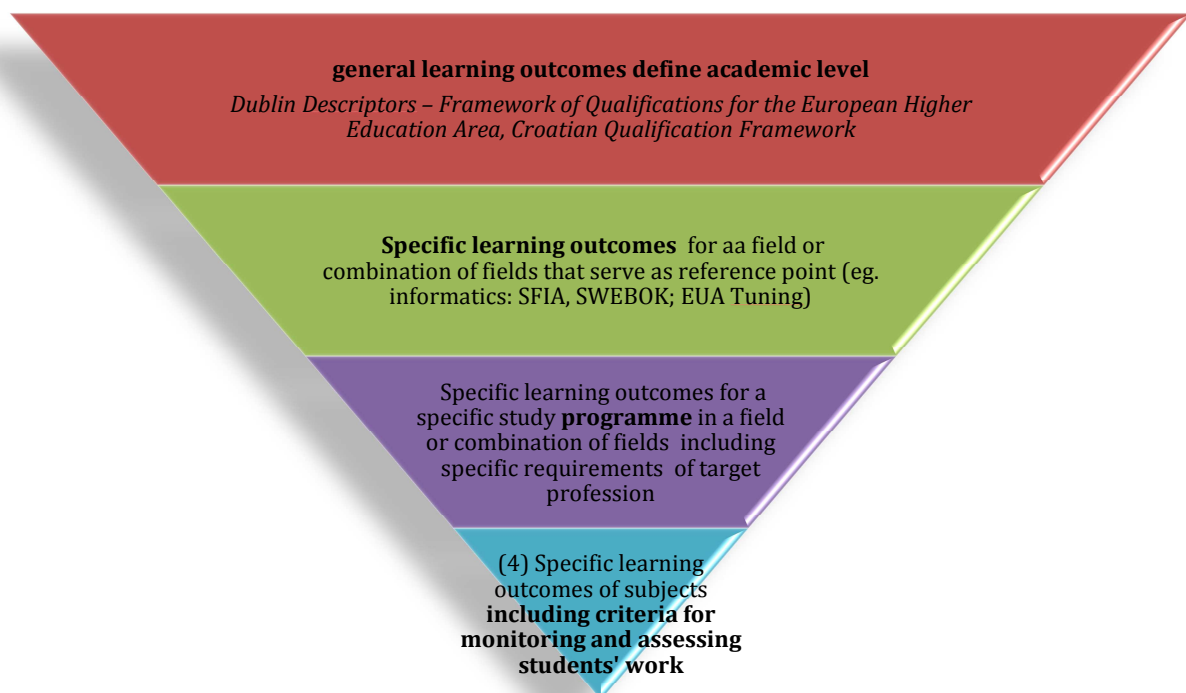
Learning outcomes of study programmes

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[1] Mager, 1975; Mager, R. F. (1984). Preparing instructional objectives. 2nd ed., Belmont, California: Pitman Learning.
[2] ECTS Users' Guide, str. 13; European Communities, (2009)

Learning outcomes of study programmes that are basis for curriculum design should be formulated using both top-down and bottom-up approach, as shown in Picture 1. It is necessary to take account of the so called Dublin Descriptors[3] (Dublin Descriptors, 2004) developed to serve the Framework for Qualifications of the European Higher Education Area (EHEA), and to offer generic statements for each level in higher education (undergraduate, graduate, post-graduate). Dublin Descriptors were an important tool in the development of Croatian Qualification Framework. Recommendations of international professional organizations and networks of individual fields also play an important role. Thus, for example, in the case of informatics international documents such as SFIA (Skills Framework for the Information Age) and SWEBOK (the Guide to the Software Engineering Body of Knowledge), as well as the results of the EU Tuning project[4] could be considered. The project *Tuning Educational Structures in Europe* is especially important for the understanding of curriculum design based on learning outcomes in different learning fields, and its web page abounds in numerous useful publications and examples of best practices for some twenty fields .

Picture 1: Learning outcomes of study programmes

general learning outcomes define academic level
Dublin Descriptors – Framework of Qualifications for the European Higher Education Area, Croatian Qualification Framework

Specific learning outcomes for aa field or combination of fields that serve as reference point (eg. informatics: SFIA, SWEBOK; EUA Tuning)

Specific learning outcomes for a specific study **programme** in a field or combination of fields including specific requirements of target profession

(4) Specific learning outcomes of subjects **including criteria for monitoring and assessing students' work**

On the other hand, learning outcomes of study programmes are achieved through learning outcomes of subject areas and should therefore be defined in the process of designing study programmes (Picture 1). It is recommended that 15 to 20 learning outcomes should be written for each level of a study programme and in the case of integrated undergraduate and graduate study programme up to 30. It must be borne in mind that they have to be written in a very restricted section in diploma supplement (chapter 4.2.). A learning outcome on a graduate

[3]Dublin Descriptors, (2005) http://www.eua.be/eua-work-and-policy-area
[4] EU Tuning http://www.unideusto.org/tuningeu/

level of informatics could be: *Student will be able to use mathematical methods, models and technologies suitable for problem solving in the field of information and business systems.* Such a learning outcome is rather general, but its concretization and assessment should be achieved through learning outcomes of subject areas.

Learning outcomes of subject area

At a subject area level there should be 4 to 10 learning outcomes that are further elaborated within teaching units. Learning outcomes should be written in such a way that they are concrete, clear, measurable, related to contents, teaching and assessment methods, and at the same time contributing to learning outcomes of study programme.

In order to facilitate the writing of learning outcomes, the use of a known taxonomy that classifies learning outcomes is recommended. Bloom's classification of cognitive skills developed in 1956.[5] and followed by a few improved variants[6] is the most used taxonomy. Bloom identified three learning domains: cognitive (picture 2), affective and psychomotor and for each of them introduced a model of hierarchical complexity of a skill. Each level uses certain verbs to decribe behaviour characteristic for that level that are later used in student learning outcomes transcipts[7].

By the way of illustration the following learning outcome: *Student will be able to calculate the value of the third order determinant,* refers to the third hierarchical level (application), while the learning outcome: *Student will be able to define the concepts of matrix, determinants and addition and multiplication of matrices,* refers to the first level (knowledge). Students might find this illogical since the majority of them can calculate the third order determinat, but are not that familiar with strict mathematical definition .

Picture 2. Bloom's taxonomy of cognitive skills

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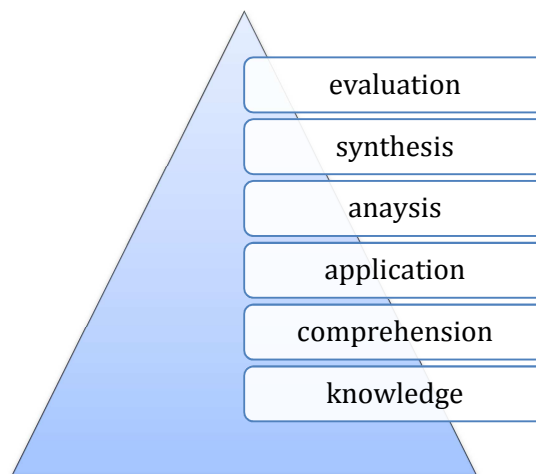
[5] Bloom, B. S., Engelhart, M., D., Furst, E.J, Hill, W. and Krathwohl, D. (1956) Taxonomy of educational objectives. Volume I: The cognitive domain. New York: McKay.

[6] Krathwohl, David, R. (2002) A Revision of Bloom's Taxonomy: An Overview. Theory into Practice, 41 (4).

[7] Divjak B. (ur.). (2008) Ishodi učenja u visokom školstvu, FOI-TIVA, Varaždin.

Furthermore, it is necessary to start connecting learning outcomes, teaching and assessment methods with student workload (ECTS) already in the process of curriculum design for each subject area. An example is given in Table 3.

When assessing complex tasks or when more teachers assess students in the same subject area, assessment column should be prepared as an assessment tool. The column should be available to students before they engage in an individual activity that is being assessed, and teachers should bear in mind that with their assessment and evaluation methods they direct student learning.

Table 3. Learning outcomes of subject area interconnected with other curriculum elements

Learning outcomes of subject area	Education activity / learning	Assessment/ Evaluation	Student workload in hours/ECTS
1. use of methods and techniques of project managment when writing applications for international project in the field of higher education	Team work – preparing concrete project application following standard procedure	Project application posted in a e-learning system and assessed according to predetermined criteria (column)	40 hours = 1.5 ECTS
2.…			

Moreover, by adding up student workload in all education activities related to the recognized learning outcomes, an estimated number of ECTS credits for each subject area is obtained. In the next step they are harmonized on the level of study programme. Assessment is carried out upon the completion of a programme and students assess their workload[8].

Diploma supplement

In the box of the head of diploma supplement there is an explantory note informing us that it follows the model developed by the European Commission, Council of Europe and UNESCO/ CEPES and that its purpose is to provide sufficient indipendent data to improve international transparency and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). Diploma supplement consists of eight sections which should be filled in. Under the Science and Higher Education Act (2003.), institutions of higher education in Croatia are under obligation to issue diploma supplement in both Croatian and English, free of charge, to every student that completes a level of study programme.

In December 2011. Ordinance on amended Ordinance on the Content of Diplomas and Diploma Supplements (OG 149/2011) was published and the University of Zagreb changed diploma supplement . The most important change is the obligation to include learning outcomes. Learning outcomes are written in the section 4.2. "Programme requirements and learning outcomes". In order to present learning outcomes in a systematic way they can be grouped and in line with Dublin Descriptors the following groups can be identified:

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[8] Priručnik za osiguravanje kvalitete Sveučilišta u Zagrebu, (2012) Sveučilište u Zagrebu

Knowledge and Comprehension; *Application of Knowledge and Comprehension*; *Conclusion and Decision making*; *Communicating /stances, ideas, problems and solutions* and *Learning skills*. Information on diploma supplement shoud serve to employers as a tool for identying competencies of the diploma suplement holder and therefore it is important that the relevant content is carefully prepared and clearly written. Special attention should be paid to the following chapters:

4.2. programme requirements and learning outcomes;
5.2. professional status;
6.1. additional information: awards, extra-curricular activities, mobility, training.
The European Commission allocates special DS label[9] for universities and other institutions of higher education that issue this document according to the recognized rules and in line with prescibed procedure.

AHELO

In March 2013. a feasibility study of the project *Assessment of Higher Education Learning Outcomes* (AHELO), carried out by OECD, was issued and a conference was held in Paris. AHELO is also known as *Pisa for higher education* since this ambitious project aims at evaluating the implementation of learning outcomes of undergraduate students around the world. By the agency of a a complex instrument 23 000 students at 249 higher education institions in 17 countries where tested in its pilot stage. In this phase students that completed undergraduate programme of civil engineering and economy were tested in which process generic learning outcomes were assessed separately. It is expected that this project is soon widely applied.

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[9] Diploma supplement http://ec.europa.eu/education/lifelong-learning-policy/ds_en.htm