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Joint curricula analysis

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Joint curricula analysis

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1. Introduction

Based on the previously created guidelines and work plan, the project partners made an overview of the education system in their countries from EQF level 3 to 8. They researched and singled out qualifications in the field of construction, emphasizing their level, and the learning outcomes that are acquired in the field of profession, digital and green skill. 56 programs (curricula) and around 270 courses were analysed in these five countries. The goal of this analysis is to compare the analyzes of individual partner countries with each other and with the European Sustainable Development Goals and the European Strategy for Education and Economic Development, and to determine possible common good elements (knowledge and skills), but even more importantly, to identify those skills that are missing and represent an imperative in today's education and training for the labor market. The collective analysis of the curriculum should provide conclusions and recommendations of learning outcomes that should be included in the curriculum for teachers and trainers in VET programs.

Although the project envisages a curriculum analysis at EQF level 3-5, given that the partner University of Rijeka runs programs at EQF level 6-8, it is considered that the learning outcomes that exist at these levels can be useful for transfer to lower levels because they are a consequence research, scientific and professional work in specific areas.

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2. Review of educational systems in partners countries

1.1. Croatia

The education system in the Republic of Croatia consists of:

- pre-school education
- primary (including lower secondary) education
- (upper) secondary education
- higher education.

High schools (secondary education), depending on the type of curriculum they implement, are:

1. Grammar schools (general or specialized) lasting for four years.
2. Vocational schools, lasting from one to usually three or four years, exceptionally five, upon the completion of which the students acquire a qualification of a certain level, scope, profile and quality which is proven by a public document whose content and form are prescribed by the ministry responsible for education.
3. Art schools (music, dance, art and other, determined by the type of curriculum) lasting a minimum of 4 years.

The existing system of vocational education covers 66.9% of the total secondary school population, i.e. 96,018 students in 300 schools.

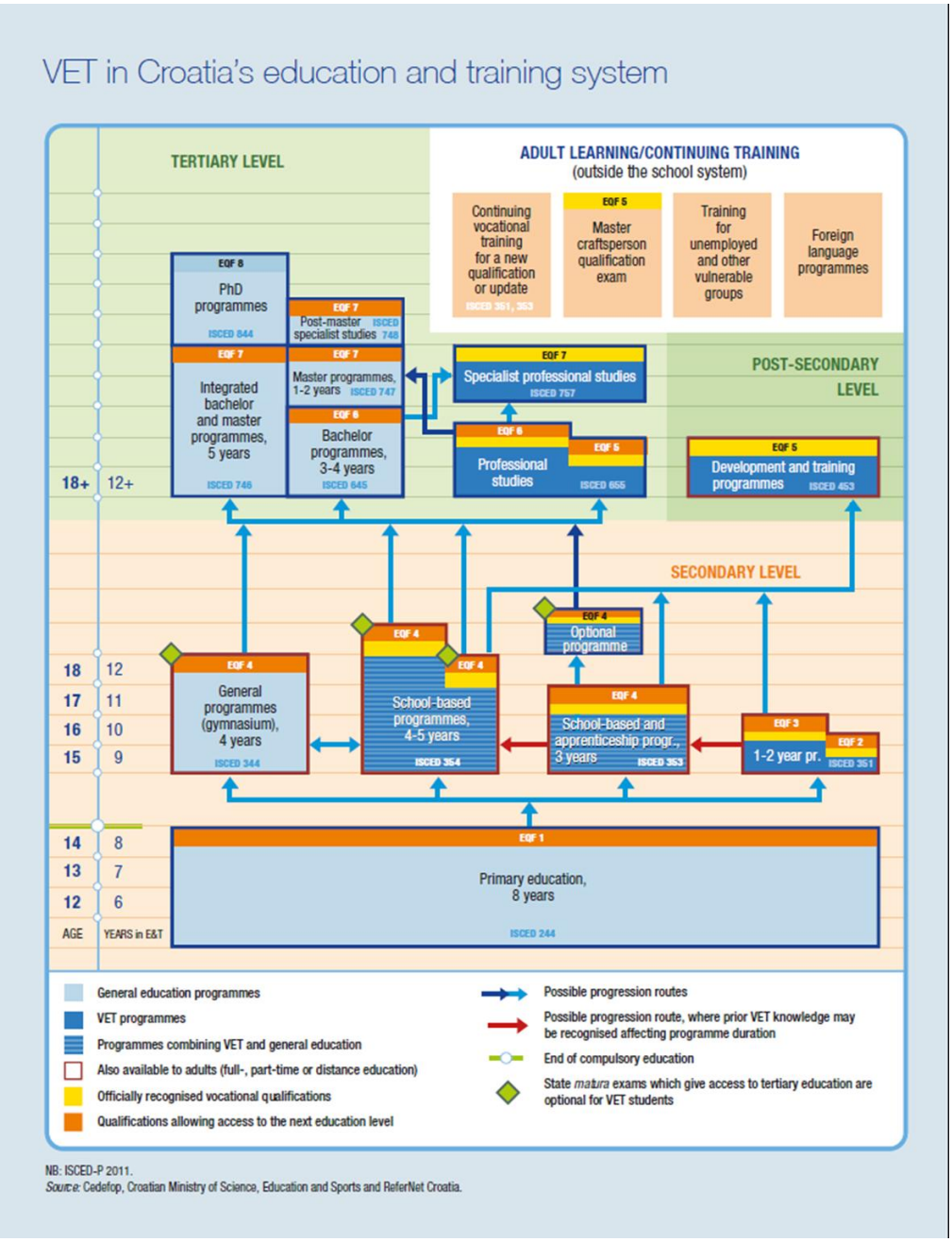
The system of regular vocational education for acquiring low and intermediate level qualifications, according to educational programs, consists of:

- one-year and two-year programs of lower education in 8 educational programs. The number of students attending these programs is 159, which is 0.17% of the total number of vocational education students, or 0.1 % of the total secondary school population.
- three-year programs for occupations in industry and crafts in 139 educational programs. They are attended by 26,995 students, which is 28.1% of the total number of vocational education students, or 18.8% of the total secondary school population.
- four-year technical programs and similar orientations in 83 educational programs. They are attended by 63,442 students, which is 66.1% of the total number of vocational education students, or 44.1% of the total secondary school population.

The diagram of the education system in Croatia is shown in the picture.

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Source: Agency for Vocational Education and Training and Adult Education

Further, the spreadsheet document shows an overview of programs in the field of construction that are implemented in Croatia with extracted learning outcomes from the field of sustainable construction, circular economy, digital and green skills, if they exist.

In the field of construction there are 10 programs accredited in public VET high schools, while on EQF levels 6 and 7 there are Civil Engineering studies (Bachelor and Master). On EQF level 8 there is one program in Civil Engineering: Environmental protection in construction.

In addition to programs in the field of construction, programs for teachers that include digital and green skills are also recognized:

- Computer science study: teaching major (EQF 7)
- Informatics And Technics: Specialisation In Education (EQF 7)

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- Content development - Expert in content creation, organization and implementation of digital learning (lifelong learning program)

Conclusions:

There are no programs in the field of interest in Croatia at EQF levels 3 and 5. A certain number of programs are at EQF level 4, and at most at level 6 and 7. It can be said that vocational education is not developed in Croatia, because they were not recognised in industry and economy.However, the Ministry of Labor became aware of this and adopted measures to encourage its development.

It can also be concluded that the presence of digital skills is more significant in learning outcomes compared to green skills. Learning outcomes related to sustainable development, environmental protection, climate change and circular economy are most common in level 7 and 8 programmes.

Therefore, such outcomes can, with adjustment, be accepted at lower levels.

The learning outcomes in the area of digital skills at EQF level 4 are basic and are based on solving problems in a digital environment or computer-aided drawing.

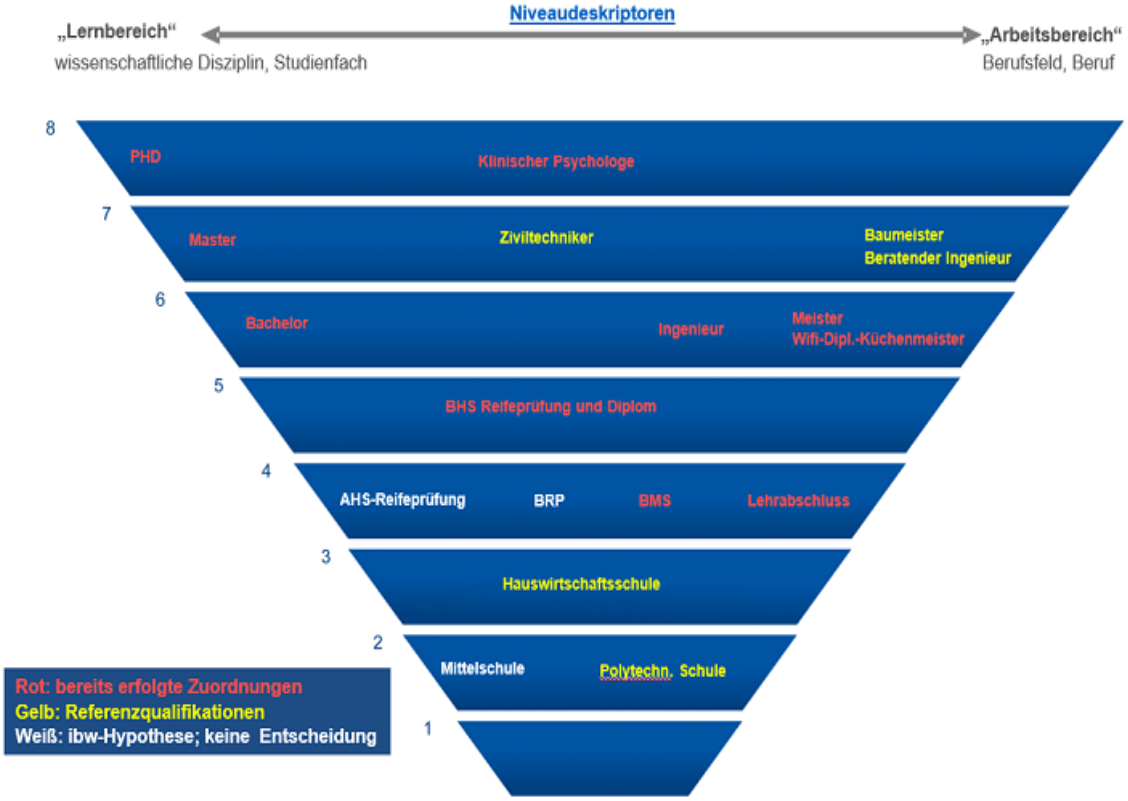
Green skills are actually very scarce and general, and relate to collecting, analyzing and evaluating data on the impact of the economy, state policy and daily consumption of citizens on sustainable development, recognizing the consequences of the exploitation of natural resources, excessive construction on the quality of life, etc.

2.2. Austria

In Austria, there are also educational programs at EQF levels 3-8, but there are no programs at EQF level 3 in the area of interest for the project.

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Source: AMS Ausbildungskompass - Startseite

At EQF level 4 exist next school programs:

- apprenticeship as a civil engineering specialist - specializing in construction machinery operation
- apprenticeship as a structural/civil engineering or concrete specialist (various specialization options)
- apprenticeship as a construction assistant
- apprenticeship ready-mix concrete technology
- Technical school for construction technology (vocational middle school)
- apprenticeship construction specialist
- various apprenticeships in the field of energy, water, heating

At EQF level 5:

- Secondary school for civil engineering - environmental engineering
- College of Civil Engineering - Building Construction Technology and Design
- Advanced course in construction technology - renovation technology and ecological construction

At EQF levels 6-8 there are programs with qualifications: Bachelor, masters and PhD degree in Architecture/Civil Engineering at Technical University & University of Applied Sciences.

A detailed list of programs by EQF levels and learning outcomes is given in the table.

Conclusions:

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Looking at all presented programs at EQF levels 4-8, there is an equal ratio of learning outcomes in the field of digital and green skills.

Digital skills mainly refer to:

- engineering drawing (CAD)

-3D visualizations

- BIM

-Energetic building simulation

- digital design

modeling, simulation and digitalisation in general.

As for learning outcomes in the field of environmental protection and circular economy, they are numerous and very significant and concrete.

2.3. Spain

There are 26 Professional families for VET in the Spanish catalogue. The study addresses Building and civil work. This family consists of the following 6 i-VET courses, sorted by the 3 levels of the Spanish classification: Basic, Intermediate and Advanced VET (which correspond to EQF2, 3 and 4, respectively):

EQF2 (Basic):

- Basic Vocational Qualification in Building Renovation and Maintenance

EQF3 (Technician intermediate level - First Officer):

- Technician in Construction
- Technician in Interior Works, Decoration and Refurbishing

EQF4 (Higher level Technician):

- Higher Technician in Management and Control of Construction Work
- Higher Technician in Building Projects
- Higher Technician in Civil Work Projects

There are 11 programs at EQF level 2, 14 programs at level 3, and 43 programs at level 4.

EQF5 are called *"cursos de especialización", specialization courses*. These are similar to master degrees at VET level. There are no courses of this type in the area of construction.

The general learning goals and outcomes of each course that are relevant to the scope of the project are summarized in the table. The courses are divided by modules, each of them with a series of learning outcomes. The modules are identified by a code since some of them are transversal to different courses. Each LO is defined by a series of evaluation criteria from which those applicable were specified if necessary.

Conclusions:

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There is no specific mention of recycling or circular economy in all the curricula. With the exception of the EQF2 course, which includes more specific content on renewable energy and pollution, all references to environmental knowledge are focused on either waste disposal and its planification, or simply being familiar with the applicable law in terms of environmental protection. These references become more succinct as the qualification level progresses, to the point of being just vague allusions to "environmental corrective measures" or regulations. This could be due to the fact that this is considered to be more basic knowledge, as the higher-level courses are focused on project planning and management rather than actual building work.

In terms of digital skills, there is no particular focus on them other than the vague references to innovation included in some of the general learning goals. Students are generally "encouraged to use ICTs" for tasks such as gathering information, project making and design, but being specifically focused only on planning, sketching and design software.

2.4. Finland

In Finland, construction can be studied at two levels: VET (EQF 4-5) and University of applied sciences (EQF 6-7).

1. VET (EQF 4-5)

- Basic degree, Vocational upper secondary qualification (Engineering, manufacturing and construction), 180 (EQF 4)
- "Profession degree", Further vocational qualification, 150 (EQF 4)
- Further vocational qualifications and specialist vocational qualifications (Competence area in Supervision of Work at a Construction Site), 180 (EQG 5)

2. University of applied sciences (EQF 6-7)

- Civil engineering Architecture and construction, Bachelor of Engineering (EQF 6)
- Engineering, manufacturing and construction, Master of Engineering (EQF 7)

A detailed list of programs by EQF levels and learning outcomes is given in the table.

Conclusions:

In Finland, at EQF levels 4, there are predominantly learning outcomes related to green skills (environmental protection), and almost insignificantly digital skills (only in one program - Engineering, manufacturing and construction) and refer to the selection and use of basic IT tools in daily work.

Learning outcomes in the field of environmental protection (EQF 4) refer to:

- waste identification

-saving energy and water during operation

- development of awareness about the impact of human activities on the environment

- understands the principles of carbon neutrality and a circular economy

-Planning operating methods for sustainable development

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-chooses measures and operating methods that promote sustainable development

-implements methods of sustainable development at their workplace or in their vocational field

- assesses the changes in operating practices or outputs at their workplace or in their vocational field

Learning outcomes in the field of environmental protection in programs at EQF 7 are more general and refer to understanding, interpretation, explanation and recognition of construction impact on environment and circular economy.

2.5. Latvia

In Latvia, an education system covering EQF education levels 4-6 has been introduced. In the field of construction, there are 18 programs in VET schools at EQF level 4, 25 programs at EQF level 5 and 35 programs at EQF level 6. A detailed list of programs by EQF levels is given in the table.

Conclusions:

Despite the enviable number of programs covering a wide range of professional skills, there is no information on the existence of learning outcomes in the field of digital and green skills at all.

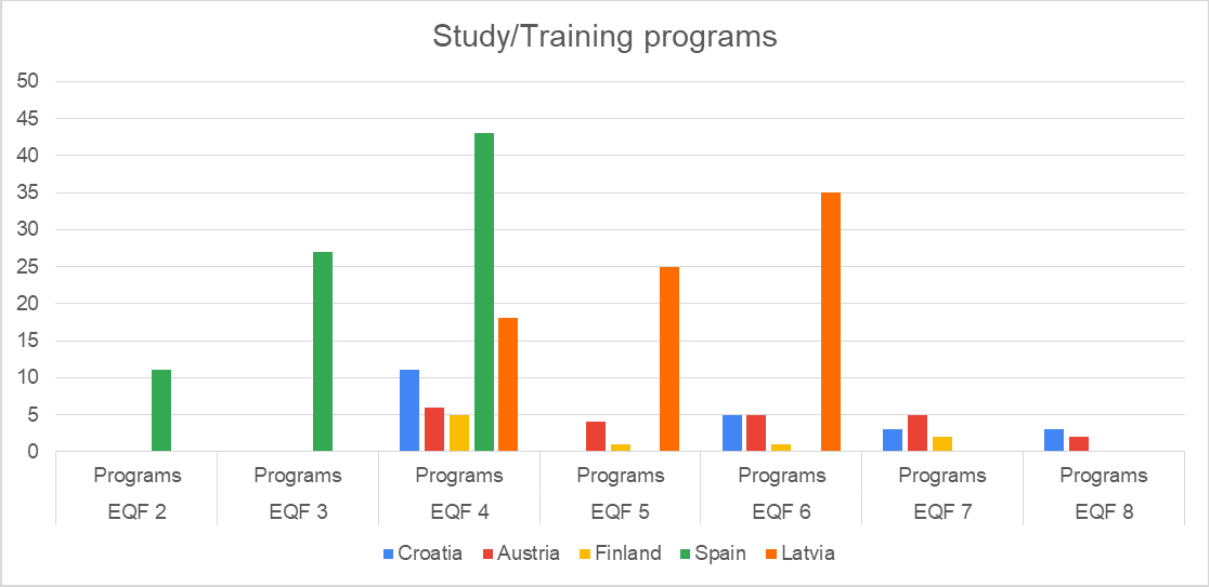
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3. Quantitative and qualitative analysis of the curricula in the partner countries

All education systems of the partner countries have accredited programs at all EQF levels 4-6. Only Spain has developed a significant number of programs at EQF level 2 and 3, Latvia leads in the number of programs at EQF level 5 (25 programs) with a smaller number in Austria (4) and Finland (only one program). In Spain and Croatia, there are no programs at EQF level 5 in the field of Civil Engineering.

Most VET educational programs at EQF level 3-5 are in Spain and Latvia, some in Austria, while the number is insignificant in Croatia, Finland and Latvia. However, in Croatia and Finland there is a significant number of level 6-8 programs, which define learning outcomes in the field of environmental protection, which can be a useful starting point for lower levels because they are the result of comprehensive scientific research.



According to the data shown in the graph below, the most significant number of learning outcomes in the field of digital skills is present in Finland at EQF level 4 and in Croatia at EQF level 7.

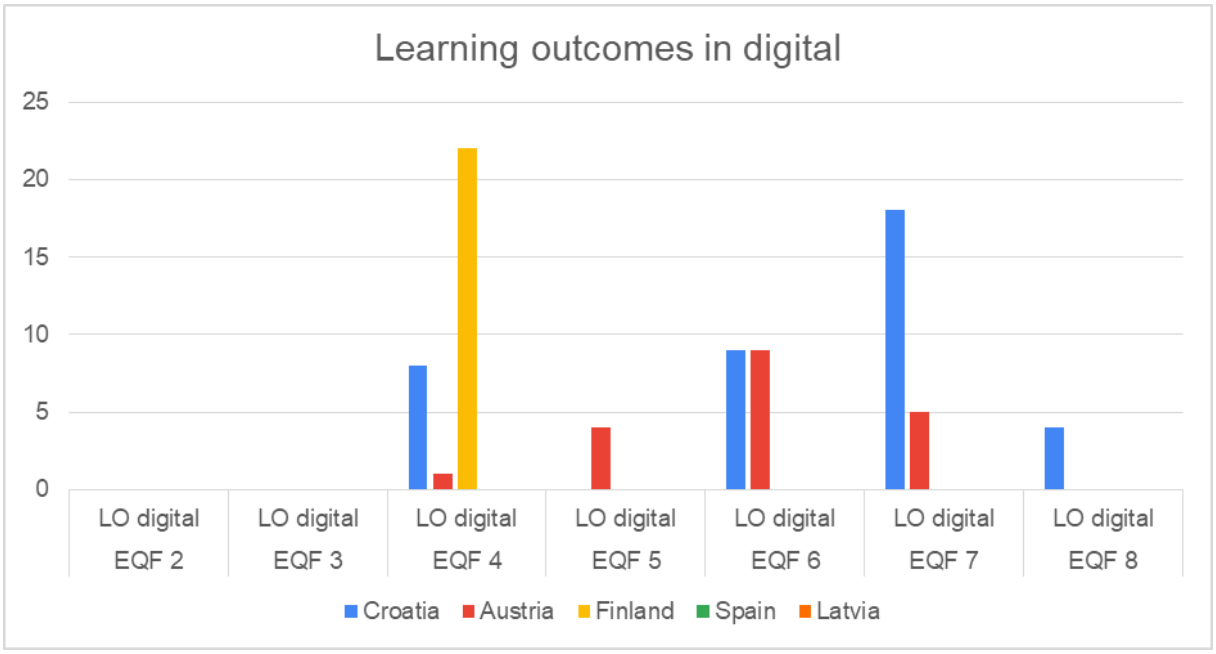
Austria and Croatia have these learning outcomes in programs at all EQF levels 4-8, while Spain and Latvia do not have them at all.

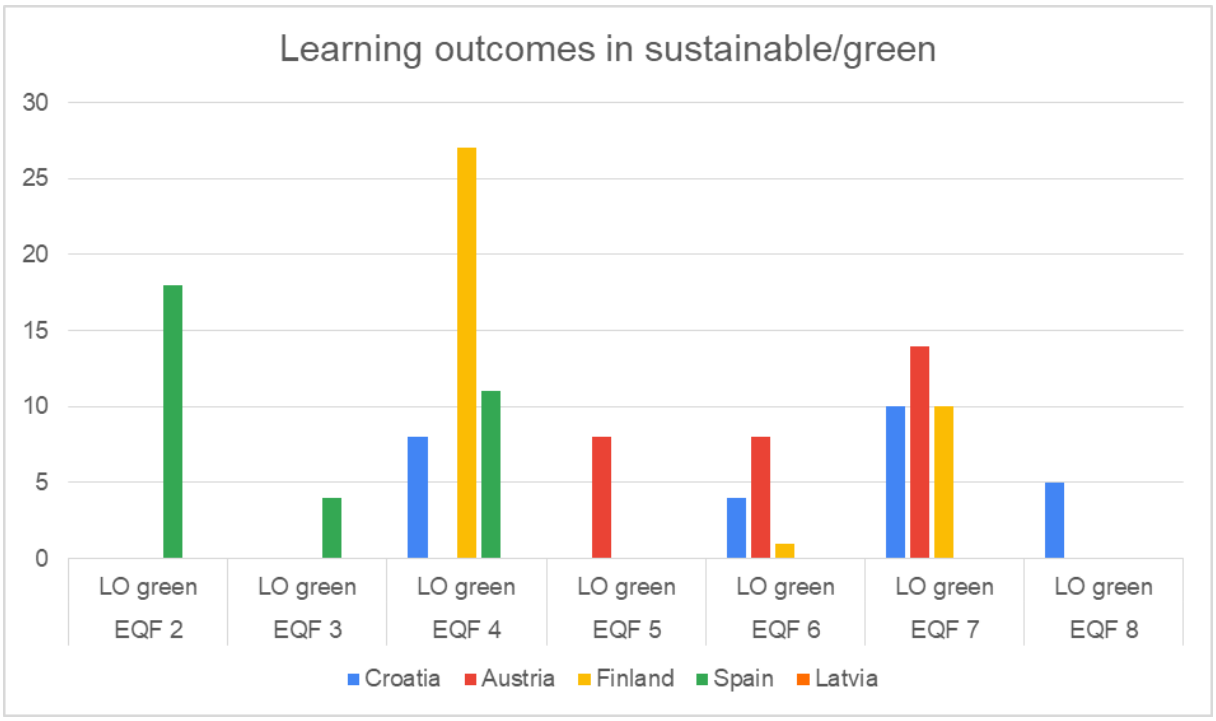
Data on learning outcomes in the area of green skills are more varied.

In Spain (the only partner country with programs at EQF level 2 and 3) there are learning outcomes at EQF levels 2-4, mostly at level 2, Finland has by far the largest number of LOs at EQF level 4 and some at 6 and 7, while Croatia and Austria have them at almost all levels.

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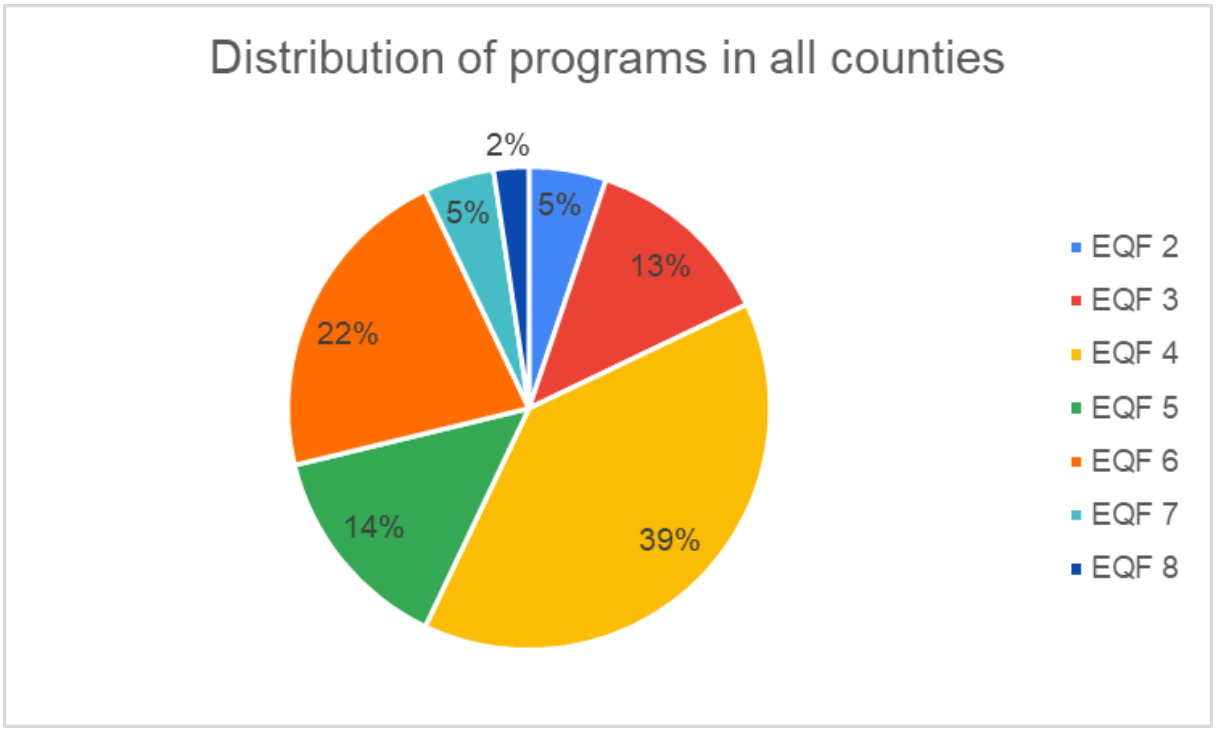




If you look at how the analyzed programs are distributed by EQF levels in the pie chart below, you can see that most programs are in EQF levels 4 (39%), twice as many are in EQF levels 6 (22%), about 13% are in EQF levels 5 and 3, and almost insignificantly at other levels.

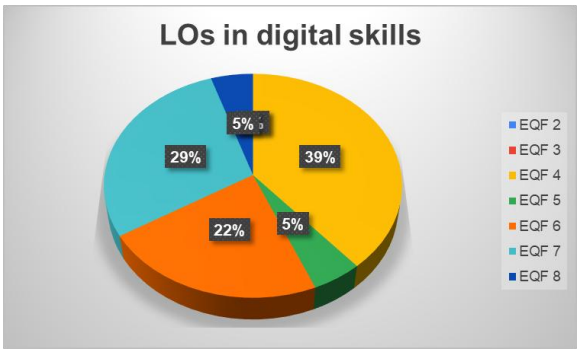
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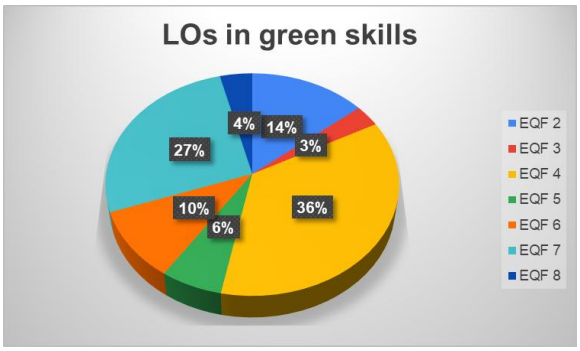
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The two pie graphs below show the share of digital and green skills in the programs of individual levels. The largest share of digital skills is in EQF level 4 programs, followed by EQF 7 and EQF 6. There is an evident lack of digital skills at EQF levels 3 and 5.

Green skills are also most represented in EQF level 4 programs, followed by EQF levels 7 and 2. Here, too, the absence of these specific skills is noticeable at EQF levels 3 and 5. One of the main reasons is that the analysis showed a lack of programs at these levels in general in most of the analyzed countries, and where they are developed, they include only professional skills.





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4. Cross-section of common elements in the curricula of the partner countries

The most overlap in the number and type of learning outcomes, looking at all partner countries, is in EQF level 4 and 7 programs. Given that the focus of the project is on EQF level 3-5 programs, below is a cross-section of the most significant learning outcomes of EQF level 4 programs and at a higher level that should definitely be included in the new common curriculum with updates based on online questionnaires and focus groups.

LOs in digitalisation

Student will be able to:

- use computer aided drawing and design (CAD)
- select devices and applications that are appropriate for the purpose
- use appropriate digital devices and applications
- search for, processes and shares information of different forms
- assess the reliability of digital content
- use and shares digital content in compliance with copyrights
- use the most common applications for text processing, spreadsheets and presentation graph appropriate digital services and applications in their work tasks
- identify the online communities central to their work
- use platforms and services for cooperative working
- build their professional online identity
- produce and share digital content

LOs in green

Student will be able to:

- work without wasting energy, water, and materials.
- to sort and reuse materials and waste generated in their work
- to reduce harmful emissions into the air, water, and soil
- to collect, analyze and evaluate data on the impact of the economy, state policy and everyday consumption of citizens on sustainable development
- building ecology
- establish the criteria for the foundation and structure distribution, temporary installations and waste management
- establish the means for protection and risk prevention, along with the adequate environmental corrective measures.
- consider factors of climate, environment and energy efficiency, as well as the use of resources (orientation, sunlight, dominant wind, use of eco-friendly materials, use of rainwater, among others)
- analyze and develop the information about safety and health, applying established procedures and regulations to elaborate plans for safety and risk prevention as well as for waste management and demolitions
- analyze and use the resources and learning opportunities resulting from scientific and technological evolution on the sector, as well as information and

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communication technologies, to maintain a spirit of innovation and adapt to new personal and working situations

- understands the importance of biodiversity and recognises the necessity of sustainable use of natural resources nationally and globally
- identifies operating methods of sustainable development in their own life and work
- understands the principles of carbon neutrality and a circular economy
- identifies the energy or material efficiency of a product or a service
- proposes development needs for promoting sustainable development in the future
- operates as an active agent in sustainable development
- assess factors contributing to sustainable development in the workplace or in the vocational field

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5. Identification of gaps

Gaps in learning outcomes will be identified after e-survey focus groups result analyses, where different stakeholders, such as companies/industry representatives, teachers and students will give their insight and articulate needs.

However, the analysis of learning outcomes of programs at higher EQF levels, EQF 6-7, can identify gaps in learning outcomes that need to be filled, that is, to enrich existing learning outcomes.

LOs in digitalisation

Student will be able to:

- do 3D modelling
- use the usual computer tools to perform calculations and simulations for simple systems
- be familiar with the BIM concept

LOs in green

Student will be able to:

- understand the impact of construction on society and the environment
- understands recent environmental changes at local and global levels for sustainable development
- recognize the importance of social responsibility, including barrier free design for the physical environment
- building ecology and sustainable materials

Beside them, some learning outcomes useful just for teachers could be pointed out from the analysis:

- use proven tools in accordance with the rules of instructional design
- analyze and recognize a given problem in the field of computer vision
- choose and prepare design interface of the interactive system

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6. Conclusions and recommendations

The goal of this analysis was to compare the analyzes of individual partner countries with each other and with the European Sustainable Development Goals and the European Strategy for Education and Economic Development, and to determine possible common good elements (knowledge and skills), but even more importantly, to identify those skills that are missing and represent an imperative in today's education and training for the labor market. The collective analysis of the curriculum provided conclusions and recommendations of learning outcomes that are necessary for students and learners to have and, consequently, should be included in the curriculum for teachers and trainers in VET programs.

Looking at individual partner countries, there is a lack of either EQF 3-5 level programs or digital and green knowledge and skills in the field of construction. However, by overlapping the national curricula of all partner countries, a useful cross-section of modern and high-quality knowledge and skills is obtained that is in line with EU goals, climate change and the development of the industry in the construction sector, which can be, together with other tools for data collecting (e-surveys and focus groups), the basis for creating a new curriculum for teachers and recommendations for revising existing or launching new programs in interested educational institutions.

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