GREEN SKILLS

At Vocational Education

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"Comparative report about the curricula for construction workers on green skills"

Erasmus+

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Comparative report about the curricula for construction workers on green skills.

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CONTENT

Project Description

Climate change is the main environmental policy priority across Member States and Turkey. It is often related to other environmental pressures and policy areas, for example water scarcity and energy. Public policies and enterprise strategies in many areas focus on greener economics. Countries take into account environment when they are preparing their legislation etc. Although all Member States and Turkey recognise the importance of environment in general policy statements, the skills dimension of climate change and low-carbon policies is disregarded. In fact green skills for different occupations plays a crucial role in having an eco-friendly world.

The project aims to analyse and make some positive changes for greener economics by contributing the Vocational Education by identifying the needs of partner countries on green skills for construction and electric sectors.

The expected results of the project are:

- contribution to the protection of environment in long term in partner countries.
- contribution to the expansion of green skill jobs.
- increase in the quality of green skills vocational education and training in partner countries.
- increase of the awareness of policy makers, VET trainers VET students, employers and all communities in partner countries on green skills
- contribution to European Union's green skills strategy
- improvement of the employment opportunities for the workers graduating from partner countries' VET organizations by increasing the awareness of VET systems regarding green skills education for construction and electric sectors.
- share of knowledge about and experiences of the green skills occupation in vocational training for construction and electric sectors.
- A cross-border cooperation among partners in the field of education and employment from different EU countries from different nature (VET, private sector, NGO's) but with common goals related to the potential increase in vocational education.
- The Enhancement of the commitment of local and regional public authorities in the high quality VET offer, labour inclusion by work-based training and the identification of key skills for construction and electric sectors.
- The involvement of participants in this project will improve their capacities in the area of strategic development, organizational management, project management, international cooperation in EU level, leadership, quality of learning provision, equity and inclusion.
- increase in the human resources capacity of partner institutions.

About Report

This comparative report has been developed to determine the need to introduce green skills in curricula and in training contents of vocational education for construction workers in partner countries. Each partner country analysed their vocational education system on construction sector from the aspect of green skills. We scanned the training content on construction sector in order to find the information related to green skills and environment in curricula and training contents.

Firstly we developed a framework to be able to have comparible national versions. Each partner developed its national drafts and then we combined them in a final report. (work to combine these

national drafts). We saw that each partner country has totally different VET systems. This makes difficult to compare the systems.

This report is a good start to understand how much the curricula and training contents of partner countries (Turkey, UK, Italy, Spain, Romania) include green skills and environment related issues at construction training.

We compared training content of ISCED 3 level (age 15-17) students at construction sector.

Green Skills in General

Climate change is the main environmental policy priority across EU Member States and Turkey. A significant amount of money has been dedicated to dealing with climate change and moving towards a low carbon economy through national stimulus packages adopted in response to economic crisis. The focus for green stimulus spending tends to be energy efficiency in buildings, renewable energy, low-carbon vehicles and sustainable transport.

Climate change and environmental degradation are jeopardising livelihoods and future sustainability in many areas of economic activity around the world. Alongside other drivers of change such as globalisation and rapid technological change, they are causing important shifts in labour markets and skills needs.

Although all Member States and Turkey recognise the importance of environment in general policy statements, the skills dimension of climate change and low-carbon policies is disregarded. In fact green skills for different occupations plays a crucial role in having an eco-friendly world.

Public policy, together with private initiatives, can foster expansion of green transformation and harness energy efficiency and renewable energy potential, all of which requires transformation of the skills base. Skills development responses need to focus on adding to existing competences, emphasising core skills, for all levels of skill needs. Every job can potentially become greener. Understanding the environmental impact of a job, and its possible contribution to greener economies, needs to be mainstreamed into education and training systems. Integrating sustainable development and environmental issues into existing qualifications and capturing new and emerging skill needs on the greening job market are a massive task.

Green jobs are jobs that reduce the environmental impact of enterprises and economic sectors, ultimately to levels that are sustainable. The ILO defines ‘green jobs’ as work in agriculture, industry, services and administration that contributes to preserving or restoring the quality of the environment while also meeting requirements of decent work: adequate wages, safe conditions, workers’ rights, social dialogue and social protection

General Vocational Education System in Partner Countries

TURKEY:

Purpose and Priorities of Vocational Education

Vocational and technical education aims to train skilled labour force with national and international occupational competence, professional ethics and professional values, innovative, entrepreneurial and productive in cooperation with the social and economic sectors. Vocational and technical education aims to create a system that provides appropriate learning opportunities in line with the interests and abilities of individuals, prepares young people for employment and develops them according to the needs of economic and social sectors.

Priorities of vocational education in Turkey are the following:

- To train qualified labour force in line with the needs,
- To manage vocational and technical education with a participatory approach,
- To ensure that graduates are trained to participate in production,
- To continuously improve the technical and technical education system and improve its quality,
- To prepare modular teaching programs according to the needs of the labour market,
- To ensure the social and sectoral integration of vocational education in order to increase efficiency and competitiveness in the economy,
- To provide individuals with the skills needed to adapt to change as well as knowledge and skills,
- To establish new business areas within the framework of the digital transformation of the sector and gaining entrepreneurship understanding that plays a role in increasing employment.

School Types and Programs

In vocational and technical education, formal and non-formal education is provided in order to enable the students to receive education in accordance with their possibilities. Vocational open education high schools have been established in order to meet the vocational training needs of individuals who have gone out from formal education for some reason or who wish to acquire an alternative profession after compulsory education age. Student enrollment to vocational high schools may vary according to the type of school and the field and branches to be selected. Transitions of students between the school type and the programs and the transfers between the schools can be made under certain conditions. The students are given a diploma according to the school type, program, field and branch they have completed. In 2017-2018 academic year, a total of 5.689.427 students were educated in secondary education. 1.987.282 of these students were in vocational and technical secondary education institutions. The formal education given within the scope of vocational and technical education is carried out in three types of schools: Vocational and Technical Anatolian High Schools, Multi-Program Anatolian High Schools and Vocational Training Centres. Vocational and technical education within the scope of non-formal education is given in Vocational Open Education High Schools. Training periods vary according to school types.

Formal Vocational and Technical Education Schools are as follows:

Vocational and Technical Anatolian High School
Anatolian Vocational Program (AMP)
Anatolian Technical Program (ATP)
Craftsmanship Program (MEMP)

Multi-Program High School
Vocational and Technical Anatolian High School
Anatolian High School
Anatolian Religious High School
Craftsmanship Program (MEMP)
Vocational Training Centres
Craftsmanship Program (MEMP)

Fine Arts High Schools
Sports High Schools

• In the Anatolian Vocational Program there are general knowledge courses as well as knowledge and skills related to a profession.
• In the Anatolian Technical Program, mathematics, physics, chemistry and biology courses are given predominantly for 4 years as well as knowledge and skills related to a profession.
• In both programs, vocational field education in the 10th grade and branch training depending on the profession in the 11th and 12th grade are given.
• Multi-Program Anatolian High Schools; Secondary education institutions which apply general and vocational and technical education programs under an administration.
• Vocational Training Centres are the educational institutions where craftsmanship training and vocational and technical course programs are applied.
• In vocational and technical Anatolian high schools, a curriculum is offered in 54 fields and in 199 branches under these fields.
• In Vocational Education Centres training programs are carried out in 27 fields and 142 branches under these fields.

Non-Formal Vocational and Technical Education Schools

Vocational Open Education High Schools (MAOL): Vocational Open Education High School started to serve face to face education in its programs in 1995 and served until 02.02.2006. On 02.02.2006, "Vocational Open Education High School" participated under the umbrella of the General Directorate of Educational Technologies with the approval of the Ministry.
Vocational Open Education High School is equivalent to the vocational high schools in formal education in terms of program content but it differs from formal education in terms of structure and operation. Education is carried out by distance education, on the other hand graduation is based on passing the course and credit system. In spite of training is given within the scope of non-formal education, vocational courses are often given face to face in formal vocational education institutions in order to develop students' skills. Since 2005-2006 academic year, education in Vocational Open Education High School has been structured as four years. Adult education is also provided in public education Centres. Vocational colleges provide vocational training at universities within the body of YÖK.

Vocational Technical Education Budget:
The total budget allocated for vocational and technical education reached 12.5 billion TL in 2018, compared to 6.32 billion TL in 2013. The MTEK budget per student increased to 7.609 TL in 2018 from 3.916 TL in 2013. The fact that both the total budget allocated and the budget per student reach approximately twice in a six-year period are important in terms of increasing the quality of vocational and technical education and emphasizing its importance.

Fields of Vocational Education:

Vocational and technical education in Turkey, began to be offered in a modular way with the Strengthening Vocational and Technical Education Project (MEGEP) applied since 2005. Currently, vocational training is offered in 54 fields, which are given below.

Justice
Family and Consumer Services
Shoe and Saddlery Technology
Biomedical Device Technologies
Office management
Child Development and Education
Marine
Entertainment Services
Craft Technology
Electrical and Electronics Technology
Industrial Automation Technologies
Journalism
Ship Building
Food Technology
Fashion Design Technologies
Graphics and Photography
Beauty & Hair Care Services
Public Relations and Organization Services
Map / Deed
Patient and Elderly Services
Construction Technology
Firefighting and Fire Safety
Chemical Technology
Accommodation and Travel Services
Jewelry Technology
Labouratory Services
Machine Technology
Printing Technology
Metal Technology
Metallurgical Technology
Furniture and Interior Design
Motor Vehicles Technology
Accounting and Finance
Musical Instrument Making
Marketing and Retail
Plastic Technology
Radio-Television
Rail Systems Technology
Art and Design
Ceramic and Glass Technology
Agriculture
Textile Technology
Plumbing and Air Conditioning
Aircraft Maintenance
Transportation Services
Food and Beverage Services

Internship Practice
Students perform vocational training practices by internship in enterprises. Vocational Training in enterprises is a training model that students take skills training in enterprises and theoretical education in education units established by schools, enterprises or institutions. Anatolian vocational program students in the 12th grade go to skills training in enterprises three days; on the other hand, Vocational Education Centre students go go to skills training four or five days from the 9th grade. Internship is the vocational training which the students of Anatolian technical program develop in their professional knowledge, skills, attitudes and behaviours, to adapt to business life, to grow in real production and service environment, and to work in enterprises for 40 working days in order to enable them to recognize the facility and equipment that are not in school.

Rights Granted to Graduates
All vocational and technical education graduates are given the title of technician. In the transition from vocational and technical secondary education to vocational higher schools, additional score are given to graduates who wish to study in the field according to the results of the university entrance examination.

Some Statistics
In 2017-2018 academic year in Turkey there are 1.642.635 students who continue their formal education in MTEGM -dependent vocational and technical secondary schools. Of the existing students, 864.591 (56.08%) are male and 677.008 (43.92%) are female. 1.541.599 of these students are in Vocational and Technical Anatolian High Schools and 101.036 in Vocational Training Centres. The total number of vocational and technical education institution is 3,636 in Turkey. 2.552 (70.21%) of these institutions are Vocational and Technical Anatolian High School, 762 (20.93%) are Multi Programmed Anatolian High Schools and 322 (8.86%) are Vocational Training Centres. Indicators considered to be important for monitoring the development of vocational and technical education in Turkey is examined under this heading. In this context, the number of students, teachers and schools, revenue assets incomes and employment status of graduates have been examined.

The employment status of the graduates of vocational education between the years 2008 and 2014 provides important information in the fields of graduation and outside of their fields. It is noteworthy that the rate of out-of-field work of vocational education graduates in all fields is higher than the rate of employment in graduation areas. The highest proportion of graduates working outside the field is the Printing Technology (57.20%). The area with a rate of more than 10% graduates working in their field is limited to: Aircraft Maintenance, Marketing and Retail, Labouratory Services and Entertainment Services. The fact that In most occupations, the rate of work in the area of graduation is less than 5% indicates that they work in jobs that are not directly related to the education they receive. This situation constitutes a significant discrepancy between the vocational skills of graduates and the skills required by their work.

SPAIN:

The current educational system in Spain allows choosing the most appropriate training option for students, the training with which a person accesses the current labor market plays a fundamental role in the possibility of finding a job. But the successful job placement of young people, as well as adults, no longer depends only on their level of education but also on their level of professional competence.
Nowadays, Vocational Training is the professional studies whih are closest to the reality of the labor market and is answering to the need for specialized qualified personnel in the different professional sectors and the current demands for employment.

In Spain, it is offered different proffesional families and inside it, there are different levels:

- Basic Vocational Training Cycles, which lead to the corresponding Basic Professional Degree and it could be compulsory for some students.
- Middle Level Training Cycles, which lead to the Technician's degree and which are part ofpost-compulsory secondary education.
- Higher Degree Training Cycles, which lead to the title of Superior Technician and it is part of higher education.

The qualifications obtained during a training cycle have official status and the same academic and professional validity throughout the whole national territory, regardless of whether the studies are carried out in an Autonomous Community or within the scope of the Ministry of Education and Vocational Training.

It is usual that most part of student in VET are located in Middle Level Training courses, above all in the Target Group of this study (15-17). Within the Middle Level Training cycles there are a total of 59 different degrees belonging to 25 families, among which are:

- Physical and sports activities
- Administration and management
- Agrarian
- Graphic arts
- Commerce and marketing
- Building and Civil Works
- Electricity and electronic
- Energy and Water
- Mechanical manufacturing
- Hotel and Tourism
- Image and sound
- Food industries
- Extractive industries
- IT and Communications
- Installation and maintenance
- Wood, Furniture and Cork
- Maritime-Fishing
- Chemistry
- Health
- Security and environment
- Socio-cultural and Community Services
- Textile, Clothing and Leather
- Vehicle Transportation and Maintenance
- Glass and Ceramic

Modalities For The Impartition of Training Cycles

In Spain, there are different modalities of teaching the training modules of each degree:

Face-to-face modality

This modality is studied in educational centers, with regular class attendance. It can be done in the ordinary centers, integrated professional training centers and national reference centers. Beside of that offer of training cycles, in Spain exists the possibility to do on the job-training, which it is directly in the enterprise, in this case it is better to suit personal and professional situations.

Modality through the Internet (e-learning)
This modality is offered to proffesionals who want to improve their professional qualifications or train for the exercise of other professions and whose social, work or family circumstances prevent or hinder them from undertaking training VET courses in traditional face-to-face mode, this modality offers the possibility of studying with a flexible schedule and with the confidence of having the support and collaboration of teachers, even from your home.

Experience or background
In Spain, there is other alternative to obtain the title of Technician or Superior Technician without having to take the courses of Middle and Higher Level in person or even remotely. This is usually held once a year and are intended for people who already have an important training or background in a certain profession but do not have still the degree, and they are able to prove it presenting itself to a single test (theoretical and / or practical) of each professional module that composes a formative cycle.

Requirements For Being Accepted in a Mıddle Grade Training Cycle in Spaın
Only is necessary to accomplish one of the following:

- Be in possession of a Basic Professional Degree (Basic Vocational Training).
- Be in possession of a Technician or Auxiliary Technician degree or equivalent for academic purposes.
- Have passed the second course of the Unified and Multivalent Baccalaureate
- Have passed the entrance exam to medium-level training cycles (it will be required to be at least seventeen years old, completed in the year of the test).
- Having passed the entrance exam to the University for over 25 years

About the entrance exam to medium-level training cycles, it is organized by each Autonomous Community and, in case that the student passes, the participant will be able to study any medium-level training cycle around the national territory.
The reference curriculum for the organization of this test is focused on the core competencies of Compulsory Secondary Education which are supossed to enable a student to be trained in a mid-level vocational training cycles.

Traıining In Work Centers
It has to be stressed that in Spain, in VET studies there are a compulsory professional module which is called Training in Working centers, and this is a practical training phase inside a company that takes place in professional workplaces and once all the professional modules of the training cycle have been passed, in fact, this is performed in the real environment of the company with real tasks.
The students in this professional module of Training in Work Centers (FCT) does not have an employment or internship relationship, for that, the students who are doing this period are keeping the status of enrolled students in regulated VET education.
In the Degrees of Middle and Superior Grade adapted to the Organic Law of Education (LOE), the length of the professional module of Training in Work Centers will always be up 400 hours. This practices take place in the last semester of the second training year, generally between March and June.

UK

Education in the UK

The United Kingdom of Great Britain and Northern Ireland (UK) is a sovereign state comprised of four countries: England, Scotland, and Wales (Great Britain), and Northern Ireland. The UK Parliament is the supreme legislative body of the UK, but various levels of power are devolved to the individual national administrations of Scotland, Wales and Northern Ireland. As a devolved matter, the governments of the UK administer their own education and training systems, leading to similarities and differences between each country.

Compulsory Education

In England, education is compulsory between ages 5 to 18. At age 16, a learner may alternatively start an apprenticeship or traineeship or spend 20 hours or more week working or volunteering whilst in part-time education or training. In Scotland and Wales, education is compulsory between ages 5 to 16, and in Northern Ireland ages 4 to 16.

Pre-school education is not compulsory, but each government of the UK provides programmes to offer free or part-time nursery or other early years education provision.

Across all countries of the UK, students typically attend a form of early years schooling or nursery to age 4, primary school from ages 4 to 11 and secondary school from ages 11-16. Students may attend a sixth form or college between the ages of 16 and 18, and may attend universities from age 18.

Structure

In England, Wales and Northern Ireland the UK, the compulsory stages of education are referred to as 'Key Stages':

- Key Stage 1: Ages 5-7 (Primary School). Ends in examination by government.
- Key Stage 2: Ages 7-11 (Primary School). Ends in examination by government.
- Key Stage 3: Ages 11-13 (Secondary School). No examinations.
- Key Stage 4: Ages 14-16 (Secondary School). Examinations by Examining Bodies in both years.

Schools are organised into year groups. In England, Wales and Northern Ireland, Primary School runs from Reception to Year 6 and Secondary School runs from Year 7 to Year 13. Years 12 and 13 (Post-16) are also called Sixth Form. In Scotland, Primary School runs from P1 to P7 and Secondary School runs from S1 to S6.

After taking national qualification exams in both years of Key Stage 4 (S4 and S5 in Scotland), students start work or enter 'Further Education' (FE): studying for qualifications at their secondary school's Sixth Form (S6 in Scotland), attending a Further Education, Sixth Form, or Specialist College, or undertake a traineeship or apprenticeship. University education, accessible from age 18, is known as Higher Education (HE).

Curricula

There are three sources of curriculum in the UK: national curricula, private curricula, and Awarding Organisation (AO) curricula.

National Curriculum

The devolved governments and associated public bodies of each country of the UK devise a national curriculum which informs the programme of study and attainment targets for all four Key Stages – i.e. ages 5 to 16.

Private curricula

Some types of school, such as academies and private schools, do not have to follow the national curriculum. Such schools devise their own curricula, but pay Examining Bodies to examine and award qualifications.

Awarding Organisations

Private companies called Awarding Organisations (AOs) set curricula for post-16 qualifications, including 'vocational' qualifications, developing courses under the guidance of Skills Sector Councils, businesses, and other advisory bodies. Awarding Organisations also provide examination services for Key Stage 4 and for post-16 qualifications.

Funding

The governments of the UK each set their own funding budget for education. In England, for example, the schools budget for 2017/18 was approximately £39billion – 12% of total public spending for the year (UK Government, 2017).

Compulsory education is available for freely available to all, however some parents choose to send their children to fee-charging schools. Access to post-16 learning provision is usually dependent on a student's grades at Key Stage 4. Many courses are offered free for under-24s studying for their first qualifications. Courses for returning learners or those in employment may be undertaken for a fee. There is a range of funding available for all learners to cover potential course costs, living costs and childcare.

Examinations and Qualifications

At Primary School level, each devolved government is responsible for examining students in numeracy and literacy. In England, Wales and Northern Ireland, students take standard attainment tests (SATs) at the end of Key Stage 1 and Key Stage 2. There are no examinations during Key Stage 3. In Scotland, as of 2017, students take Scottish National Standardised Assessments (SNSAs) at P1, P4, P7 and S3.

At Secondary Education level, the national qualifications are GCSEs (14-16) in England, Wales, and Northern Ireland, and Nationals (14-16) in Scotland. These qualifications are examined by five Examination Boards in England, Wales and Northern Ireland, and one board in Scotland[1].
Post-16, students may study 'A-Levels' at their school's Sixth Form or Sixth Form College in England, Wales and Northern Ireland. In Scotland, students study 'Highers' in their 5th year at secondary school, and 'Advanced Highers' in their 6th – two years collectively called S6. These qualifications are broadly intended for learners seeking to attend university and are also examined by the Examination Boards.
All other Post-16 qualifications are examined, awarded and developed by Awarding Organisations (AOs). As AOs set the curriculum, examine students and award qualifications at the post-16 level, they play an important role in the 'vocational' education system of the UK.

Summary Table

Age	Education provider	Key stage	Examiner	Awarding Body	Level	Compulsory?
Pre-5	Nursery		None	None	Early Years	No
4 – 5	Primary School		None	None	Primary (Reception)	No (En,Sc,Wa) Yes (NI)
5 – 7	Primary School	1	Government	None	Primary (Infant)	Yes

7 – 11	Primary School	2	Government	None	Primary (Junior)	Yes
11 – 14	Secondary School	3	None	None	Secondary	Yes
14 – 16	Secondary School	4	Examining Board	Awarding Organisation	Secondary	Yes
16 – 18	Further Education College/Sixth Form College/ Apprenticeships		Awarding Organisation	Awarding Organisation	Further Education (FE)	No (Wa, NI, Sc) Yes (En)
18+	University		University	University	Higher Education (HE)	No

Table Summary of General Education System in the UK Source: UK Government (2012, 2018c), DfE (2018), British Council (2015)

The Vocational Education System in the UK

The UK has never adopted an official definition of 'vocational education' (Wolf, 2011). The term is used differently depending on context, but generally refers to qualifications and apprenticeships 'providing practical skills that are directly aligned to employment' (DfE, 2017). Other definitions offered specify that vocational educations are 'designed for initial entry to an occupation' (UKCES, 2013).

As such, 'vocational' education in the UK refers to a broad range of:

- *Ages*: vocational may commonly refer to Further Education (FE) provision for 16-18 year olds outside of school, but can be equally applied to practical skills, training and qualifications delivered to all ages;
- *Levels*: from new-comers to a profession to advanced skills;
- *Providers*: from further education institutes to employers;
- *Location*: in a college, workplace or both;
- *Specificity*: from highly specific to the skills need of an occupation to 'vocationally-related' or 'pre-vocational'. (Wolf, 2011)

Whilst often seen in contrast to 'academic' education, vocational education can also prepare learners to 're-enter' academic pathways (DfE, 2017).

Recently, across the UK, the term 'technical education' or 'technical and professional education' is being used more frequently than 'vocational education' (Doel, 2018). Technical education was defined as 'the acquisition of both a substantial body of technical knowledge and a set of skills valued by industry' (BIS and DfE, 2016). A new landscape for work-based learning, including apprenticeships and vocational learning under 'T-Level' qualification will be launched in England in 2020 (DfE, 2018a).

Structure and Governance

There is a complex institutional framework responsible for education policy and provision across the four countries of the UK. Crucially, independent companies known as Awarding Organisations (AOs) design, develop and deliver qualifications rather than the government. Learning providers subsequently buy the rights to deliver AO-created qualifications at their institution or company (DfE, 2017). A range of governmental bodies regulate AOs, inspect education provision, and manage qualification frameworks on which to define the level of each qualification. Currently, there are approximately 160 AOs in England (ibid.).

The following table summarises the main bodies for each UK country Source: CEDEFOP (2014)

Country	Governmental department for Education	Qualification framework	AO/Qualification Regulation	Learning Provision Inspection/ Regulation
England	Department for Education (DfE)	Qualifications and Credit Framework(CQF) maintained by Ofqual	Ofqual	Ofsted (Office for Standards in Education, Children's Services and Skills)
Scotland	Education Scotland	Scottish Credit and Qualifications Framework (SCQF) maintained by the SCQF Partnership	SQA Accreditation	Education Scotland
Wales	Department for Education and Skills	Credit and Qualifications Framework Wales (CQFW) maintained by the Welsh Government	Qualifications Wales	Estyn
Northern Ireland	Department of Education (DE)	Qualifications and Credit Framework(CQF) maintained by the Council for the Curriculum, Examinations and Assessment (CCEA)	Council for the Curriculum, Examinations and Assessment (CCEA)	Education Training Inspectorate

Table Bodies with responsibility for education across the UK

Awarding Organisations (AOs)

Awarding Organisations develop curricula, examinations, provide training for teachers and oversee quality assurance. This package of services is purchased by learning providers to teach and award their students. In England and Northern Ireland, 163 AOs supply around 25,000 regulated qualifications (vocational and academic). Near 8.4 million certificates are awarded annually, but the largest 10 AOs award 70% of all certificates issued (DfE, 2017). In Wales, 106 AOs are recognised by the regulating body (Qualifications Wales, 2018), and 39 in Scotland (SQA, 2018a).

Vocational Education Provision

Vocational education generally refers to qualifications offered at upper secondary level onwards (14+) and can be delivered in two manners: college-based or employer-based (DfE, 2017).

College-based provision refers to taught courses and exams outside of employment, at providers which include:

- *Further education colleges*
- *Sixth Form Colleges* (focus is usually on non-'vocational' courses or courses designed to

- prepare students for degree-level, such as A-Levels and Highers)
- *Sixth Forms within schools*
- *Specialist Colleges* (for studies such as agriculture or performing arts)
- Private sector training centres (which may receive public funding).

	England	Wales	Northern Ireland	Scotland
Further Education Colleges	235	13	6	27
Sixth Form Colleges	90	1	0	0

Figure Number of Further Education Colleges in each country of the UK Source: DfE (2018a)

Employer-based provision refers to qualifications earned whilst working, and include:

- *apprenticeships*
- *on-the-job training*
- courses with some college-based provision, but undertaken whilst being employed in the role being trained for.

Awarding Organisations also organise course planning, training events and exam guidance to provide teachers the additional resources needed to teach their qualifications.

Apprenticeships

In England, Wales and Northern Ireland, apprenticeships are offered at four different levels: Intermediate, Advanced, Higher and Degree. Apprenticeships are available to those over 16 and provide an apprenticeship minimum wage and on-the-job training from the employer (UK Government, 2018a). In Scotland, apprenticeships are offered at: Modern, Foundation, Higher, Graduate and Professional levels (SCQF, 2018). The UK also offers traineeships – courses with work experiences that last up to 6 months, designed to prepare the learner for work or an apprenticeship.

Vocational Education Users

As the UK has no formal definition for 'vocational education', the following data refers to the Further Education sector – the provision of qualifications and apprenticeships outside of schools and school sixth forms. These institutions also provide 'non-vocational' courses, qualifications (e.g. A-Levels/Highers) and excludes non-governmentally regulated vocational education provided by employers.

The following table shows the number of further education students in the UK, per country, as of November 2018, as well as the percentage of learners under 19 – the target group of learners for this project.

	England	Wales	Northern Ireland	Scotland	All UK
Under 19	1,071,700	49,600	74,600	105,900	1,301,800
All Ages	3,157,800	136,200	117,500	233,200	3,644,700
Percentage under 19	34%	36%	63%	45%	36%
Approximate percentage of population under 19 in Further Education[5]	32.0%	24.9%	59.1%	31.9%	36.9%

Table: Students in Further Education by country Source: DfE (2018a)

The following table demonstrates the gender for all students in further education. Across the UK, there are slightly more females in further education than males.

	England	Wales	Northern Ireland	Scotland	All UK
Female	54.6%	55.0%	47.0%	49.6%	52.2%
Male	45.4%	45.0%	53.0%	50.8%	47.8%

Table: Students in Further Education by gender Source: UK Government (2018a; 2018b), Welsh Government (2018a; 2018b), (DoENI, 2018a; 2018b), SFC (2017)

The final table shows students in further education with learning difficulties or other disability.

England	Wales	Northern Ireland	Scotland	All UK
17.9%	10.1%	17%	Unavailable[8]	15%

Table: Students in Further Education with learning difficulties and/or disabilities by country

For Apprenticeships, 72,300 people aged under 19 years commenced internships in the 2017/2018 academic year. In Wales, there were 16,250 apprenticeships started for the same period and age, plus 7,951 in Northern Ireland (Welsh Government, 2018a; (DoENI, 2018c). In Scotland, there were 6,321 new starts for Modern Apprenticeships amongst 16- 19 year olds for the second quarter of the 2018/19 year (SDS, 2018).

Number of qualifications exceeds number of users, as most students will study more than one course or achieve more than qualification from work-based training. For example, in England for the period October 2017-2018, a total of 5,754,900 qualifications were awarded across all subjects and age groups (Ofqual, 2018).

Qualification Levels

National qualification frameworks define the level of a qualification, their credit values and provide comparison between each. Currently, these are:

- the Regulated Qualifications Framework (RQF) regulated by Ofqual in England and the Council for the Curriculum, Examinations and Assessment (CCEA) in Northern Ireland;
- the Credit and Qualifications Framework for Wales (CQFW)
- the Scottish Credit and Qualifications Framework (SCQF)

The RQF and CQFW use the same levels, running from Entry Level (which is further sub-divided into Entry Level 1, 2, and 3) and Levels 1 – 8. In Scotland, the SCQF runs from Levels 1 – 12.

RQF (Eng/NI) and CQF W (Wal)	SCQF (Sco)	EQF
Entry Level 1	1	1
Entry Level 2	2	
Entry Level 3	3	
1	4	2
2	5	3
3	6	4
4	7	5
5	8	
6	9	6
	10	
7	11	7
8	12	8

Table: Comparison of qualification levels as per all UK and European Frameworks Source: UK Government (2018d); CQFW (2018); SQA (2018b); SCQF (2018)

Several types of qualifications are available for each level. Not viewed as 'vocational' in the sense of leading directly to an occupation, GCSEs and Nationals (in Scotland) are the national qualifications taken at age 15/16. A-Levels and Highers (in Scotland) taken at age 17/18 are often viewed as pathways to university courses. Types of 'vocational qualification include BTECs, diplomas, and certificates. A full list of the types of qualification relating to the target group is as follows:

England, Wales, and Northern Ireland			Scotland	
ISCED 3/ EQF 3	RQF/CQFW Level 2	GCSE – Grades 4-9 or A*-C *Intermediate apprenticeship* *Level 2 award* *Level 2 certificate* *Level 2 diploma* *Level 2 ESOL* *Level 2 essential skills* *Level 2 functional skills* *Level 2 national certificate* *Level 2 national diploma* *Level 2 NVQ* Welsh Baccalaureate National	SCQF Level 5	National 5 Level 5 SQA Award Skills for Work National 5 *Level 5 National Certificate* *Level 5 National Progression Award* *Level 5 Modern Apprenticeship* *Level 5 SVQ*

Table: Qualification types available at project target level

Non-regulated Qualifications

Awarding Organisations design qualifications to be placed on the abovementioned national qualification frameworks. Some AOs or employers may offer 'non-regulated' qualifications that are not recognised by the regulated frameworks. Delivering non-regulated qualifications is not illegal, but cannot be used to deliver vocational training, but may be necessary in situations where learners 'have learning difficulties

or disabilities, are unemployed and actively seeking work, or need smaller packages of tailored support to re-engage with learning' (SFA, 2015).

Credits

Units within qualifications are worth credits. A learner must complete a number of mandatory and optional units in order to reach the credit requirement to earn the qualification. A student may take certain optional units in order to specialise in particular skill to an occupation, often called a pathway. In some circumstances, the Joint Council for Qualifications (JCQ) and the regulator can arrange credits to be transferred.

Current Issues in Vocational Education

A review of adult vocational qualifications in England (UKCES 2013), identified key issues with the vocational education system as a whole, including:

- Awarding organisations are not expected to provide information about the value added by their qualifications
- Awarding organisations are not expected to be consistent in their approach, compared to other awarding organisations
- Vocational qualifications having no consistent design
- Little emphasis on economically useful skills
- Confusing titles and databases for qualifications
- Teachers untrained in new technologies for delivering education
- Limited employer involvement in creation of courses (2013: 16-20)

After the review, qualifications were streamlined and made easier to navigate and established that qualifications should be 'relevant, rigorous and recognised'. In 2017, a government consultation which looked at the changed vocational education landscape after the Whitehead review found issues remained:

- The importance of passing inspections has led institutions to offer more qualifications that are 'easier to pass', causing a 'race to the bottom situation'
- Insufficient content regulation – including lack of regulation for curriculum content.
- Small training institutes lacking tools and resources
- Smaller employer's needs less likely to be represented in course content. (DfE, 2017)

The vocational education system is on the edge of an overhaul, with new 'T-Level' qualifications scheduled to launch in 2020. The invitation for AOs to tender to develop the courses commences imminently (Spring 2019) (DfE, 2018b)

ITALY

In Italy all young people have to attend the school until reaching the age of majority (18 years old) and to perform a total of 10 years of compulsory schooling in wich two years of an education and professional training are planned.

In Italy, the first cycle of education ends at the age of 14 and it is validated through an exam and the issue of a certificate for admission to the second cycle of education. In this second cycle the students have the possibility to choose between a general education or an education and training path. Within this second cycle, young people can choose different solutions:

- high school education;
- technical education;
- professional education;
- vocational education and training programs organized by the regions;
- apprenticeship for qualification and professional diploma (after having completed 15 years of age);

Education and vocational training (VET)

In Italy, the term vocational education and training identifies specific paths that are formulated by the regions and the autonomous provinces. Vocational education and training is available at secondary, post-secondary or higher levels in formal or non-formal education and training. VET is aimed at young people and adults and can be provided by a school or by a public or private company or body. VET in Italy also includes technical and professional institutions.

In planning the course structure, the actors involved have different responsibilities:
- The Ministry of Education, University and Research defines the framework of VET in national school curricula;
- The Ministry of Labor and Social Policies defines the framework for vocational education and training, while its planning, organization and provision is delegated to the regions and autonomous provinces.

Specifically, the objectives of continuing vocational training provided within the public system are set by the Ministry of Labor, while the activities of continuing vocational training are managed by the autonomous regions and provinces or by the social partners. The social partners generally play a consultative role in the formulation of VET policies and contribute to their translation into the paths that make up the training offer.

Technical and professional training courses

The programs offered by the technical institutes provide knowledge, skills and competences for the performance of technical and administrative professions, while those of the Professional institutes provide both theoretical and practical preparation for the accomplishment of qualified professional roles in productive sectors of national interest. Graduates have access to higher education and acquire a 4th level qualification of the European Qualifications Framework (EQF). The certificates issued to test the acquired skills are drafted by the Ministry of Education and formulated in four Community languages, in order to be included in the various Member States.

The three-year and four-year courses of VET

The three-year and four-year vocational education and training courses are organized by the regions but funded by the Ministry of Labor. Currently, four-year professional courses are not offered uniformly throughout the country. These paths are structured in modules and aim to develop basic, transversal and technical-professional skills. The articulation in modules allows students to change the area of study

thanks to the recognition of credits. It is important within these courses, the supervision of two tutors: one related to the trainer, the other to the enterprise.

Post-secondary high school technical training
These paths aim to deepen the specialization at post-secondary level to meet the needs of the labor market in the public and private sectors. These are planned and organized by the regions and the autonomous provinces on the basis of territorial plans adopted every three years and their offer are different from region to region. These courses are divided into:

Higher Technical Education and Training courses: divided into 20 specialization areas at national level. However, each specialization is described according to the demands of the local job market. These courses include a mandatory internship is considered very important. The Advanced Technical Education and Training paths are planned by the regions and are designed and managed by at least four training subjects: a school, a vocational training center, a university and a company.

P***athways realized within the Higher Technical Institutes:*** these courses offer nonacademic opportunities at a higher level for a total of 29 national professional profiles. The routes form technicians specialized in six technological areas considered strategic for the development of the country. Young people and adults may be admitted as long as they hold a certificate of upper secondary school and 50% of the training must be provided by subjects from the real job world and professions.

Furthermore, the Higher Technical Institutes act as foundations for participation that must involve the following subjects:

- a secondary, private or public educational establishment which belongs to a technical or professional association;
- a training agency accredited by the region for higher education;
- an enterprise of one of the productive sectors referred to by the higher technical institute;
- a university department or other body belonging to the scientific and technological research system;
- a local authority.

Post-VET paths and much more
Those who have completed a training in three- or four-year and those who have completed a second-level secondary school can access the vocational courses developed by the regions or autonomous provinces. These are courses lasting 400-600 hours and they are co-financed by the European Social Fund (ESF). A certificate of professional training is issued, ie a second level qualification, at the end of the course.

The courses provide theoretical, technical and managerial knowledge but also include workshops and practical work and the achievement of a mandatory internship. Admission enters through selection procedures with a knowledge assessment through an interview. To start the courses it is necessary to reach a suitable number of students and the teachers selected are based on this number.

The courses are divided into modules or units for thematic groups or acquisition of specific skills. Timetables are established at regional and local level and subsequently defined by the vocational training center that provides the course: lessons can be concentrated in a few weeks or be distributed throughout the year. Course management is decentralized and general information on curriculum contents is not available at national level. The acquisition of skills is generally monitored with intermediate evaluations through an examination or presentation by the student. There is a final exam that can be written, oral or practical, and for the admission to this examination it is necessary to have attended at least 2/3 of the course. The courses are managed by the vocational training centers accredited by the regions and are not uniformly distributed throughout the territory. The courses

conclude with a qualification certificate issued by the regions on the basis of their specific register and these certificates are not recognized at national level. There is still no national register of qualifications achievable with regional courses.

Postgraduate education and training
Those who have completed a degree course can access postgraduate specialization courses in a specific field. These are organized by the regions and by the autonomous provinces and have a duration of between 400 and 600 hours. These courses provide participants with a regional qualification that corresponds to specific professional areas not included in the national qualification registry.

The apprenticeship
In Italy, the apprenticeship is a work contract for training and employment. This includes both on-site and classroom training. The apprenticeship contract, which differs from other forms of work-based learning, must be in writing. The roles and responsibilities of all the parties are defined in it. The apprenticeship system in Italy includes three types of contracts:

Apprenticeship for the qualification and the school leaving professional certificates: it is aimed at young people aged between 15 and 25 years. There are no specific requirements for admission to these courses. Furthermore, the apprenticeship is governed by the regions and the autonomous provinces through specific agreements signed in the State-Region conference. The contents, divided into theoretical and practical learning, the specific qualifications offered and the number of training hours, are established by the regions and the autonomous provinces in accordance with the minimum standards agreed at national level. The duration of the contract is determined according to the certificate or diploma obtained. These apprenticeships last from three to four years and allow to acquire an operator or technical qualification respectively in 22 and 21 professional fields. The professional qualification certificate can be obtained (level 3 of the EQF) or professional technical diploma (level 4 of the EQF). These qualifications are present in the national qualification registry.

Professional apprenticeship or professional contract*:* it is aimed at young people between the ages of 18 and 29 who want to acquire a qualification included in the collective agreements and required by the labor market.

Apprenticeship of high training and research*:* This apprenticeship is aimed at obtaining qualifications of various levels and includes qualifications ranging from level 4 to level 8 of the EQF and is aimed at young people aged 18-29.

ROMANIA

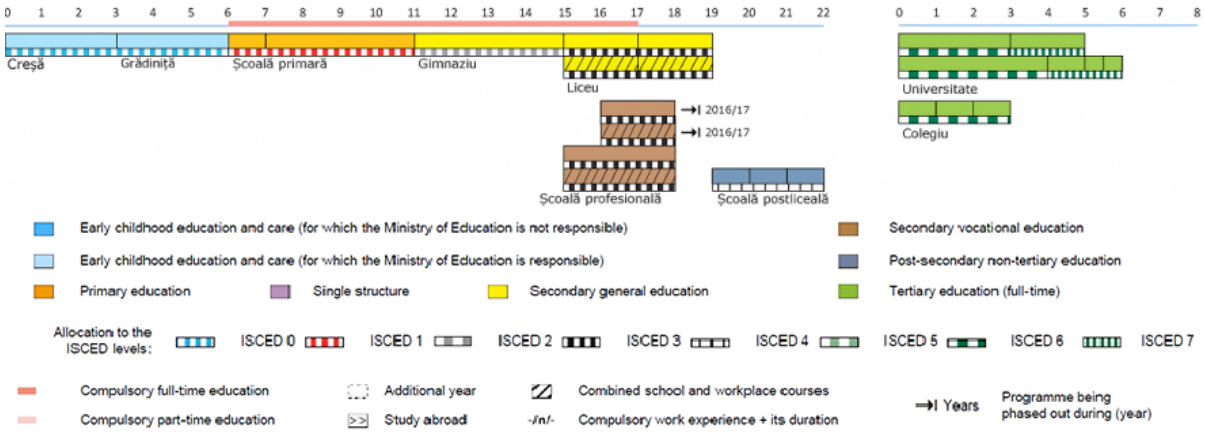
Romania's education system is centralized, both horizontally and vertically. All key responsibilities for education strategy, policy and delivery are concentrated within the Ministry of National Education (MNE). Several specialized bodies provide input to the ministry, but there is no fully independent evaluation body. Locally elected authorities play very little role in the design and delivery of education policies. The MNE directly steers and monitors the implementation of national policies at the local level through the County School Inspectorates (CSIs).

Responsibility for education is concentrated in central government. The MNE is responsible for setting the education system's overall strategy and national policies, from pre-school and compulsory education to vocational education and training and higher education. In the pre-university system, it is responsible for approving and monitoring the implementation of the curriculum, managing the school network, and

allocating financial and human resources to schools. The MNE is also responsible for the national system of evaluation, with implementation and some policy evaluation performed by public bodies linked to the ministry.

Source: oecd reviews of evaluation and assessment in education: romania 2017

The Romanian education system has the following structure:



source: Eurydice 2016

Pre-university education:

a) Early education (0-5 years), consisting of the ante-pre-school level (0-2 years) and pre-school education (3-5 years);

b) Primary education (6-10 years) (5 Grades: Preparatory Grade up to Grade IV)

c) Secondary education, which includes:

1.Lower secondary education 11-14 years (4 Grades: Grade V up to Grade VIII)

Upper secondary education:

15-18 years, which may be:

- High school education, comprising high school Grades IX-XII / XIII, with the following branches: theoretical line with the humanist and real profiles, "vocational" branch, with military, theological, sports, artistic and pedagogical profiles and technological line with technical profiles, services, natural resources and environmental protection;

- Professional (Vocational)[2] education, comprising professional schools Grades IX-XI, that may be independent or affiliated units to technology high schools;

Non-tertiary tertiary education, which includes post-secondary education

[2] In Romanian education system, "Vocational" refers to the military, theological, sports, artistic and pedagogical high schools profiles. In order to not create confusion, for VET, we will use the terminology of Professional and technical education instead of Vocational and technical education.

University education:
a) Higher education Bachelor degrees
b) Higher education Master
c) Higher education Doctoral studies

General information about the Romanian initial professional and technical education (iVET)

The initial professional and technical education (iVET) in Romania refers to professional education with an important component of work based learning and consists of:
a)professional education,
b)technological high school education
c)post-secondary education.

Currently, the iVET system in Romania is focused on the specific qualifications and practical skills and deepening the key competences to the real work and offers qualifications at four levels:

- Qualifications at NQF/EQF level 2 for graduates of 2 years professional education;
- Qualifications at NQF/EQF level 3 for graduates of 3 years of professional education;
- Qualifications at NQF/EQF level 4 for graduates of upper secondary education (technological high schools);
- Qualifications at NQF/EQF level 5 for graduates of post-secondary education (VET postsecondary school).

The initial professional and technical (iVET) education graduates who pass the professional qualification certification exam, acquire a professional qualification certificate for level ~~2,~~ 3, 4 or 5, according to the National Qualifications Framework, and the descriptive supplement, according to the Europass.

The initial professional and technical education (iVET) can be organized for qualifications in the National Register of Qualifications, updated periodically, according to the needs of the labor market identified by strategic planning documents of the regional, county and local training offer.

The initial professional and technical education (iVET) may also be organized on the basis of requests from private employers or from the National Agency for Employment, based on tuition contracts.

The iVET National Curriculum shall be based on Professional Training Standards approved by order of the Minister of National Education, at the proposal of the National Center of Education Development of Vocational and Technical Education, and elaborated in consultation with the social partners.
The Professional Training Standards are based on Occupational Standards approved by National Authority for Qualifications.

The National Centre for Technical Vocational Education and Training Development was created in 1999 and is accountable to the MNE. It develops the qualifications and the national curriculum for initial professional and technical education (iVET) in upper and post-secondary education, according to the National Qualifications Framework.

In initial professional and technical education (iVET) apply the National Curriculum, developed in accordance with the needs specific to personal development and the needs of the labor market and of each community, based on the principle of subsidiarity.

Based on the National Education Law issued in 2011, schools in Romania have some autonomy over the curriculum: the National Curriculum contains compulsory disciplines / modules and fields study that

represent 2/3 of the total number of training hours and optional disciplines / modules at the school's decision (that represent 1/3).

For the initial professional and technical education (iVET), the curriculum at the school's decision is a local development curriculum and constitutes the educational offer at the local level, developed by the school in partnership with the economic organization / local public administration, with the approval of the County School Inspectorate. In this way the iVET education is adapted to the local needs of the labor market.

General information of VET programmes for target groups at construction training.

TURKEY

Construction was the leading sector of Turkish economy after 2000. So it has a big place at employment. Construction sector was 9% of the economy in Turkey at 2017.

7,4 of the employment is at construction sector in Turkey and there were more than 2 million people working at this sector at 2017. This situation makes vocational education at construction sector more meaningful.

High quality building construction is important because of earthquake risk in Turkey. The engineering capacity of the firms and the qualified labour force they work are the most important determinants of the quality of the construction. Graduates can easily find jobs in large scale and capacity companies in the sector. In addition, in public institutions such as State Hydraulic Works, Roads, Rural Services, Land Registry Cadastre, Public Works Provincial, Regional and Branch Directorates and Municipalities; graduates are employed as technical staff. This situation makes vocational education at construction sector more meaningful.

In the field of Construction Technology, students gain knowledge and skills about the design and use of modern building technologies used in buildings that serve different purposes, including houses.
Branchs at Construction Technology Vocational Education are:
Wood Construction Systems
Reinforced Concrete Building Systems
Concrete-Cement and Ground Technology
Facade Systems and PVC Joinery
Roof Systems
Steel Structure Technical Drafting
Interior Technical Drafting
Architectural Design Technical Drawing
Restoration
Static Construction Technical Drafting
Building Interior Decoration
Building Insulation
Building Surface Coating

Construction Technologies is one of the 54 fields in vocational education system in Turkey. 27,94% of of the construction technology students are females, 72,06% of them are males. Only 7,85 of the construction graduates are working at their sector. 42,58 of them are working at other sectors. This is one of the main problems of Turkish VET system.

Main lessons at construction technology:
Aggregate and Asphalt Experiments Course
Wooden Roofs
Woodcutchers Course
Wood Coatings Course
Wooden Carcass Structures
Wooden Structures Course
Wooden Mural Restoration Course
Plaster Decoration
Concrete Experiments Course
Concrete and steel roofs
Reinforced Concrete Reinforcement Course
Reinforced Concrete Molds
Reinforced Concrete Structures and Vocational Courses
Decoration Restoration Course
Steel Structure and Project Drawings Course
Computer Facade System Drawings Course
Computer Drawing Lesson Lesson
Computer Interior Drawings Lesson
Computer aided project drawing course
Computer Relay and Restoration Project Drawings Course
Computer Static Project Drawing Course
Building models
Building and Layout Instruction
Roof Systems Vocational Drawing Course
Roof Insulation and Coating Course
Steel Structure Production Course
Facade Systems Assembly Course
Cement Experiments Course
Formal Education
Wall Art Drawing Course
Wall and Floor Covering
Wall and Floor Coverings Course
Interior Drawings Course
Decoration Profession Drawing Course
Decoration and Carton Artist Course
Human and Earthquake Courses
Excavation and Arbitration
Cost Calculations Course
Professional Development Course
Architectural Project Drawings Course
Pre-stressed Concrete Assembly Course
Pre-stressed Concrete Production Course
Paving Stone and Bordure Coating Profession Drawing Course
Paving Stone and Bordure Coating Course
PVC Chopping and Plating Profession Drawing Course

PVC Joinery and Coating Course
Design Course with Colours
Relay Course
Plaster Profession Painting Course
Static Project Drawings Course
Ornamental Art Class
Draft Geometry Course
Technical and Basic Vocational Drawing Course
Basic Construction Technology Course
Insulation Profession Painting
Building Cost Accounts
Structure Static Calculations
Structure Paints Course
Walls in Structure
Plaster in Structure
Insulation in Structure
Surface Coating Profession Drawing Course
Soil Experiments Course

SPAIN

In spain, the degree to be Construction Technician belongs to the VET family of "Construction and civil works" The duration of the Construction Technician course is **2000 hours** and it can be taken in 18 educational centers spread throughout the whole national territory.

The learning objectives in this Construction Technician VET course are the following:

- Prepare and assemble formworks, placing them according to the layout and guaranteeing the stability and rigidity of the complete assembly.
- Execute reinforced concrete elements, elaborating and placing reinforcements and collaborating in the laying of cement.
- Construct masonry factories and to clad in stone, brick and block, rethinking their position and complying with the prescriptions.
- Carry out plastering, lining and screed with mortars, pastes and concretes applying good sighting and mastering techniques.
- Carry out roofing works, executing slope formation systems, skirts and providing insulation, waterproofing, complementary elements and covering materials.
- Perform urbanization works, executing pavements, registers and arranging linear pipes without pressure and complementary and singular elements.
- Covering horizontal and vertical walls, performing flooring work with rigid, veneered and tiled pieces, guaranteeing the flatness and the proper arrangement of the joints.
- Organize the execution of the masonry and concrete pits, planning activities, assigning and adapting materials, human resources, means and equipment.
- Evaluate masonry and concrete works, measuring units of works and preparing budgets.
- Interpret construction plans, identifying their elements and obtaining dimensions.

The professional modules of this training cycle are offered on a face-to-face basis, and it will be organized in **two academic courses**. The first academic course is developed entirely in the educational center. In order to be able to take the second course, it would be necessary to have passed, at least, eighty percent of the hours of the first course

In Spain, this training takes place in four different areas:
1- The **multi-purpose classroom**, where it is usual the audiovisual equipment is located.
2- **Construction techniques Workshop**, where it can be found the tools of masonry (hammers, pointers, spatula, saw ...), tools for application of coatings, tools for stakeout and leveling and other tools for general auxiliary purposes.
3- Place for **work execution practices**
4- **Warehouse**, where occupational risk prevention and **environmental protection teams are located.**
At the end, when the students have finished their studies, **the professional opportunities** are very varied in Spain, among them are the following:

- Team leader.
- Bricklayer
- Mason
- Paver
- Technician in sanitation networks.
- Form worker
- Steel fixers
- Roofers
- Slater
- Coating applicator
- Tiler
- Installer of waterproofing systems in buildings and civil works.
- Terrace waterproofing technician

These job positions could be done in a wide spectre inside **the construction sector;** even they could be present **in small, medium and large construction companies or in Public Administrations**, either they could be on his own account or employed by others, in tasks like developing works of masonry or cement in construction, rehabilitation, maintenance and reform in buildings.

Once the student has finished his training at Middle level, he/she can continue to be trained with:

- Professional specialization courses
- Another cycle of Vocational Training with the possibility of being reduced some modules due to validations of previous studies.
- Pre-university courses
- Preparation for doing the official test to access to the University

UK

Sector Overview
As of 2018, the construction industry provides 2.4 million jobs – 6.8% of all jobs in the UK (Rhodes, 2018). A high number of those working in the industry are self-employed – construction accounts for 37% of all self-employed jobs in the UK (Rhodes, 2018). The sector is forecast to require an additional 31,600 new recruits annually to 2022, a 3.3% growth (CITB, 2018a). The potential impact of 'Brexit' – the UK's move to exit the European Union – on the sector is yet to be fully comprehended, however CITB reports that more firms are seeing Brexit impacts through 2018, including staff shortages (CITB, 2018b).

The skills needs of UK industries such as construction are assessed a network of industry specific Sector Skills Councils (SSC). The SSC for the construction industry is CITB – the Construction Industry Training Board. The CITB and other skills bodies advise awarding bodies in course content and development and endorse the content of individual modules.

Construction is one of the first subject areas to be trialled under the new 'T-Level' qualification. A T-Level in 'Design, Surveying and Planning' is scheduled for 2019 delivery, and 'Onsite Construction' in 2021 (DfE, 2018b)

Pathways into Construction
A 2016 CITB survey identifies four main routes into the construction industry for post-16 year olds: apprenticeships, further education study, sixth form study, and starting work.

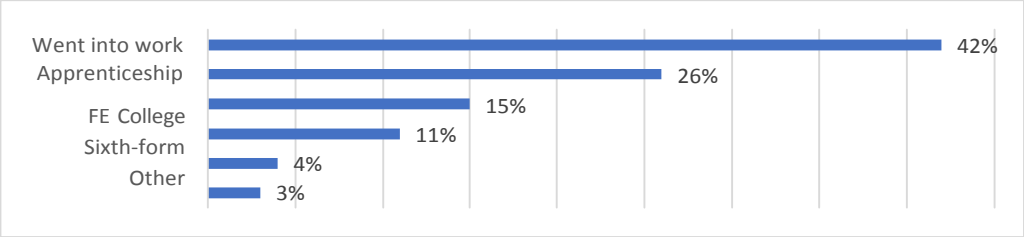


Figure 2 Pathways of workers after compulsory education (CITB, 2016b: 11)

Apprenticeships
26% of respondents to the CITB survey took an apprenticeship after finishing compulsory education, two-thirds of which were 'company' provided, one-third were 'government' provided. Most taking a company apprenticeship were older workers, before government funding for apprenticeships was initiated.

Following their apprenticeship, 67% remained in employment, 17% became self-employed, 9% went to study for FE or HE qualifications (CITB, 2016b).

For the period May 2017 – 2018 in England, the government's construction apprenticeship framework accepted 17,500 new starts – 5.5% of all apprenticeship starts (UK Government, 2018z). In Wales, 2,040 construction work-based were started for the first three quarter of 2018, accounting for 9% of all new starts (Welsh Government, 2018a). In Northern Ireland, 8% of ongoing apprenticeships are in construction (DoENI, 2018c). In Scotland, for Q2 of 2018/19, construction and related apprenticeships saw 3,328 new starts – 25% of total starts and the most apprenticeships per occupational group (SDS, 2018).
The construction sector heavily reflects the gender imbalance for apprenticeships and the workforce of the UK in general. In 2012, half of all apprenticeships starts were female, but made up only 2% of starts in construction sector apprenticeships (Tabrizi 2014).

Qualifications at Further Education (FE) providers
On average, 72% of workers surveyed achieved vocational qualifications from FE colleges. Of that amount, 79% were in construction subjects: 'most frequently bricklaying, wood skills, plumbing and heating, and electrical work' (CITB 2016: 12). The most common qualifications were NVQs, City and Guilds and BTECs at RQF levels 2 and 3.

Qualifications at Sixth Form Colleges
Taking A-levels and other qualifications in Sixth Form College comprised 11% of worker's pathways to construction, especially amongst managers and craft occupations. Sixth Form study is often preparation for attending university – 41% of Sixth Form learners went to undergraduate study. A relatively high number – 18% - went on to study at an FE College (CITB, 2016b: 12).

Starting Work

The CITB (2016) survey found that 42% of surveyed workers started work without apprenticeships or studying for qualifications at sixth form or FE College. Direct entry to work is age dependent – 60% of 55-59 year olds used this route compared to 31% of 20-24 year olds. The predominance of this pathway into work amongst older workers emphasises the importance of upskilling the current workforce to adapt to the changes of the industry as much as training new workers.

Qualifications

In England, 327,800 certificates in subjects related to construction, planning and the built environment were awarded between October 2017 and September 2018 – a growth from 290,990 the previous year (Ofqual, 2018).

For the period July to September 2018[10], a total of 118,050 construction or construction related certificates were awarded (Ofqual, 2018), in Wales 12,775 (Qualifications Wales, 2018), and in Scotland, 1,932 (SQA Accreditation, 2018).

CSCS Cards

Most developers and house builders require their workers to hold a Construction Skills Certification Scheme (CSCS) card, although this is not a legal requirement. CSCS cards provide are colour-coded as per the worker's employment level, from labourer to manager. The worker's qualifications are listed on the back of the card, as well as stored on the card's chip and accessible by an online database. A worker must have at least a qualification in site safety in order to obtain a card, ensuring safety within the workforce overall. The CSCS card is possibly the primary reason that "BSC Level 1 Award in Health and Safety in a Construction Environment" is the 18th most awarded certificate in England (Ofqual, 2018).

Current Issues in Vocational Education particular to Construction

In 2016, the Construction Leadership Council published a review of the UK Construction Labour Model with a blunt message: 'modernise or die' (Framer, 2016). The review included the urgent need to reform strategy from reactionary to long-term, encourage innovation, and align training to industry need. Similarly in 2015, the Federation of Master Builders (FMB) issued its own analysis, describing the skills need in construction as a 'Time Bomb' (Pye Tait, 2015).

CITB identifies a skills supply gap and a need to 'accelerate the pace of modernisation' (CITB, 2018a). Main causes for the skills gap include:

- *Aging work population*: 20% of workers are over 50, 15% over 60
- *Perception*: new entrants put off by the industry's image, or by collapse of large firms such as Carillion – a British construction and support service business which went into liquidation after amassing
- £1.5bn in debts (BBC, 2018), halting several large projects and causing the redundancy of over 3,000 workers (Scott, 2019).
- *Technologically behind*: lack of digital or creative options putting off young entrants (Waters, 2017)

A recent review of the vocational education market found that construction qualifications rank, on average, as quite low in terms of responsiveness and innovation (0.6), but high in terms of rigour and qualification recognition (0.25) (DfE, 2017). The review found that construction in particular rated poorly on employer involvement, with only 1-2% of employers involved in course content design and 8-11% noting that qualifications could not be adapted to their business needs (DfE 2017). It is common practice to consult larger firms on content, rather than the needs of small construction businesses (DfE, 2017).

Apprentice Levy

In 2017, the government created a scheme called the Apprenticeship Levy. Employer's wages bills are levied 0.5% to pay for apprenticeships, rather than from taxpayer funds. All companies with payrolls of over £3m are liable to pay the levy. Those contributing may reclaim their contribution as digital vouchers which can only be spent on the training apprenticeships (CITB, 2016a). The scheme has been met with an overall decrease in apprenticeship uptake (UK Government, 2019). Construction bodies such as the Federation of Mater Builders (FMB) have called for apprenticeship reform, criticising the inability for larger firms to use vouchers in other areas of training – such as on-site tradespeople – where it is vitally needed (Price and Wales, 2018). The ability to move 25% of digital vouchers across the supply chain will be introduced in April 2019, and the scheme is in review (Gerrard, 2018).

ITALY

In Italy, for the three-year and four-year courses of VET, there are no national study programs divided by subject, because each individual region are responsable of them.

The provision of VET, an alternative to the scholastic one, is divided into two macro-typologies: pathways owned by training agencies accredited by the Regions and interventions by educational institutions in integration with the training agencies. In this case the schools follow the guidelines of the individual regions for the realization of these paths.
To plan and carry out the training intervention, the structures prepare a didactic project, based on the analysis of the tasks and skills characterizing the professional objective of the intervention. It is widespread the design of interventions for articulated modules attributable to the basic, transversal and technical-professional skills.

Regarding key competences, the reference for the development of the curricula for the first two years of compulsory education is the document on key competences for the citizen, within which the basic skills for the 3rd and 4th years, useful for the subsequent didactic planning, are contained in the Agreement of 27 July 2011 and refer to the areas of linguistic, mathematical, scientific-technological and historical-socio-economic competence.

Regarding the programming of the training objectives related to the professional aspect, the reference goes to the technical-professional standards for the 22 professional figures leaving the three-year courses and for 21 of the four-year courses. These standards are organized around work / activity processes and skills required by the professional figure. Furthermore the skills are articulated in skills and knowledge.
An example of a VET program concerning the construction industry can be described below. This analysis was drawn up after contacting the "Padua School of Construction". For years active in the field, with a historical background in the training of construction workers.

In Italy, the three-year course for the "Construction Worker" course aims to train a professional figure who on one hand combines, technical knowledge and executive skills in a "conscious doing", optimizing both the time and the executive quality, from the other side it is open to the recovery of traditional construction and to innovations regarding materials and procedures related to sustainable construction. The course is divided into 3 years for a total of 2,346 hours and is addressed to 15 students.

The objectives of this course are both to incentivize and realize the relationship between skills and abilities to organize work on site, through appropriate communication and to understand the environmental and structural function performed by the technical elements of a construction project.

In the professional area the progarmma focuses on the analysis of the functional elements of a traditional construction work but also on the issue of sustainability with the use of the most appropriate technical solutions and innovative materials in respect of the green and blue economy.

The training intervention is divided into training areas, whose contents develop the skills and knowledge related to the reference skills:
WORK ACCOMPANYING: Development of knowledge for a positive insertion into the world of work.

CULTURAL AREA:

- Improvement in the social and professional use of written and oral communication.
- Development of the use of a foreign language in a professional environment.
- Deepening of the logical mathematical languages and ability to use them to solve complex problems related to the professional context.
- Deepening the analysis of physical and chemical phenomena present in the construction process of a construction work and their implications in the choice of materials and technical solutions.
- Improvement of the use of computer knowledge in the professional CAD field.
- Knowledge of past events and their influence in the present cultural, social, economic and professional reality.

PROFESSIONAL AREA:

- Development of the ability to use the technical drawing to trace the elements of a building work.
- Development of the ability to identify the elements of a building work, the function they perform and the technical solutions with which they are made with knowledge of the materials.
- Development of the concept of sustainable neighborhood, spatial planning and energy requalification of existing buildings.
- Facade insulation systems and their applications
- Improvement of the ability to perform masonry work, carpentry and finishing up to the adoption of cutting-edge technologies, knowledge of new innovative materials in respect of the green and blue economy with its installation.
- Consolidation of the ability to work in safety, identification of risks, adopting protection measures.

CIVIC ENTERPRISE: within this area there is an agreement with a public body for a useful intervention to the community.
The 3-year program is developed through different teaching methods, including: brainstorming, film use, intervention training, presence training, problem-based learning, project work, role-play, testimonials and company visits.
The subjects to be supported in the course are:

First Year: total 990 hours

Subjects:

- Safety - 66 hours
- Religion - 20 hours
- Construction technology - 74 hours
- English - 60 hours
- Italian - 60 hours
- Motor Education - 24 hours
- Mathematics - 60 hours
- Information technology – 92hours
- Integrated sciences - 40 hours
- History - 20 hours
- Law and economy - 36 hours
- Technical drawing and CAD - 76 hours
- Site organization - 68 hours
- Carpentry and masonry building workshop - 294 hours

Second Year: total 690 hours

Subjects:

- Safety - 60 hours
- Religion - 16 hours
- Construction technology - 74 hours
- English - 30 hours
- Italian - 58 hours
- Motor Education - 18 hours
- Mathematics - 60 hours
- Information technology - 78 hours
- Integrated sciences - 30 hours
- History - 22 hours
- Law and economy - 46 hours
- CAD drawing - 62 hours
- Construction site organization - 24 hours
- Building laboratory - 82 hours
- Plant laboratory - 60 hours

Third Year: total 666 hours

Subjects:

- Safety - 68 hours
- Religion - 10 hours
- Construction technology - 56 hours
- English - 36 hours
- Italian - 36 hours
- Motor Education - 8 hours
- Mathematics - 46 hours
- Information technology - 28 hours
- Integrated sciences - 26 hours
- History - 16 hours
- Business econonomia - 48 hours
- CAD drawing - 90 hours
- Organization of construction site and tracing 34 hours
- Building laboratory - 130 hours
- Qualifying exams - 16 hours
- Monitoring of testing and verification 18 hours

The course ends with a final exam and the issue of an EQF level qualification certificate 3.

ROMANIA

According to the National Qualifications Framework, in the field of Construction (Construction, installation and public works), at qualification level 3, there are defined 14 occupations for which professional training is made:

1. Constructor of monolithic structures
2. Steel bender -prefabricated fitter
3. Mason-stonemason-plasterer
4. Carpenter – parquet layer
5. Plate mosaic-fitter
6. Painter, plaster, dryer, wallpaper gluing
7. Plumber of local distribution networks and gas pipelines
8. Plumber of technical, sanitary and gas installations
9. Plumber of central heating installations
10. Plumber of ventilation and conditioning installations
11. Insulator
12. Railway constructor
13. Constructor of roads and bridges
14. Constructor of hydro-technical works

The training for these occupations lasts 3 years with a total of 2.328 hours.

The curriculum was designed according the Professional Training Standards related to the 14 occupations.
In the first year of professional training (Grade IX), the curriculum is the same, in terms of subjects and number of hours, for all 14 occupations. The training is done for general technical knowledge that is common to the 14 occupations. The total number of training hours is 456h (Specialized culture and practical training-306 h and Practical Training Internships- Local Development Curriculum- 150h).

In the second year of professional training (Grade X), the curriculum begins to differentiate, in terms of subjects and number of hours, for some occupations. The total number of training hours is 942h.
(Specialized culture and practical training- 672h and Practical Training Internships- Local Development Curriculum- 270h).

In the third year of professional training (Grade XI), the curriculum is differentiates, in terms of subjects and number of hours, for each occupation. The training is done for the specific technical knowledge for each occupation. The total number of training hours is 930 h. (Specialized culture and practical training- 630h and Practical Training Internships- Local Development Curriculum- 300h)

The content of “Specialized culture and practical training” is establishes at national level by the National Curriculum, while “ Local Development Curriculum” is designed by the school and the practice organization, with the approval of the County School Inspectorate.

To compare the curriculum, the main modules of the following occupations were chosen:

Training Content Related to Green Skills

In this part we scanned the selected lessons on construction sector in partner countries and found the content related to environment on these selected content and we also make some recommendations about that training content.

TURKEY

	Any content related to green skills	**Recommendation that need to be included**
Woodwork- Wooden framed buildings	No info about green skills.	Some information about the influence of using wood on environment. There may be some comparisons with the alternatives of wood and wood work. There are some information about the some chemicals used in woodwork (glues etc.) There may be some more information about the effects of these chemicals. The measures to reduce the effects of these chemicals to the nature shall be mentioned. -Some information about increasing the expected life of the woods will be helpful for environment. The constructor shall inform the customers about how to use.

Concrete testing	-One of the responsibilities of Truckmixer operator fitting in environmental regulations. -Information about types of concretes. They give information about which one of them has noise problems and bother the environment. -There are some principles about what will be done with the water with concrete that has been obtained after the cleaning of mixer such as not to put water resources and environment. -There are some principles about the water saving. -Some methods are taught about saving time and energy.	There shall be information about the chemicals used at the production of concretes. By this way they will not use unnecessary chemicals. -There shall be information about distortion in nature about concrete types and its ingredients. --There is information about use of waste materials to produce some types of concrete. This information can be linked to environment and can be detailed. By this way the waste materials will be recycled. -There are some regulations about the concrete factories but there is no training for the employees who work here. Some training can be included about the environment legislation.
Ferroconcrete Equipments	The module is mostly related with the columns and girders. No info about the environment.	Some information to increase the lifetime of buildings will be protective for environment.
Formwork (timber forms and tunnel formwork)	There are some information about which types of formwork materials are environmental friendly. (For example plywood is mentioned as environment friendly material. -Timber forms are mentioned as harmful to environment because of timber consumption.	There shall be better comparison between different tunnel systems from the aspect of environment.
Decoration methods. (Wood decoration, Protection of decorated Works, wall decoration)	Modules are mostly about making decoration and resurrection of old decorations at walls. No info about environment.	Some types of chemicals used. Some info about the effects of these chemicals on environment. Some advices to minimise the use of these chemicals.
Design with computer	No content related to environment	No advice
Models	There is an advice about not wasting the materials that can be used later on preparing models.	Some info about the materials used at model making from the aspect of environment. Not to use plastic materials etc.
Building Relief	No content related to environment	No advice

Frontispiece Systems and Montage		Comparison between different facing materials from the aspect of environment. -Regulations (legislation) about the external thermal insulation. -Importance of thermal insulation. Effects of materials used at thermal insulation to the environment in long term.
Roof Systems	There is a sub-module on insulation at roof. It gives information about insulation methods at roofs.	There may be some information about the effect of materials used at roof systems and roof insulation.
Steel Building Fabrications	-There is information about curtain walls are more environment friendly	Steel painting is included at the module and there can be information about use of minimum paint and other chemicals.
Cement Tests	There is information about which types of cements are better for environment.	More detailed information about types of cement and why they are better for environment. Information about the chemicals used at cements. Dissolving time in nature. Effect of cement industry on environment in general. Information about what shall be done with the waste cement.
Wall and floor covering	There is warning about cleaning before and after the task but this is mostly related to better covering not for environmental concerns.	Effects of materials used to the environment.

Drawing	There is only warning that the visual pollution. There is information about the accord of the drawing to the other factors of environment. There is information about building and planning regulation. This regulation says the building shall be planned according to the environment. There is a warning about planning and design of the building shall be made by taking into account the seasonal conditions (sun, wind etc…) The most used parts to be at South part of the building at cold regions.	There can be information about the importance of design and drawings on environment. Especially energy efficiency is directly related to drawings of the buildings including indoor and outdoor drawings. Taking into account heat abduction is so important. Drawing includes the outdoor spaces of the building. Design of the garden is included. Giving advice to create more green spaces will be a good element.
Indoor decoration	Thee is a checklist at some units and the checklist asks that." Did you take into account the environment during working" There are warnings as "respect to environment" but no details.	Effects of materials used to the environment.
Vocational Development	There is a sub-unit named as "Environmental protection" and this sub unit gives general information about environment. It includes water pollution, air pollution, pollution factors, environmental rights, recycling, energy saving, wastage, renewable energy, noise pollution etc.	Better links to the construction needed at environmental protection sub unit. Sub unit gives theoretical information about general environment. Work Ethics sub unit can give more information about the importance of environment and respect to environment.
Architectural Drawings	There is only warning that the visual pollution.	There can be information about the importance of design and drawings on environment. Especially energy efficiency is directly related to drawings of the buildings including indoor and outdoor drawings. Taking into account heat abduction is so important.

Stone (concrete) block and curb pavement	There is an information about protection of trees (length between curbs and tree trunk. Units warn the students about cleaning the mortar after their work. There is a sub-unit about green space design.	There is no information about the negative effect of concrete on nature. The chemicals and other materials used at concrete production and their effect on nature shall be mentioned.
PVC Joinery and coating	There is a warning about prevention of pollution during remove of old Windows. There is warning about protection of the environment. Wooden materials are recommended rather than PVC because of its less effect on nature. It is said that PVC is nature friendly.	Plastic materials is harmful for environment because they are dissolved at the nature very late. There shall be information about the types of materials and their effect on nature. It is said that PVC is nature friendly. This information shall be reviewed.
Design with Colours	The colours influence the heating. Light colours is better in warm climates, and dark colours is better at cold climates. This is important for energy efficiency.	
Decoration Art	There is a warning about respecting the environment.	Paints are chemicals. There can be information about harm of these chemicals to the nature. Some warnings about what shall be don by chemical wastes. Not to put them into the nature.
Paints at Buildings	There is a warning about thinners are harmful for nature so not use more than necessary. There is general warnings about respecting environment.	Comparison between chemicals(paints, varnish thinners etc…) from the aspect of their influence to the nature will contribute students to understand better. Information about how many years take the chemicals dissolve in nature and raising awareness of students about the effects of chemicals used at nature.

Ground Tests		Excavation can affect environment because it will change the ground and underground waters. There can be some warnings about the effect of excavation. Additionally there shall be more information about what can be done with the soil after the excavation. It can be used for gardening etc.

Vocational Development unit is mostly related to environmental issues.

SPAIN

	Any content related to green skills	**Recommendation that need to be included**
Building	It is studied the constuction characteristics according the environment, buildings have to be thought acording the placer where they will be built.	Identification of main materials in construction, it could be oriented to work with sustainable and eco-friendly materials. Environmental impact of buildings Energy efficiency in buildings, including the analysis of the energy demands of the building and verify the implementation of strategies of energy savings. Certifictions. Implementation of renewable energies in the buildings
Interpretation of construction drawings	Analysis of the location of a building	Integration of energy savings and renewable energy systems in the right place in a construction drawing Design waste management systems which are efficient and eco-friendly
Factories	Use of materials to build a factory, selection of sustainable ones. Compliance of environmental protection	Designed and implemented factories in an environmental protection way, including waste management
Coatings	This module contains a section called "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection regulations** and another related to environmental **protection: collection and selection of waste.**	Add a part about " Sustainable materials used in coatings"

Formworks	This module contains a section called "Organization of the work pit for the execution of formwork" in which there is an aspect related to factors of technological and organizational innovation. Innovative materials, techniques and equipment of recent implementation innovative systems in the context of **sustainable building** Also, this module contains a section called "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection regulations** and another related to **environmental protection: collection and selection of waste in formworks**	Selection of material with better effects towards the environment, due to its low energy consumption or its low level of pollution. Decrease the production of constuction and demolition wastes Insullation of the walls to affect the energy consumption
Reinforced concrete	This module contains a section called "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection regulations** and another related to **environmental protection: collection and selection of waste of reinforced concrete**	Dosage control taking into acount the field and sustainability Reduce pollution levels
Training and career guidance	-	Recommendation of doing a course of sustainable construction
Organization of construction works	Regulation of masonry works and check of quality eco-friendly seals of the products Also, it is added a unit about asignation of resources. Besides that, it is included the unit "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection** regulations in the organisation of construction works and another related to **environmental protection: collection and selection of waste** in that organisation	Objectives of the sustainable construction Selection of materials and natural resources Environmental Product Declaration (EPD). Life-cycle environmental impact of products

Urbanisation works	Cretion of network services inside an urbanisation The module contains a section called "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection regulations** and another related to **environmental protection: collection and selection of waste.**	Environmental impact of any urbanisation, how to reduce this impact. Certifications Water savings Control of the use of energy Eco-friendly parking system (bikes, points to recharge an electric vehicle)
Flooring, tiling and plating	How to isolate the place and improve the use of heating systems Also, this module contains a section called "Organization of the execution of the works of floorings, tiling and plating" in which there is an aspect related to factors of technological and organizational innovation. Materials, techniques and innovative equipment of recent implantation innovative systems in the context of the **sustainable building** Moreover, this module contains a section called "Completion of the work of finishing of floors, tiling and plating" in which there is a related aspect the consideration of the **environmental conditions of execution.** Finally, this module contains a section called "Prevention of occupational risks and environmental protection in the processes of execution of floors, tiling and plating" in which there is an aspect related to compliance with **environmental protection regulations** and **environmental protection: collection and selection of waste**.	Stimulation of using new eco-friendy materials
Covers	This module contains a section called "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection regulations** and another related to **environmental protection: collection and selection of waste.**	Measures to have the lowest possible transfer of energy. Improvements in the environmental behaviour of covers Use of ecological and multifunctional covers Reutilisation of material

Waterproofing and insulation	Thermal insulation This module contains a section called "Prevention of occupational risks and environmental protection" in which there is an aspect related to compliance with **environmental protection regulations** and another related to **environmental protection: collection and selection of waste.**	Improvement of Energy efficiency. Use of natural materials Efficient water management
Business and Entrepreneurship	-	Bussiness related with environment in construction
Practical Formation in work centers	-	Practical activities about sustainable construction

In Spain, in most modules, there is a part dedicated to environmental protection which is totally related with the development of green skills.

There is training content that is directly related to green skills. Formative *Cycle of Use and Conservation of the Natural Environment.* This professional works in large, medium and small companies, both public and private, dedicated to the work of afforestation, restoration and hydrological-forest management and forest harvesting as well as control and monitoring of the natural environment.

UK

For UK it was impossible to make a scan ob training content because of 2 reasons. First one is the huge number of training contents in UK. There are private companies that prepares content and all of them have different contents and second one is the administrational bodies in different regions of UK (England, Wales, Scotland, North Ireland) have different educational systems and training contents. So we decided to make a general scan for UK about the green skills content at construction education.

Green Skills Content in Vocational Education

Background

Green skills content in vocational education for construction has developed steadily but has been marred by a lack of collaboration between interested parties: the complex network of devolved government bodies for education and for skills, sector skills councils, businesses and awarding organisations.
In 2011, the UK government's report on 'Skills for a green economy' identified the skills required for sectors, including construction, to enable a transition to a green economy. For construction, the report identified additional skill requirements for:

- New building standards such as BREEAM (Building Research Establishment Environmental Assessment Method)
- New management systems
- Sustainable construction methods
- Environmental targets
- Ecosystem services design
- Carbon and water foot printing (UK Government, 2011)

The Learning and Skills Improvement Service (LSIS) was established to improve green skills provision across the sector, however the service was closed in the 2013.

The Green Deal

Creation and withdrawal of environmental policy has also stifled green skills in vocational education, with providers unsure of which skills will continue to be promoted. A primary example is the government's flagship 'Green Deal' policy. Announced in 2013, the Green Deal would allow consumers to pay for 45 types of energy efficient home improvements through the savings made to their lower energy bills. It was hoped that £400m in savings across 14m homes could've been created (Guardian, 2016).

Preparation for the Green Deal involved a detailed review of skills gaps (Pye Tait, 2012), from which a Green Deal Competency Framework (GSA, 2013) was created – linking the needed job roles to national occupational standards, qualifications and apprenticeships routes. The framework intended to guide skills in terms of future market demand.

However, Green Deal funding was pulled in 2015 after only 1% of households took up the scheme (Guardian, 2016). Prior to its inception, construction industry figures pointed to a lack of incentives to enter into the Deal (Nichols, 2011) and poor marketing (CPA, 2014).

Current Policy

Modern methods

The terminology around the construction industry is changing. Rather than 'building' and 'construction', the Farmer Review advocates for 'built environment', 'built asset creation' and 'construction integrated manufacturing'. Rather than 'green skills', the term '*modern* methods of construction' has taken precedent (Rhodes, 2019). Modern methods of construction implies sustainability as a given. Current government policy for construction looks to encourage the development and use of 'modern' materials and techniques, primarily off-site construction – a method which causes less waste.

Reducing Carbon

Current policy (IPA, 2016) follows the targets set in *Construction 2025* (HM Government, 2013), which pledges a 50% reduction in greenhouse gas emissions from the built environment by 2025. The Construction Leadership Council (CLC), created to implement *Construction 2025*, oversees the 'Green Construction Board', which has created a roadmap to guide the sector to achieve an 80% reduction in carbon emissions by 2050, a document with the potential to link green skills needs to carbon reduction schemes (GCB/ Arup, 2016). The CLC has also created the 'Sustainable Building Training Guide (http://cic.org.uk/admin/resources/clc-sustainable-building-training-guide-web-1.pdf) a guide for training providers and creators to ensure 'green' learning outcomes are being met across all levels of provision.

The Construction Industry Training Board continues to recognise the importance of sustainable construction, particularly in response to low carbon agendas (https://www.citb.co.uk/about-us/who-we-are/our-role-construction-industry/)

Digital

The Construction Industry Training Board (CITB) is pushing for the digitisation of construction, modernising the industry and allowing better use of digital modelling programmes and thus more sustainably planned work (CITB, 2018c). The government's 2018 'Grand Challenge' for 'Clean Growth' is currently funding a 'core innovation hub' to explore the potential of off-site construction and digital technologies (Innovate UK, 2018).

Apprenticeships
For apprenticeships, the government is looking to change standards to better reflect future construction needs rather than traditional building skills (Rhodes, 2018). Specialist colleges are in the process of construction, such as a facility for District Heating Networks training.
A coherent approach to green skills within vocational provision would require cooperative policy from many arms of government: education, skills and climate, as well as the guidance of sector skills councils, businesses, the demands of the current market, and awarding organisations.

Brexit
The UK's planned exit from the European Union ('Brexit') calls into question each UK government's relationship with previous EU directives concerning environmental issues and construction, such as nearly zero energy buildings (nZEBs). Scotland and Wales have pledged to follow the directive for all new buildings nZEBs by the end of 2020, even if the UK leaves the EU (Passive House+, 2017). The UK Green Building Council are sceptical that the England and Northern Ireland will implement the legal framework to follow the nZEB directive to be carried out after Brexit, citing previous withdrawals from schemes such as Zero Carbon Allowable Solutions (Passive House+, 2017). Future policy may need to reflect the needs and demands of different levels of construction directive implementation in each of the countries in the UK.

Levels of Green Skill Content
Green skills are factored into qualifications at varying degrees. At 564 unique courses for construction at the project target level (see Section 5), identifying green skills content in all qualifications is outside the remit of this project. Most courses will have some form of general sustainability content which could be considered a green skill, however our qualitative research for this project has informed us that such content is often not studied in detail (Landward Research, 2018). Qualifications can be wholly dedicated to a green skill, contain green skill units or options, or touch on green concerns.

Individual examples underscore the different levels in which green skills content may be included within a qualification.

Whole qualification level
Qualifications which train a learner in a green occupation skill, for example the EAL Level 3 Award In the Installation and Maintenance of Small Scale Solar Photovoltaic Systems.

Unit Level
Green skill forming the basis of a whole unit – either mandatory or optional. For example, the Level 3 NVQ Diploma in Domestic Plumbing and Heating offered by the City and Guilds AO includes the mandatory units in the installation commission and handover of solar thermal hot water systems (https://www.cityandguilds.com/qualifications-and-apprenticeships/building-services-industry/plumbing/6189-plumbing-and-domestic-heating#tab=documents)

Within Units
Green skills content within units which are not specifically concerning green skills. For example, the unit 'Understanding Construction Technology' within the NOCN Level 2 Diploma in Site Carpentry (Construction) instructs the learner on the principles of foundation, floor, wall, roof construction, but also 'sustainability within construction'(https://www.nocn.org.uk/what-we-do/qualifications/unit/r-504-7858-understanding-construction- technology/).

Construction Qualifications for Project Target Group

Defining the Target Group

Level

The target group for this project was set as 'Vocational Education Trainees at ISCED Level 3 – age 15-17. Fitting the UK system to this target is not straightforward.

Firstly, the UK definition of vocational education is not concrete, as discussed above. Secondly, 15-17 is not applicable age range for the UK. National examinations (including 'vocational' qualifications) are taken at ages 14-16 during compulsory education. Vocational education after 16 is often referred to as 'post-16', or 16-18.

Finally, ISCED is difficult to apply to the UK for a number of reasons. ISCED's 2011 release treated the UK as a whole, and categorises by institution or provision type rather than qualification difficulty. This means ISCED 3 refers to RQF/CQFW Levels 2 and 3 (SCQF Levels 5 and 6) (OECD, 2018). Due to the pan-European purpose of this report, we have followed the example of the European Qualification Framework (EQF). The framework aligns to ISCED (EQF 3 is ISCED 3). In the UK, EQF 3 equates to RQF/CQFW Level 2 and SCQF Level 5. These levels are mainly taken by post-16 learners, though are available to learners of all ages.

What is a 'Vocational Construction Qualification'?

For this project, we understand 'construction qualifications' in England, Northern Ireland and Wales to refer to currently available qualifications in the Sector Subject Area (SSA) 5: 'Construction, planning and the built environment' and sub-SSA 5.2: 'Building and construction' and in Scotland, to qualifications under Area of Competence 003: 'Constructing'.

The category of 'construction' may include roadbuilding, construction design, and electrical qualifications. These have been retained in order to provide a true overview of qualifications in 'construction' as defined by the UK.

Data Sources

Ofqual provides an open access register of all available qualifications for England and Northern Ireland(https://register.ofqual.gov.uk/), as does Qualifications Wales for Wales(https://www.qiw.wales/). All data taken from these databases were correct as of 5th December 2018. Scotland does not provide a downloadable database for all qualifications, therefore data for currently available construction qualifications were taken manually from the SCQF's database(https://scqf.org.uk/the-framework/search-database/) and the most recent qualification registration and award quarterly (SQA Accreditation, 2018).

Target Group Awarding Organisations
The number of Awarding Organisations (AOs) awarding construction courses are represented in the table below:

Country	Number of AOs
England	39
Wales	17
Northern Ireland	21
Scotland	7

Table: Number of AOs providing construction qualifications in the UK

A number of AOs operate in one or more of the countries of the UK. Overall, there are 57 unique AOs providing construction qualifications.
For the target group, EQF 3 – the number of AOs operating in each country is as follows.

Country	Number of AOs
England	29
Wales	15
Northern Ireland	10
Scotland	6

Table: Number of AOs providing construction qualifications in the UK at EQF 3

There are 40 unique AOs operating across the UK providing qualifications at EQF 3 in construction. The following table illustrates the 5 most popular AOs providing construction qualifications at all levels[18]:

AO (Eng)	No.	%	AO (NI)	No.	%	AO (Wales)	No.	%	AO (Sco)	No.	%
NOCN	216	20.24%	NOCN	174	24.75%	City & Guilds	123	31.22 %	SQA	178	81.65%
City & Guilds	198	18.56%	City & Guilds	171	24.32%	NOCN	107	27.16 %	QFI	18	8.26%
ProQual	104	9.75%	Pearson	81	11.52%	Pearson	80	20.30 %	City & Guilds	11	5.05%
Pearson	98	9.18%	GQA Qual	57	8.11%	EAL ltd	32	8.12%	MPQC	3	1.38%
GQA Qual	71	6.65%	ProQual	57	8.11%	BIFM	14	3.55%	CIH	3	1.38%
EAL ltd	52	4.87%	EAL ltd	46	6.54%	SQA	8	2.03%	PIABC ltd	3	1.38%

Abbreviations: NOCN (National Open College Network); GQA (Glass Qualification Authority) Qualifications; EAL (Excellence, Acheivement & Learning Limtied); BIFM (British Institute of Facilities Management); SQA (Scottish Qualifications Authority); QFI (Qualifications for Industry); MPQC (Mineral Products Qualifications Council); CIH (Chartered Institute for Housing); PIABC (Packaging Industry Awarding Body Company).

Table: AOs providing construction qualifications

The following table displays the 6 most popular information for providers of EQF 3 courses(Scotland has 6 AOs total for EQF 3 construction qualifiifcations.):

AO (Eng)	No.	%	AO (NI)	No.	%	AO (Wal)	No.	%	AO(Sco)	No.	%
NOCN	112	23.33%	NOCN	88	29.83%	NOCN	62	39.74%	SQA	79	81.44%
City & Guilds	81	16.88%	City & Guilds	62	21.02%	City & Guilds	40	25.64%	MPQC	3	3.09%
ProQual	68	14.17%	ProQual	38	12.88%	Pearson -	30	19.23%	CIH	3	3.09%
GQA Qual	44	9.17%	GQA Qual	34	11.53%	EAL ltd	8	5.13%	QFI	7	7.22%
Pearson	39	8.13%	Pearson	31	10.51%	SQA	6	3.85%	City & Guilds	2	2.06%
SQA	36	7.50%	EAL ltd	10	3.39%	GQA Qual	3	1.92%	PIABC Limited	3	3.09%

Table: AOs providing construction qualifications at EQF 3 Level

In terms of market share, in Scotland SQA are involved in the development of 82% of construction qualifications for this project's target level. In England, the 5 AOs develop 71% of these courses, higher than the overall average of 10 AOs developing all qualifications nationwide (DfE, 2017). In Northern Ireland, 5 AOs develop 86% of courses, while in Wales 3 AOs develop 85% of construction courses aimed at the target level.

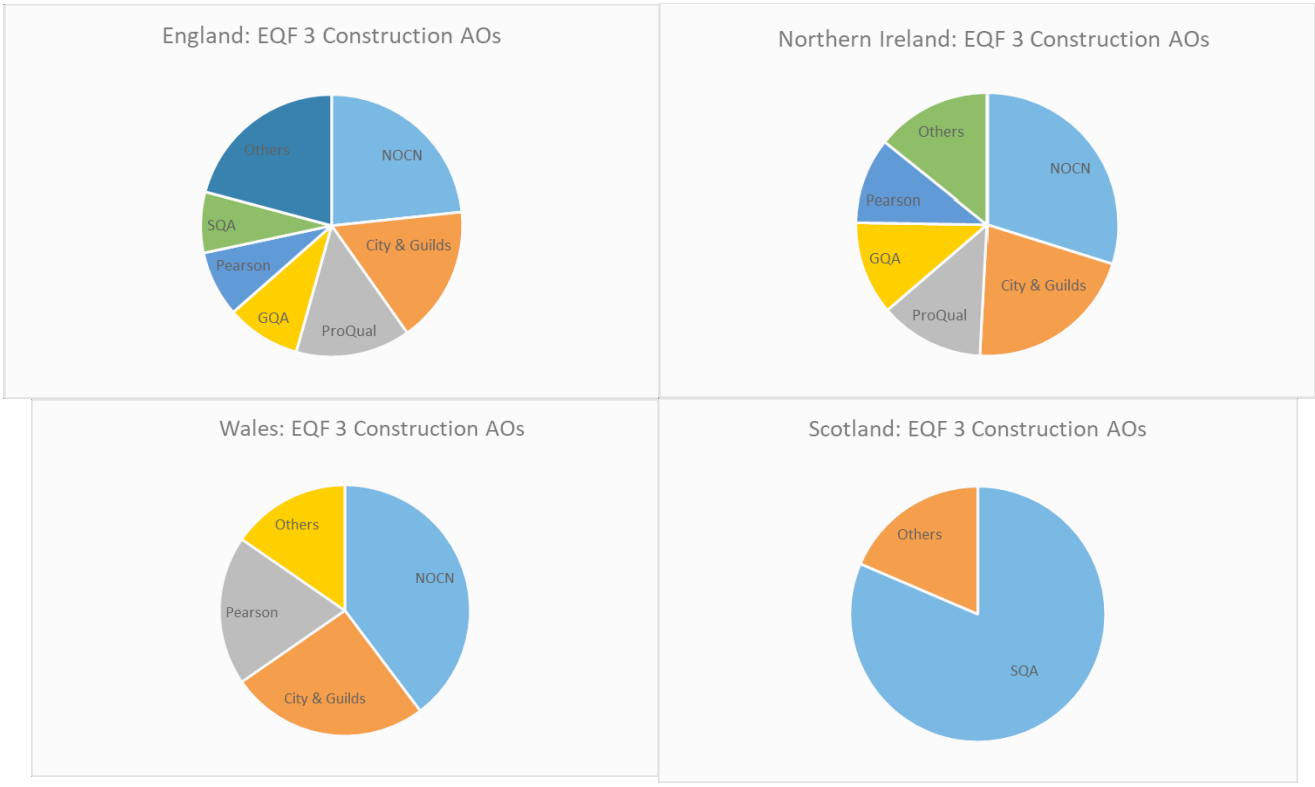


Figure: Construction AOs for this project's target level

Target Group Qualifications

From our dataset, a total of 15,725 qualifications are currently available across all subjects and levels across the UK. The following table specifies the number of construction qualifications available to

learners residing in each country of the UK, at all levels and at the target level for this project.

Country	Number of Construction Qualifications	Number of Construction Qualifications at EQF 3
England	1067	480
Northern Ireland	703	295
Wales	394	156
Scotland	218	97

Table: Number of Construction Qualifications in the UK

Some qualifications are available in one or more countries. Qualifications of the same name, level and provider were identified and removed, which gives a total of **1275** unique courses in construction at all levels, and **564** unique courses at this project's target level.

The following tables demonstrate the 10 most awarded construction qualifications for the period July – September 2018, at all levels and at the levels specific to this project for England, Wales and Scotland. Qualifications are either skills specific – such as plumbing or site carpentry, or provide an overview of construction in which the early learner can explore options – such as the Pearson BTEC Level 2 Certificate in Construction and Built Environment.

England: All

Awarding Organisation	Qualification	RQF Level	Certificates Awarded
British Safety Council	BSC Level 1 Award in Health and Safety in a Construction Environment	1	11070
City and Guilds	City & Guilds Level 3 Award in the Requirements for Electrical Installations BS 7671:2018	3	9360
GQA	GQA Level 1 Award In Construction Health and Safety	1	5770
City and Guilds	City & Guilds Level 2 Diploma in Electrical Installations (Buildings and Structures)	2	4630
Pearson	Pearson BTEC Level 1 Certificate in Construction	1	4435
City and Guilds	City & Guilds Level 2 Diploma In Plumbing Studies	2	3595
City and Guilds	City & Guilds Level 2 Award in Working in Medium Risk Confined Spaces (Top Man) (Entrant) in the Water Industry	2	3265
City and Guilds	City & Guilds Level 1 Diploma In Plumbing Studies	1	2795
WJEC-CBAC	WJEC Level 1/2 Vocational Award In Constructing the Built Environment	1/2	2575
City and Guilds	City & Guilds Level 1 Diploma In Carpentry and Joinery	1	2390

England: RQF 2

Awarding Organisation	Qualification	RQF Level	Certificates Awarded
City and Guilds	City & Guilds Level 2 Diploma in Electrical Installations (Buildings and Structures)	2	4630
City and Guilds	City & Guilds Level 2 Diploma In Plumbing Studies	2	3595
City and Guilds	City & Guilds Level 2 Award in Working in Medium Risk Confined Spaces (Top Man) (Entrant) in the Water Industry	2	3265
City and Guilds	City & Guilds Level 2 Diploma In Site Carpentry	2	2025
City and Guilds	City & Guilds Level 2 Diploma In Bricklaying	2	1140
City and Guilds	City & Guilds Level 2 NVQ Diploma in Plumbing and Heating	2	945
City and Guilds	City & Guilds Level 2 Award in Working in High Risk Confined Spaces in the Water Industry	2	750
City and Guilds	City & Guilds Level 2 Diploma In Painting and Decorating	2	640
City and Guilds	City & Guilds Level 2 NVQ Diploma in Wood Occupations (Construction)	2	615
NOCN	NOCN_Cskills Awards Level 2 NVQ Diploma in Trowel Occupations (Construction)	2	595

	Awarding Organisation	Qualification	CQFW Level	Certificates Awarded
	NOCN	NOCN_CskilAwardsLevel 2 Diplomain Site Carpentry ls (Constructio n)	2	1695
	NOCN	NOCN_Cskills Awards Level 2 Diploma in Bricklaying (Construction)	2	1080
	British Safety Council	BSC Level 1 Award in Health and Safety in a Construction Environment	1	780
	NOCN	NOCN_CskilAwardsLevel 3 Diplomain Site Carpentry ls (Constructio n)	3	545
	WJEC-CBAC	WJEC Level 1/2 Vocational Award In Constructing the Built Environment	1/2	505
	NOCN	NOCN_Cskills Awards Level 2 Diploma in Plastering (Construction)	2	355
	NOCN	NOCN_Cskills Awards Level 3 NVQ Diploma in Occupational Work Supervision (Construction)	3	350
	City and Guilds	City & Guilds Level 1 Diploma In Plumbing Studies	1	320
Wales: All	City and Guilds	City & Guilds Level 1 Diploma In Carpentry and Joinery	1	305
	City and Guilds	City & Guilds Level 2 Diploma In Site Carpentry	2	275

	Awarding Organisation	Qualification	CQFW Level	Certificates Awarded
Wales: CQFW 2	NOCN	NOCN_CskilAwardsLevel 2 Diplomain Site Carpentry ls (Constructio n)	2	1695
	NOCN	NOCN_Cskills Awards Level 2 Diploma in Bricklaying (Construction)	2	1080
	NOCN	NOCN_Cskills Awards Level 2 Diploma in Plastering (Construction)	2	355
	City and Guilds	City & Guilds Level 2 Diploma In Site Carpentry	2	275
	City and Guilds	City & Guilds Level 2 Diploma In Plumbing Studies	2	245
	Pearson	Pearson BTEC Level 2 Certificate in Construction and Built Environment (Specialist: Construction)	2	170
	NOCN	NOCN_Cskills Awards Level 2 NVQ Diploma in Construction Plant or Machinery Maintenance (Construction)	2	165
	NOCN	NOCN_Cskills Awards Level 2 Diploma in Construction Operations - General Construction (Construction)	2	150
	NOCN	NOCN_Cskills Awards Level 2 NVQ Diploma in Floorcovering Occupations (Construction)	2	145
	City and Guilds	City & Guilds Level 2 Diploma in Electrical Installations (Buildings and Structures)	2	135

Scotland: All

Awarding Organisation	Qualification	SCQF Level	Certificates Awarded
SQA	Wood Occupations (Construction): Carpentry and Joinery	6	283
SQA	SVQ in Plant Operations (Construction) at SCQF Level 5	5	234
SQA	SVQ in Occupational Work Supervision (Construction) at SCQF Level 6	6	154
SQA	Electrical Installation	6	140
SQA	SVQ in Construction and Civil Engineering Operations (Construction) at SCQF Level 5	5	132
SQA	SVQ in Construction Site Management (Construction): Building and Civil Engineering at SCQF Level 9	9	91
SQA	SVQ in Trowel Occupations (Construction) at SCQF Level 6	6	68
SQA	SVQ in Construction Site Supervision (Construction): Building and Civil Engineering at SCQF Level 7	6	63
SQA	SVQ in Plant Operations (Construction) at SCQF Level 5	5	48
SQA	SVQ in Construction Operations and Civil Engineering Services (Construction): Construction Operations at SCQF Level 5	5	38

Scotland: SCQF 5

Awarding Organisation	Qualification	SCQF Level	Certificates Awarded
SQA	SVQ in Plant Operations (Construction) at SCQF Level 5	5	234
SQA	SVQ in Construction and Civil Engineering Operations (Construction) at SCQF Level 5	5	132
SQA	SVQ in Plant Operations (Construction) at SCQF Level 5	5	48
SQA	SVQ in Construction Operations and Civil Engineering Services (Construction): Construction Operations at SCQF Level 5	5	38
SQA	SVQ in Accessing Operations and Rigging (Construction): Scaffolding at SCQF Level 5	5	31
SQA	SVQ in Controlling Lifting Operations - Slinger/Signaller (Construction) at SCQF Level 5	5	28
SQA	SVQ in Road Building and Maintenance (Construction) at SCQF Level 5	5	26
SQA	SVQ in Interior Systems (Construction): Dry Lining - Fixing at SCQF Level 5	5	21
SQA	Heating and Ventilating Ductwork Installation	5	20
SQA	SVQ in Accessing Operations and Rigging (Construction): Scaffolding at SCQF Level 5	5	17

Table The 10 most awarded qualifications in construction in the UK, July - September 2018

ITALY

	Any content related to green skills	Recommendation that need to be included
CONSTRUCTION TECHNOLOGY: (buildings, floors, roofs, covers, electrical systems, lighting systems, renewable energy, ISO standards, energy requirements, LCA, recyclability, eco-friendy materials)	- The lesson contains notions about the bio-costruction. In particular this section deals with some concepts of energy saving, economic advantages and living comfort. How and why it is necessary to choose the ecological cover for buildings and which are the eco-friendly materials that have to be used. Furthermore, it deals with the role of human inside the building and specifically what are the best ecological choices to create a microclimate suitable for the human in relation to the costruction. -In this section it is possile to find, basic concepts both on renewable and non-renewable energy sources. Which are the energy that respect natural resources, i.e.: solar energy, wind energy, geothermal energy, marine and hydropower energy and the energy produced by biomass and at the same time what are the non-renewable ones, i.e.: fossil fuels and nuclear energy sources. The section deals also with environmental protection concepts, in particular the national and European law. For example the UNI system norms for the constraction building. - In this part there are also notions on the difference between energy demand and energy saving. In particular, it is treated the buildings energy management with the significant improvement in terms of technical, economic and consumption aspects. There are described the energy optimization actions that concern all types of building and the benefits of the interventions that can be achieved both by private and public entities. It is possible, also to find the evaluation of production factors, energy consumption and the consequent energy diagnosis. - There is also a specific section that	- Increasing practical exercises on how to implement the environmental solutions described in the module. It would be necessary to increase the workshop sessions and to have a comparison with the reality by making inspections on-site. - Deeper analysis is needed todo the best choice for the use of materials in relation to the environment respect and all the technologies that can help to protect the environment in the construction field. - Deepening also on renewable energies, their use, certifications and incentives related to them.

	deals with the concepts on how measure environmental performance through some parameters defined by the ISO 14001: 2015 standard. - A part of the lesson is about the buildings, products and materials life cycle analysis. In this section, it is defined the Life cycle assessment (LCA) in its phases, from the pre-production to the final disposal in the construction site. In particular, the following steps are considered: inputs (materials, energy, water) and outputs (emissions in air and water and solid waste). The section includes the analysis of the "LCA" objectives. The definition of all interactions, between building and environment that allow to understand the directly or indirectly consequences caused on the environmet. This analysis is carried out in several phases. These are: acquisition of primary resources; transport to the plant; production; transport to the construction site; construction; use and maintenance; desmission of the building; disposal of rubble and building materials. - There are also notions on how carry out the environmental impact procedure both from a regulatory and administrative point of view. The main focus is to understand what may be the effects that buildings, materials and anthropic actions have on the environment. Here, both positive and negative changes are important. - The lesson also deals with recyclability concepts related to the product packaging and their labels (certifications). - this module deals also with how to know the sustainable materials. It is explained how to analyse the materials that respect the environment, their use and their performance. - Particular attention is given to: 1) the environmental impact of materials, in all phases of their life (energy balance); 2) raw materials, included in the process production, (even with the possibility of recycling); 3) the	

	absence of harmful emissions in domestic environments after the implementation; 4) the energy efficient production processes with reduced polluting emissions. - In addition in the module there are some notions on how to build in an intelligent way. This section analyzes the relation between buildings and territories. Territorial planning concepts are provided, i.e. all laws and actions that regulate the territory use and the organisation of the development of human activities carried out on it. This section deals with the best solutions for the location, orientation and shape of buildings. - In the lesson are present thermal, acoustic and visual comfort notions and the practices that must be undertaken to generate and evaluate both the thermo-hygrometric, acoustic and visual wellbeing of the human being that live inside the building. - A part of the lesson deals with how isolate the building to have a better heating system, or which lighting systems are necessary to make the room lit up with the right settings both day and night, avoiding the waste of energy. Which covers, such as tiles, plaster, paints etc.. are considered eco-friendly materials and which are the latest technological innovations in this field. - In this section particular attention is given to the building envelope. What are the most efficient techniques to save energy, for the winter heating systems and cooling systems in summer. In particular, the following topics are discussed: exterior cladding, ventilated façade, insulation of the cavity, internal cover, insulating plaster, external walls, monolithic structure, core insulation, internal insulation, frame structure. - The lesson also deals with concepts of integrated design having as objectives the environmental sustainability, energy efficiency (energy saving) and production of	

	energy from renewable sources. - In addition, there are concepts about comparative study of cooling heating systems used to have the least waste of energy and exploitation of natural resources. - The lesson aslo deals with concepts regarding the building envelope and materials choice (thermal conductivity, specific heat and heat capacity, density, vapor permeability coefficient, compressive strength and fire resistance) both in the new buildings and in the building renovation. - It is presents also a section about the importance of the green roof. A great importance, it is given on the plants species research that allow savings on the heating conditioning costs of the building and therefore it allows to not waste energy and also to reduce the noise pollution because the plant material became a barrier to the propagation of sound waves. Moreover, in this section it is explained how the presence of vegetation is able to convert carbon dioxide into oxygen through the phenomenon of photosynthesis.	
BUILDING WORKSHOP (on-site work, building in relation to environmental respect and use of eco-friendly materials):	- In this section, practical exercises are carried out after studying the various eco-sustainable materials on a theoretical level. - In addition, masonry and carpentry work for building constructions are carried out, following the indications and project specifications in compliance with sector-specific safety and environmental standards. For example practical exercises are carried out on how to perform the building cover. - A part of this subject is about the execution checks, in which some measurements on the construction work, conformity and adequacy of the building in relation to the design, quality, safety and environmental standards are carried out.	Deepening in the building design phase. Solutions that can be taken into consideration and that have the least environmental impact. Focus on the choices regarding the aspects of energy efficiency and not on the economic aspect. It would be necessary to integrate more practical exercises that include all the fields of construction building, in a sustainable way, such as: which energetic plants to use, what should be the right position of a building, the recycling in the waste water system, etc ... Integrate visits to companies that produce building materials to better understand the differences between them.

TEST MONITORING AND VERIFICATION (VIA):	- In this section there are practical and theoretical exercises on how are performed tests on-site, identifying the most suitable tools for measurements and checks to be carried out. In particular, it is explained how to perform the "VIA": the environmental impact assessment of a building or a plant. In this section there are concepts on how to perform the evaluation on the correspondence of the shape, dimensions, final appearance and environmental impact of the building in relation to the indications of the project.	Practical follow-up concerning the control and monitoring of a building and the various certifications that can be issued and achieved with particular attention to the "VIA" certification.
WORKSHOP ON PLANT (plant certification, main factors of environmental impact, efficiency and energy requirements, etc ...):	- Notions about how to certify the plants and machines setting up from the operation, quality, safety and respect for the environment points of views - To determine the main environmental impact factors related to the generation of energy and to identify the tools necessary for their study. It is necessary to identify the technological solutions aimed at reducing the environmental impact of energy production and increasing overall environmental sustainability. - Calculation of the energy conversion plants characteristics: - yields, energy requirements, specific work, water requirements, etc. Calculation or estimation of emissions. - CO2, HC, NOx.	Practical insight on how to identify if the materials, machines and plants are sustainable and how to certify them.
SAFETY (risks of environmental impact, processes, materials and buildings, worker's safety in relation to the environment, environmental protection in the design and construction of a	-This section deals with the analysis, the studies and the drafting of the Environmental Impact Assessment document, in which the environmental aspects of activities, processes, materials and buildings are examined and assessed by defining the prevention and protection measures. - In the lesson there are concepts about how to draw up a Safety and Coordination Planand it describes how to manage the operational phases that	More information regarding environmental regulations and practical examples of environmental protection and sustainability. Practical examples of how to draw up a safety and control plan and how to adopt environmental protection / sustainability behavior.

building):	will be carried out on-site, identifying all the critical phases of the construction process. The objective is to prescribe all actions aimed at preventing or reducing risks to the safety and health of workers with particular reference to risks deriving from interfering and environmental impact processes. Particular attention, it is given to the environmental level. The quality and the control of the buildings and products used and the consequent disposal of waste are taken into consideration, before, during and after the construction phase. For example, it considers all the risks deriving from the unhealthiness of the air, from the materials extracted and disposed of, the risks deriving from noise, etc ... - This section analyses the environmental legislation and the pollution factors of a building. In particular, the attention is paid to the energy performance of a building taking into consideration thermal and ventilation performance. The energy standards and the European environmental certification of a building are also studied and analyzed. - This section, also explains and analyses how to adopt environmental protection / sustainability behavior. In particular, the attention is focused on the design paradigms and the technical energy saving solutions of a building. Specifically, it is studied the technical solutions to define the shape of the building, its compactness, porosity and slenderness; the distribution of the environments inside the building and the characteristics of the external envelope.	
SCIENCE, (temperature inside and outside a building, active and passive systems, earth system, ecosystem, exploitation of natural resources,	- In this section, itis analysed the general concept of temperature and temperature inside the building. Specifically, they are analyzed active and passive environmental control systems, paying particular attention to the heat, the heat output calculation, the specific heat of a material, the thermal capacity or mass, the thermal	To stimulate students in such a way that they have greater awareness of climate change. Practical exercises to implement, evaluate and verify all the principles studied in the course. Practical examples on waste management with the implemation of adequate awareness of the issue.

climate, climate change):	resistance, the transmittance and the heat flow. - In this section there are the notions about the atmosphere, the climate and the consequences of climatic changes, the drinking water availability, the desertification, and the large migrations. - Particular attention, it is paid to the study of ecology, specifically on how to protect the environment through the sustainable use of natural resources and proper waste management. - In addition to students, it is offered a general overview of the current status and the planet modification in reference to the exploitation of the Earth's resources, and the role of organisms, which are fundamental both for the balance of natural environments and for the rebalancing from pollution of the degraded one, that allows to protect the health of the territory and the population. - In this section, it is analyzed the concept of ecosystem. knowing how to recognize and how to define the main aspects of an ecosystem and to be aware of the role that technological processes play in modifying the environment around us. - In this subject there are also provided some tools to conduct and to interpret a natural phenomenon or an artificial system from the energy point of view, distinguishing the various transformations of energy in relation to the laws that govern them. This analysis is carried out to develop students' awareness of the possible impacts on the natural environment of the ways of production and the energy use in everyday life.	

In Italy, in most modules, there is a part dedicated to environmental protection which is totally related with the development of green skills, but in all subject the topics must be deepened and applied in on-site, with experiments, laboratories and workshops to better understand the effects of human action on the territory and the environmental impact that this generates.

ROMANIA

Occupation: Construction of monolithic structures

The module	The learning content refers to Green skills	Recommendations
Components for making buildings, installations and public works	Is studying the role, definition and classification of building elements, installations, public works; component elements and realization stages of the construction, installation and public works. The specific environmental protection rules norms are generally mentioned.	-Information about the environmental impact of the construction sector (consumes 50% of natural resources extracts per year in Europe; consumes 40% of energy and16% of water; issues 36% of CO2 emissions; generates 40-50% of waste production of solid waste in Europe) -Information about sustainable building materials: renewable, recyclable, light disassembly, standardized dimensions, low energy enriched, non-toxic materials -Information about green buildings, features and benefits

Equipment and machinery for processing materials	Is studying the technological features of building materials; types of machinery and equipment; procedures for preparing, sorting and checking materials, checking tools and machines; techniques for the processing of building materials; maintenance procedures for tools and machinery; Specific techniques for collecting, transporting and storing waste resulting from activities such as: construction of buildings and infrastructure objectives, construction and maintenance of roads, total or partial demolition of buildings or infrastructure objectives including: -materials resulting from building and demolition of buildings-cement, bricks, tiles, ceramics, rocks, plaster, plastic, metal, cast iron, wood, glass, carpentry, cables, varnish/painting/insulating solutions, building materials with expired validity; -materials resulting from the construction and maintenance of roads - pitch, sand, gravel, bitumen, building stone, tarry substances, substances with bituminous or hydraulic	The maintenance procedures for tools, and machinery must take account of environmental protection Selection of materials based on their environmental performance, service life and health consequences The degree of sustainability of the materials is given by the extent to which it damages the planet throughout the process of production, commissioning, use, and final storage.

	binders; -materials excavated during construction, decommissioning, dredging, decontamination, etc. - soil, gravel, clays, sand, rocks, vegetal remains. With specific means available at the workplace, to specially arranged places, respecting the environmental issues concerning: dust dispersion in the environment, storage or disposal of building materials in non-permissive places, dispersion of dirt (mud, material debris and various wastes etc.) outside the site, the abusive destruction of vegetation in the area;	
Drawing for construction and public works and installations	-no references to Green skills	
Measurements in construction and public works	Is studying the measuring units, measuring methods, measuring instruments, measuring devices; the tolerance of measuring instruments; measurement errors; sampling of objects to be measured; measurements and calculations for the quoting and execution of reveals; quality requirements for works; drawing sketches; minutes of qualitative and quantitative reception of measurements; technological data sheets for building elements. It is mentioned that environmental protection is one of the elements of the technological sheet.	-Information about the environmental impact of the construction sector related to the importance of reducing the material consumption
Measurements in installations	- no references to Green skills	
Lining out of construction works	Is studying the main elements of the formwork plans; symbols and representations used in lining plans; TDVs(tools, devices, verifiers) for lining works; execution of lining works; technical execution procedures; checks made to lining out works (according to the project's implementation). The specific environmental protection rules norms for lining out of construction works are generally mentioned.	The importance of accurate measurements to protect of the sites with high ecology (agricultural land, green spaces) and to reduce the wastage of materials
Formwork operations	Is studying the types of formwork; the meaning of conventional representations and notations used; loads acting on formworks; procedures for selecting, checking and preparing materials and TDVs(tools, devices, verifiers) for formwork; stages of lining of the	-Using recycled materials for formwork panels; -Selection of construction and demolition waste (including excavated earth from contaminated sites)

	formwork; mounting, dismantling of the shuttering panels for concrete and reinforced concrete; quality conditions to be respected. Storage of formwork panels and recyclable materials in order to quickly identify them for subsequent use, by categories, in safe conditions and with respect to occupational safety standards Recovery of recyclable materials and the release of the workplace in order to execute cleaning. Application environmental protection to the execution of the formwork operations, mentioned generally.	-Selection of packaging waste in construction field -Information about circular economy: waste and resource use are minimized, the value of products and materials is kept as long as possible, and resources are re-used and value added.
Reinforcement works	Is studying the features of reinforcement types; procedures for forming armatures; the significance of conventional and notations, the way of calculating the length of the reinforcement bars; procedures for selecting, verifying and preparing TDVs(tools, devices, verifiers); Operations on working phases for making reinforcements for reinforced concrete elements; mounting reinforcements for reinforced concrete elements; quality conditions to be respected. Recovery of recyclable materials and the release of the workplace in order to execute cleaning Application of environmental protection to the execution of the reinforcement operations, mentioned generally.	
Concreting works	Is studying the concrete types for building elements; concrete preparation, casting, compacting and transport procedures; procedures for selecting, verifying and preparing TDVs(tools, devices, verifiers); conditions to be met before casting the concrete; operations on work phases in order to carry out concrete works for the building elements, based on the execution project; quality conditions to be respected. General and specific rules on environmental protection related to concreting works. Application of environmental protection norms related to the preparation, casting, compacting and transport of concrete.	The use of re-used concrete aggregates in construction reduces the ecological impact; The environmental impact of recycled concrete aggregates is lower than that of traditional concrete materials. Ø reduced use of natural resources; Ø reduction of transport to / from extraction sites; Ø reduced consumption of energy; Ø reduction of the volume of demolition waste sent to the landfill.

Occupation: Mason-stonemason-plasterer

The module	The learning content refers to Green skills	Recomandations
Execution of masonry works	Is studying the types of masonry; masonry materials; TDVs(tools, devices, verifiers) for masonry execution; brick masonry execution technology; environmental protection norms, general and specific to masonry work; quality conditions for masonry works; reusable materials: job recovery and rehabilitation actions to clean the workplace	-Information about the use of insulating construction materials, natural local materials; -Correct calculation of materials required for masonry works to reduce waste
Execution of thermal rehabilitation works for residential buildings	Is studying the types of thermal rehabilitation works; preparing the building for thermal rehabilitation; calculation of surfaces of thermal rehabilitation elements; types of materials used; procedures for selecting, preparation and verification the materials and TDVs(tools, devices, verifiers); thermal rehabilitation operations on residential buildings; quality conditions. The specific environmental protection rules norms are generally mentioned.	-Use of environmentally friendly materials for thermal rehabilitation -Correct calculation of materials required for masonry works to reduce waste

Occupation: Carpenter – parquet layer

The module	The learning content refers to Green skills	Recomandations
Wooden floors	Is studying the types of wooden floors; protection and conservation measures; procedures for the execution, verification and remediation of tracing; procedures for selecting, preparing and checking the materials necessary for the execution of the wooden floor; procedures for selecting, verifying and preparing the TDVs(tools, devices, verifiers) for the execution of the wooden floor; operations on working phases in order to execute wood flooring; reusable materials: recovery, job placement; quality conditions; General and specific rules on environmental protection related to wooden floors.	-Separate collection of wood waste for re-use -Correct calculation of wood required to reduce waste -Use of recycle materials for wooden floors
Execution of the roof skeleton from wood	Is studying the types of wood material used for roof execution; components of the roof skeleton; conventional representations; procedures for selecting, verifying and preparing the TDVs(tools, devices, verifiers) for skeleton execution; environmental protection when using TDVs(tools, devices, verifiers); operations on working phases in order to execute the roof skeleton quality conditions; minimize material losses; general environmental protection rules for the	-Separate collection of wood waste for re-use -Correct calculation of wood required to reduce waste

	execution of the wooden roof skeleton; quality conditions at execution	
wood carpentry	Is studying the types of wood carpentry; symbols and conventional representations; selecting, verifying and preparing SDVs; operation on working phases for mounting and adjustment of wood carpentry; quality conditions. General and specific rules on environmental protection related to wood carpentry.	-Separate collection of wood waste for re-use -Correct calculation of correct calculation of door and window gaps to reduce waste

Occupation: Plate mosaic-fitter

The module	The learning content refers to Green skills	Recomandations
Preparation of materials for the realization of plating and flooring works	Is studying the types of materials for floors, plating; influence of atmospheric agents and temperature; stages for the preparation of materials for plating and flooring; the need for the materials used; quality conditions; conditions for receiving, transporting, handling and storing materials for plating and flooring. Environmental protection standards specific to the preparation of materials for plating and flooring: during transport, handling, storage, storage.	-Correct calculation of required materials for floors, plating to reduce waste
Making plating inside and outside of buildings	Is studying the carrying out wet plating works; performing dry plating works Environmental protection standards specific to wet and dry plating works inside and outside of buildings	-Emphasis on the importance of meeting the conditions for performing the wet and dry plating, in order to reduce the consumption of materials and waste
Execution of flooring in buildings	Is studying the types of flooring; types of support layer support; realization of molded mosaic floors and tiles; realization of parquet floors; realization of linoleum flooring, and carpet. Environmental protection rules specific to different types of flooring	-Separate collection of wood waste for re-use -Correct calculation of wood required to reduce waste

Occupation: Insulator

The module	The learning content refers to Green skills	Recomandations
Preparation of materials for building insulation work	Is studying the types of materials specific to waterproofing, thermal and acoustic and anticorrosive insulation; technical specifications; conditions of reception, transportation, handling, storage; preparation of waterproofing mixtures; environmental protection rules specific to preparing of waterproofing mixtures; the way of cutting materials; specific environmental protection standards for cutting materials delivered in the	-Emphasis on the importance of insulation works, in order to build sustainable constructions and to reduce the subsequent consumption of water, energy, heat -Use of natural insulating materials -Correct calculation of insulating materials required to reduce waste

	form of sheets, boards, nets, membranes, profiles and strips for waterproofing, thermal and sound insulation.	
Making waterproof, anticorrosive and protective insulation to buildings	Is studying the preparation of support surfaces; waterproofing on roofs and terraces; waterproofing for underground constructions (foundations, basements and vats); proofing of waterproofing; technological processes for the rehabilitation of waterproofing insulation; environmental protection rules specific to the realization of waterproofing insulation; preparation of surfaces for carrying out works of anticorrosive and protective insulation; the technology process for the realization of the anticorrosive and protective insulation works; environmental protection rules specific to the realization of the anticorrosive and protective insulation works.	-Emphasis on the importance of meeting the conditions for making waterproof, anticorrosive and protective insulation to buildings, in order to reduce the consumption of materials and waste
Realization of thermal and sound insulation in buildings	Is studying the preparation of substrates for thermal insulation; thermal insulation fastening systems; thermal insulation construction technology; environmental protection rules for the thermal insulation; protective solutions and procedures for the application of thermal insulation protections; preparing surfaces for sound insulation; procedures for the execution of support structures for sound insulation; sound insulation technology for floor, wall and installation; environmental protection rules for the sound insulation; the technology of acoustic design.	-Use of insulating construction materials

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