MICROGUIDE

UNIVERSITY OF BELGRADE

QUALIFICATIONS AGENCY REPUBLIC OF SERBIA

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University of Applied Sciences

ACEEU
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Project acronym:	MICROGUIDE
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Abstract	The analysis of micro-credential (MCs) implementation practice is necessary to show the impact of Mc´s and to identify the qualities and weaknesses in implementation of micro-credential in higher education in project partners countries, and in that sense to give examples of good practice as a guide for future improvements.

Title of document:	Analysis of the micro-credential implementation practice in Project Partner countries, making a list of examples of good practice
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Content

1 Objectives

Micro-credentials (MCs), which are also often referred to as the new currency of lifelong learning[1], have been a key topic of discussion in field of higher education (HE) in Europe in recent years. They certify the learning outcomes of short-term learning experiences, for example a short course or training[2].

On 16 June 2022, the Council of the European Union adopted a Recommendation on a European approach to MCs for lifelong learning and employability[3]. Experts believe that effective environments and tools for lifelong learning help to equip people with the knowledge, skills and competencies needed for a successful personal and professional life.

MCs offer a way to gain insight and expertise quickly in an ever-changing landscape and stand out above the competition. In fact, a recent study from North-eastern University found that 61% of HR leaders believe that credentials earned online are of generally equal quality to those completed in-person[4].

There are a number of factors behind the great interest and demand in MCs:

The cost of HE

Traditional education in Europe, the US, Canada, and Australia is renowned for its high tuitions. MCs, on the other hand, offer a cheaper alternative for people in search of academic and professional mobility.

Skill gaps

Many employers, particularly large corporations like Google and Microsoft, are aware that a degree position does not necessarily indicate competence, and therefore offer a wide range of credentials which largely solve the problem of knowledge and competence gaps.

The rapid pace of technological development

The rapid development of technology leads to the emergence of new fields of knowledge (such as data science and data mining), software or programming languages. Incorporating new knowledge into existing Bachelor's and Master's programmes is problematic and inefficient, while MCs offer certification in the latest fields of IT, engineering, etc.

Pandemic

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[1] https://www.hrk.de/resolutions-publications/resolutions/beschluss/detail/micro-degrees-and-badges-as-formats-of-supplementary-digital-credentials/

[2] Eupopean Comission, https://education.ec.europa.eu/education-levels/higher-education/micro-credentials#:~:text=Micro%2Dcredentials%20certify%20the%20learning,their%20personal%20and%20professional%20development.

[3] https://data.consilium.europa.eu/doc/document/ST-9237-2022-INIT/en/pdf

[4] https://www.taotesting.com/blog/5-reasons-why-micro-credentials-matter/

The pandemic has significantly changed lifestyles, including the format of education. MCs, which were available in both online and offline formats even before the pandemic, have easily adapted to the new environment.

MCs in the context of digitisation of HE

Since the Ministerial Conference held in Paris in 2018, digitisation in field of HE has been given an important role, and its role in the context of lifelong learning has been emphasised repeatedly[5]. This (as well as increasing cost of HE, rapid labour market changes, demand for more flexible learning opportunities) explains proliferation of learning programmes and credentials positioned as "alternatives" to traditional formal education programmes. Alternative credentials include academic certificates, industry certifications and digital badges.

Such educational units as Massive Online Courses (MOOC) and Micro-Degrees, which can be defined as hyper-focused online courses, designed to teach a practical skill set in a short amount of time. Along with them, rewards and certificates, namely MCs, Badges, etc. as evidence of the completion of those courses were developed.

MOOC	MICRO-DEGREES
➢ Online courses that are designed for a large number of participants. ➢ Mostly, does not reach the level of quality required to replace or be considered as substitute for actual HE. ➢ Expands the existing forms of teaching. Often offered by private providers.	➢ Hyper-focused and short-term degrees, designed to be immediately applicable to a very specific profession. ➢ The fundamental idea is that topics covered by study programmes can be broken down into micro-components and reassembled in order to achieve maximum modularisation and to group content as best possible
BADGES	MICRO-CREDENTIALS
➢ Symbolic rewards given to learners for (learning) successes achieved, can be a type of MCs . ➢ Can be a targets or positive mechanism that motivates learners to complete module or buy costly offers. ➢ May not have any assessment or formal processes to ensure academic quality and assessment rigor.	➢ Certificates that are awarded for the successful completion of an educational unit, which is shorter than a course of study and can be conducted flexibly at any time. ➢ Usually follow a formally approved or accepted set of standards. ➢ There is a demand for them to be both recognised and awarded by universities.

The analysis of MCs implementation practice in Project partner countries is the first MICROGUIDE research activity, as it can be used as part of the Logical Framework matrix of the Project to draw the preliminary conclusions necessary for each of the following Project activities. The target group of this analysis is HE in Project partner countries as a whole. The impact of this activity is to identify the

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[5] https://www.fzs.de/2021/09/22/statement-lebenslanges-lernen-massive-online-courses-und-micro-credentials/

qualities and weaknesses in implementation of MCs in Project partner countries, and in that sense to give examples of good practice as a guide for future improvements. The following analysis includes a short overview of the school system in Project partner countries with focus on the tertiary level of education, quality assurance (QA) and accreditation responsible in this field as well as status quo of MCs policy and tendencies in development.

Methodological steps in research activity are:

Step 1. To identify information sources regarding topic of the research;

Step 2. To collect relevant information;

Step 3. To analyse collected information;

Step 4. To discuss results obtained by analysis;

Step 5. To produce analysis report;

Step 6. To create a list of examples of good practice in Project partner countries. If examples do not exist, the reasons for it will be defined, as well as recommendations on measures that need to be implemented to overcome it.

2 School system in Serbia

The education system in the Republic of Serbia includes preschool education and upbringing, primary and secondary education, adult education and HE, and presents an existing framework in which qualifications are obtained through formal and non-formal education or informal learning (Figure 1).

Figure 1. Education System in the Republic of Serbia with qualifications levels
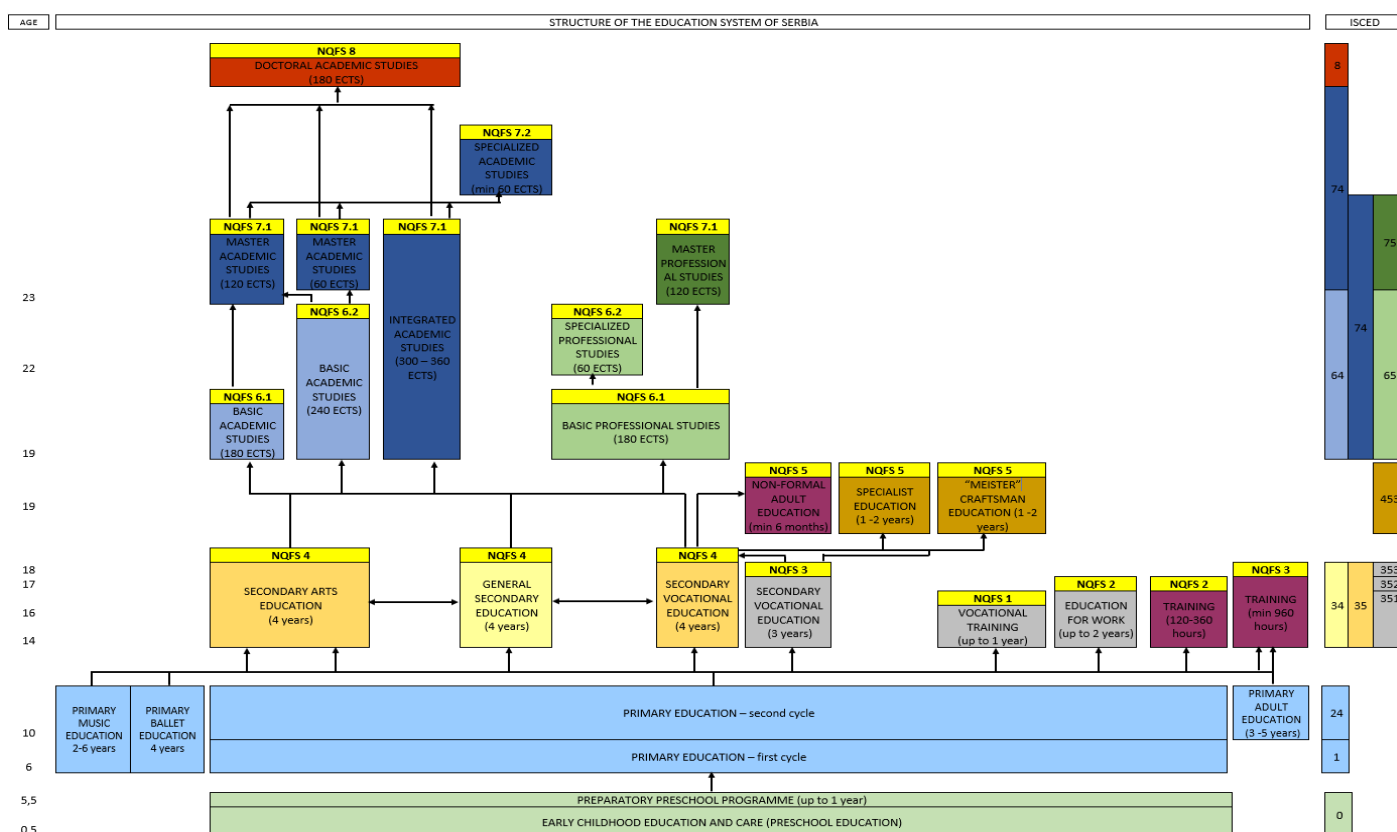
2.1 Legal and Institutional framework of the HE system in the Republic of Serbia

The HE system of the Republic of Serbia is regulated by the following laws:

– The Law on HE;

– The Law on the Dual Model of Studies in HE;

– The Law on Regulated Professions and the Recognition of Professional Qualifications;

– The Law on the National Qualifications Framework (NQFS) of the Republic of Serbia.

Institutional framework of the HE system in the Republic of Serbia consists of the following bodies:

– Ministry of Education (MoE)

– National Council for HE (NCHE)

– National Entity for Accreditation and QA in HE (NEAQA)

– Commission for Accreditation and QA (CAQA)

– Conference of Universities

- Conference of Academies of Applied Studies in Serbia
- Students Conferences

2.2 HE Structure in the Republic of Serbia

Preparations for the HE reform in Serbia started in the year 2000. Since 2003 the Republic of Serbia is a full member of the Bologna Process and the Qualification Framework of European Higher Education Area (QF-EHEA) to which initially had joined as the State Union of Serbia and Montenegro[6]. With the adoption of the Law on HE in 2005 the formal conditions for HE reform were fulfilled, whose basic novelties were:

- Three-cycle study system;
- Credit accumulation and transfer system, ECTS;
- Mobility of students and teachers;
- Diploma Supplement;
- NCHE establishment;
- Commission for Accreditation and QA.

2.2.1 HE institutions (HEIs)

HE is carried out by following HEIs:

1. University;
2. Faculty, or Art academy within a University;
3. Academy of applied studies;
4. College;
5. College of applied studies.

A university, academy of applied studies, college and college of applied studies are independent HEIs. Depending on their founder, they can be state or private. University is an independent HEI which, in the implementation of its activities, integrates educational, scientific and research, professional, artistic and innovation activities. University may realise all types and study cycles. In order for a HEI to qualify for the status of a university, it must implement academic study programmes at all study levels, within at least three educational-scientific, i.e., educational-artistic fields and three scientific, artistic or professional areas. Exceptionally, a university may be established in the field of arts if it has all three study cycles in at least three areas of arts and art sciences. College is an independent HEI implementing bachelor (undergraduate) academic studies, master academic studies and specialised academic studies in one or more scientific, artistic or professional areas. Academy of applied studies is an independent HEI which, in the performing its activities, integrates educational, applied research, professional and

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[6] EHEA National Report - http://www.ehea.info/pid34250-cid101594/serbia.html

artistic activities as components of a single HE process. An academy of applied studies may realise bachelor applied studies, master applied studies and specialised applied studies. A HEI has the status of an academy of applied studies if it realises at least five accredited applied study programmes in at least two educational-scientific, or educational-artistic fields. College of applied studies is an independent HEI that realises bachelor applied studies, specialised applied studies and master applied studies in one or more scientific, artistic or professional area.

Universities carry out their educational, scientific and artistic activity through the faculties and art academies which are their part, and which do not have the status of an independent HE institution. In order for a HEI to meet the requirements for the status of a faculty or art academy, it must implement academic study programmes in one or more areas. In addition, faculties and art academies may implement applied study programmes. In order to advance scientific research or artistic research activities, university may also have scientific or artistic institutes within it, with which it can realise a part of the accredited study programmes of master academic studies and doctoral studies. For innovations and providing infrastructural support to innovation development and commercialization of scientific and artistic research results, university may have innovation centres, exceptional value centres, technology transfer centres, business and technological incubators, science and technology parks and other organizations in accordance with the law governing scientific research.

In the 2017/18 school year in the Republic of Serbia at all levels of study 256 172 students was enrolled. A total of 214 681 students were enrolled in state and private universities, of which 86.8% were enrolled in state and 13.2% in private faculties. There were 41 491 students enrolled in state and private colleges, of which 89.8% in state colleges and 10.2% in private ones. According to the mode of financing, 41.0% of students were state-financed and 59.0% of students had the status of a self-financing student[7].

2.2.2 Studies

According to the type, studies are divided into academic and applied:

- academic studies train students to develop and apply scientific, artistic and professional achievements;
- applied studies to apply and develop professional knowledge and skills required in order to enter the labour market.

By cycle, studies are divided in first, second and third cycle of studies. First cycle studies:

1. bachelor academic studies of three and four-year duration (180-240 ECTS);
2. bachelor applied studies of three-year duration (180 ECTS);

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[7] Statistical Office of the Republic of Serbia - http://www.stat.gov.rs/vesti/20180629-upisani-studenti-u-%C5%A1kolskoj-201718-godini/?s=1104

3. specialised applied studies of one-year duration (60 ECTS) after applied or academic studies of three-year duration (180 ECTS).

Second cycle studies:

1. integrated academic studies of five and six-year duration (300-360 ECTS);

2. master academic studies of one-year duration (60 ECTS) after bachelor academic studies of four-year duration (240 ECTS), or master academic studies of two-year duration (120 ECTS) after bachelor academic studies of three-year duration (180 ECTS);

3. master applied studies of two-year duration (120 ECTS) after bachelor academic or bachelor applied studies of three-year duration (180 ECTS);

4. specialised academic studies of one-year duration (60 ECTS) after master academic studies.

Third cycle studies are doctoral academic studies of three-year duration (180 ECTS) after integrated academic studies of at least five-year duration (300 ECTS) or master academic studies.

In addition to academic and applied studies, HEI may also organize a Short study programme of the scope from 30 to 60 ECTS credits. These programs are organized for the professional training of persons with at least secondary education and for the purpose of entering the labour market. Short study programmes have a clearly defined structure, purpose and learning outcomes and upon completion, a certificate with obtained competencies is issued. Short study programmes defined in this way are different from Short-cycle study programmes in the QF-EHEA since there is no level or descriptor for them in the National Qualifications Framework. Also, these programs are not subject to accreditation as defined for the first, second and third cycle study programmes, but on the HEI decision.

2.2.3 Study programmes

Studies are implemented through accredited study programmes with defined learning outcomes. By successfully completing a study programme, students acquire the knowledge, skills, abilities and attitudes necessary to obtain an appropriate qualification. Study programmes are implemented within one or more educational-scientific or educational-artistic fields, which contain relevant scientific, artistic and professional areas. Educational fields and areas are determined by the NCHE, based on the proposal of the Conference of Universities and the Conference of Academies of Applied Studies in Serbia[8].

The scope of a study programme is expressed through ECTS credits, which define the workload of students while mastering the foreseen learning outcomes. Each subject in a study programme is expressed through the appropriate number of ECTS credits and the scope of the entire programme by their sum. A sum of 60 ECTS credits corresponds to the average total student engagement over a 40-hour workweek during one school year. Total student engagement consists of active teaching activities

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[8] The Rulebook on Scientific, Artistic, and Professional Areas within Educational-Scientific or Educational-Artistic Fields (RS Official Gazette, No 114/17) - http://nsvo.gov.rs/wp- content/uploads/2017/11/Pravilnik-o-naucnim-oblastima-u-okviru-naucnih-polja.pdf

(lectures, exercises, practicums, seminars, etc.), individual work, colloquiums, exams, final thesis, student internships, voluntary work in the local community and other forms of engagement. The total number of active teaching hours cannot be less than 600 hours during one school year. The total workload of 30 hours of an averagely successful student equal to 1 ECTS. For the purposes of accreditation, a study programme defines: the name and study programme objectives; the type of study; the outcomes of the learning process in accordance with the law that establishes the national qualifications framework; professional, academic, scientific or artistic title (i.e. qualification); enrolment requirements for a study programme; the list of mandatory and elective study areas or subjects, with indicative content; the manner of implementation of a studies and the time required to carry out particular forms of a studies; the credit value of each subject reported in accordance with the European Credit Transfer System (ECTS); the credit value of the final thesis in bachelor, specialised and master studies and doctoral dissertation or doctoral artistic project, expressed in ECTS credits; preconditions for enrolment related to individual subjects or group of subjects; the way of choosing a subjects from other study programmes; conditions for transferring from other study programmes within the same or related study areas, as well as any other issues relevant to the implementation of a study programme.

For programs accredited in Serbian language, classes are organized and implemented in Serbian. Parts of a study program, exams and drafting and defending the final, master and specialist thesis and doctoral dissertation may also be conducted in the language of a national minority or in a foreign language, in accordance with the HEI statute. Furthermore, study programmes may be fully accredited, organized and implemented in a national minority language or in a foreign language. For students with disabilities, HEI may organize and carry out studies, or parts of studies in the sign language.

The bachelor and specialised study programmes may foresee a final thesis. The master study programme includes the obligatory final thesis. A doctoral dissertation is the final part of a doctoral study programme, except for a doctoral study programme in arts for which an art project represents the final part. Exceptionally, a doctorate may also be awarded to a person with completed medical studies and appropriate specialization in accordance with the law regulating health care, and on the basis of a successfully defended dissertation based on papers published in top world journals, in accordance with standards set by the NCHE. The number of credits of the final thesis, that is, the final part of a study programme, is included in the total number of credits required for the completion of studies.

ECTS credits can be transferred between different study programmes, within the same cycle and type of studies. The criteria and conditions for transferring ECTS credits and the appropriate knowledge assessment are defined by the general act of an independent HEI, or an agreement between HEIs. For

students participating in international mobility programmes, ECTS credits can be transferred between different study programmes within all cycles and types of studies.

2.2.4   Students

All persons who have completed four years secondary education, that is who have passed the Matura exam have the right to HE. From the school year 2024/2025, students with the completed General and Vocational Matura will be eligible to enrol in HE. Upon completing a study programme, the person obtains an appropriate professional, academic or scientific title (qualification), namely[9]:

 −   the person who completes bachelor academic studies of the scope of 180 ECTS credits obtains the qualification "bachelor" in an appropriate area, and the person who completes bachelor academic studies of the scope of 240 ECTS credits qualification „bachelor with honours";

 −   the person who completes bachelor applied studies of the scope of 180 ECTS credits obtains the qualification "bachelor (appl.)" in an appropriate area, and the person who completes specialised applied studies of the scope of 60 ECTS (in total 240 ECTS throughout the entire studies) the qualification "bachelor specialist (appl.)";

 −   the person who completes master academic studies obtains the qualification "master" in an appropriate area, and the person who completes master applied studies the qualification "master (appl.)";

 −   the person who completes specialised academic studies (at least 360 ECTS throughout the entire studies) obtains the qualification "master specialist" in an appropriate area;

 −   the person who completes doctoral academic studies obtains the qualification doctor of sciences (Ph.D.), or doctor of arts (D.A.), with the indication of the field, or area.

Public documents obtained upon completing a study programme are the Diploma and the Diploma Supplement[10]. The diploma supplement must also contain the description of the HE system in the Republic of Serbia. The Diploma and the Diploma Supplement are signed by rector and dean of faculty or art academy within the university, president of academy of applied studies, or director of college and college of applied studies. The Diploma and the Diploma Supplement of joint programmes organized between more HEIs are signed by their authorised persons.

2.2.5   Accreditations of HEIs and study programmes

The QA system in HE follows the European standards and guidelines for QA in the QF-EHEA (ESG)[11] and includes competent bodies and procedures for ensuring the system of establishment and monitoring

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[9] Professional, academic or scientific title is determined in accordance with the Law on Higher Education and the Rulebook on the List of Professional, Academic and Scientific Titles (RS Official Gazette, No 53/2017, 114/2017, 52/2018, 21/2019 and 34/2019).

[10] The Rulebook on the Content of Public Documents Issued by a Higher Education Institution (RS Official Gazette, No 15/19) - http://www.mpn.gov.rs/dokumenta-i-propisi/zakonski-okvir/

[11] http://www.ehea.info/cid105593/esg.html

of quality in HE. HE QA is implemented through the accreditation of HEIs and study programmes, external QA of HEIs and study programmes, and self-evaluation of HEIs.

2.2.6 Recognition of foreign HE documents

Recognition of a foreign HE document is a procedure that determines the right to continue the education of the holder of that document (academic recognition), or employment (professional recognition), based on a previously completed evaluation of a foreign study program or part of a study programme. The evaluation is done based on the type and level of competencies achieved by completing the study program or its part, taking into account the education system in the country where HE document was acquired, the enrolment conditions, the rights arising from the HE document in the country of acquisition and other relevant facts without considering the formal characteristics and structure of the study programme, in accordance with the principles of the Lisbon Recognition Convention (Convention on the Recognition of Qualifications concerning HE in the European Region.

ENIC/NARIC Centre, as an internal organisational unit of the Qualifications Agency, evaluates the foreign study programme, or a part of the study programme for the purpose of employment. Based on the evaluation, the ENIC/NARIC Centre issues a decision on professional recognition. The decision on professional recognition contains the name, type, degree and duration (scope) of the study programme, the scientific, artistic or professional field within which the study programme was completed, the qualification as it is stated in the foreign HE document – in the original language and translated into Serbian, as well as the NQFS level to which the qualification corresponds.

The evaluation of a foreign study programme in order to continue the education is carried out by the professional body of an independent HEI to which an application for academic recognition has been submitted. Based on the evaluation, the independent HEI issues a decision on academic recognition. If it is determined that there is a substantial difference between the knowledge and skills achieved in relation to the conditions for enrolment in a particular study programme, further education or enrolment in HE cycle may be either denied or conditioned by the obligation to obtain additional learning outcomes. Criteria for determining the existence of a significant difference between the type and level of acquired knowledge and skills in relation to the conditions for enrolment in a particular study programme are prescribed by an independent HE institution.

2.3 MCs implementation practice in Serbia

Currently, MCs do not exist in Serbian HE. Hence, one of the specific goals of MICROGUIDE is to develop a Guidelines for the implementation of MCs in Serbian HE, which will be presented to the national policy makers and HEIs.

3   School system in Austria

In Austria compulsory schooling starts at the age of six and lasts for nine years. One school year lasts for ten months (from September to June). There are private and state schools; in state schools, no tuition fees are charged. The Austrian school system provides for a variety of education and training options which are designed to meet the needs and interests of children and their parents. In the following scheme levels, school types and possible schooling paths are shown.
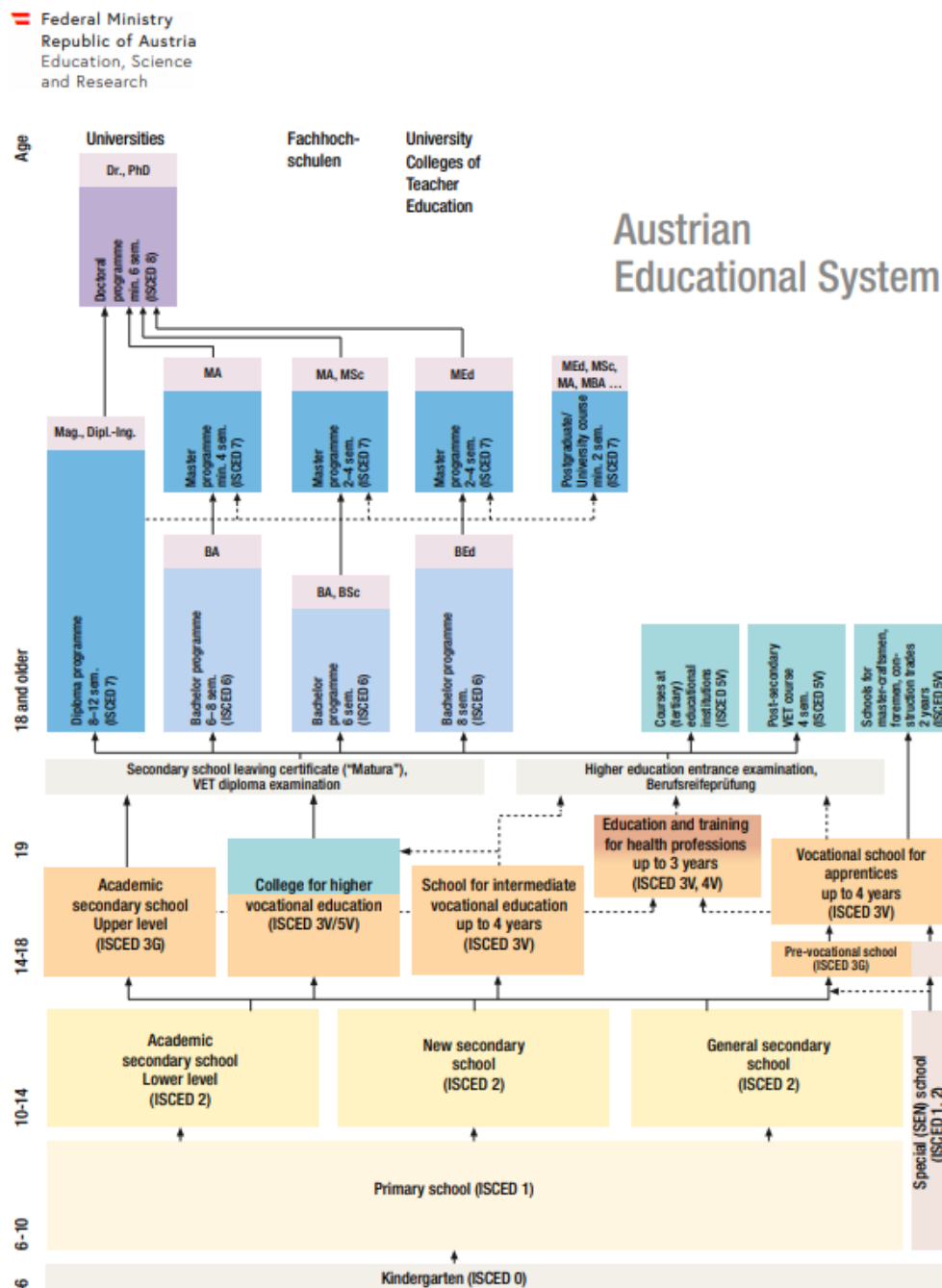
Austrian educational system[12]
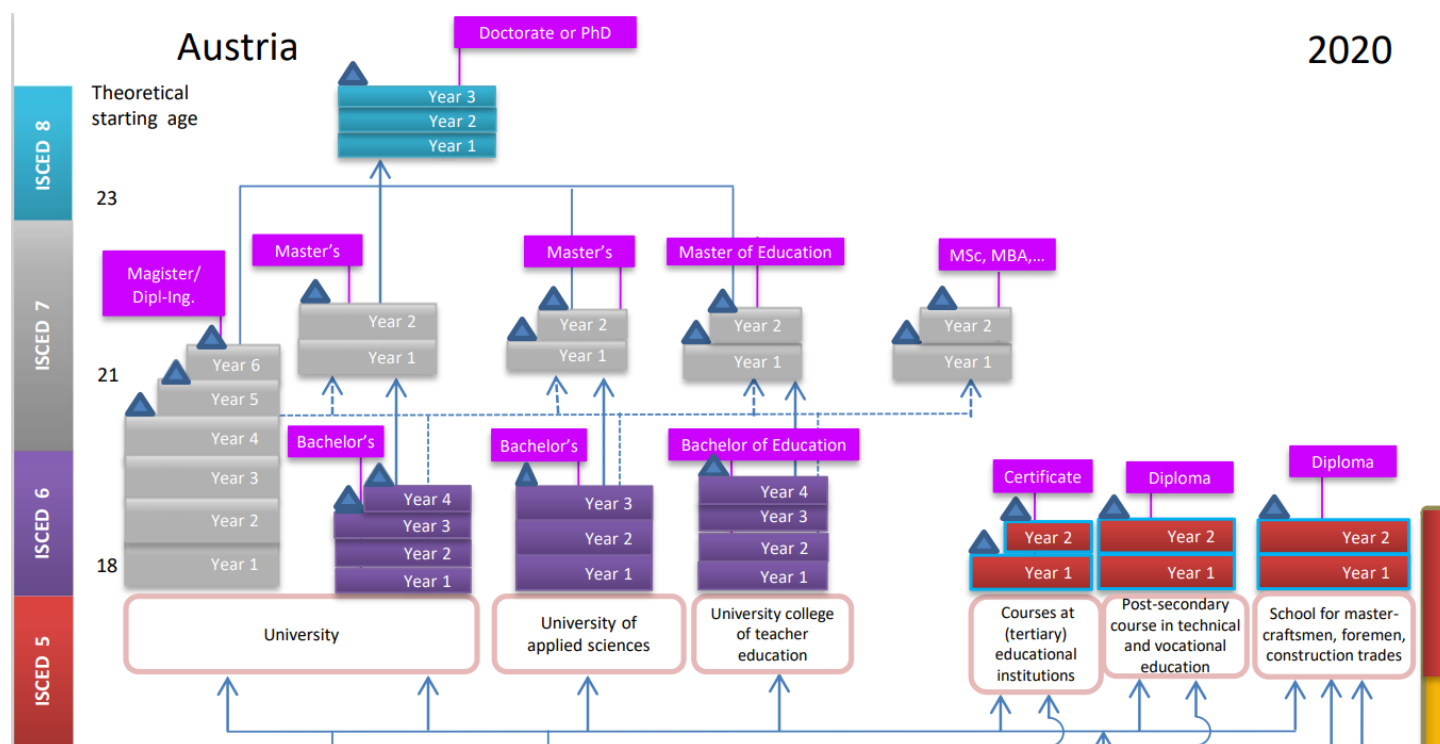
Tertiary level of education in Austria[13]

3.1 Structure and Role of HEIs[14]

3.1.1 Universities

Following on from general and vocational education and training courses, the Austrian universities offer degree programmes:

— in the humanities, engineering, and artistic studies,

— programmes leading to qualified teaching credentials in upper secondary schools,

— as well as medical, natural science, legal, social, economic, and theological studies.

Currently, three different types of degree programmes exist in Austria, but the diploma studies will be discontinued.

Diploma studies (Diplomstudien): Usually, these studies take 8 to 12 semesters (240 to 300 ECTS), they consist of two or three study sections, each of which is concluded with a degree examination. Those who successfully complete the programme are awarded a degree, such as:

— a master's degree

— a diploma, i.e., master's degree in engineering (Diplom-Ingenieur/in)

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[13] https://gpseducation.oecd.org/CountryProfile?primaryCountry=AUT

[14] https://eurydice.eacea.ec.europa.eu/national-education-systems/austria/higher-education

— exception: in medical studies, the degree Doctor of General Medicine (Doktor/in der gesamten Heilkunde) or the degree Doctor of Dentistry (Doktor/in der Zahnheilkunde) is awarded.

Bachelor's and master's degree programmes: According to the Bologna Declaration, the Austrian universities have already organised most of their study programmes in the form of bachelor's degree programmes (3 to 4 years, 180 to 240 ECTS) and master's degree programmes that build on the bachelor's degree programmes (1 to 2 years, 60 to 120 ECTS).

— The bachelor's degree programmes provide scientific or artistic vocational education and training and a qualification in the corresponding specialist area and lead to the awarding of a bachelor's degree.

— Depending on the specialist area involved, master's degree programmes lead to the awarding of a master's degree (Master … or Diplom-Ingenieur/in).

Doctoral and PhD programmes: Doctoral programmes and PhD programmes (Doctor of Philosophy) build on diploma degree and master's degree programmes at universities or universities of applied sciences and mainly provide further development of a student's ability to carry out independent research.

— Completion of the study programme (after 3 years) goes along with the awarding of the doctoral degree in the relevant field (Doctor or PhD).

3.1.2   Universities of Applied Sciences (Fachhochschulen)

Universities of applied sciences provide scientifically based vocational education and training with strong occupational orientation (e.g., the bachelor's degree programme includes at least one practical training semester). At present, degree programmes at universities of applied sciences are offered in engineering, economics, health sciences, social sciences, natural sciences, design/arts and military/security sciences.

The following types of programmes are offered:

— Bachelor's and master's degree programmes: Based on the Bologna Declaration, universities of applied sciences offer programmes in the form of bachelor's degree programmes (3 years, 180 ECTS) and master's degree programmes (1 to 2 years, 60 to 120 ECTS). The bachelor's degree programmes provide a practice-oriented education at university level with a qualification in the corresponding specialist area and lead to the awarding of a bachelor's degree (Bachelor of…). In certain subjects, mainly in the field of social work and healthcare, those who successfully complete the programmes are also authorised to practise in the corresponding profession (e.g., social worker, physiotherapist).

— Master's degree programmes build on the bachelor's degree programmes and, depending on the field involved, lead to the awarding of a master's degree (Master of…). Successful completion of a university of applied sciences master's degree programme aims to qualify graduates to pursue a subject-related doctoral degree programme at a university.

University Colleges of Teacher Education University colleges of teacher education are legal entities under public law with restricted autonomy. The following study programmes have to be offered and provided at university colleges of teacher education as part of initial teacher training: bachelor's and master's degree programmes to obtain teaching credentials for the primary sector, bachelor's and master's degree programmes to obtain teaching credentials for the secondary sector (general education as well as vocational education and training). Continuing training programmes have to be offered for all occupational fields related to pedagogy. The budget for public university colleges of teacher education is allocated by the Federal Ministry of Education, Science and Research

Types of Bachelor and Master programs in Austria

Type of program characteristics	dual or coop program work-integrated	dual or coop program fulltime	(traditional) regular fulltime	work enabeling part time	health sciences fulltime
EQF level Bachelor/ Master	6 / 7	6 / 7	6 / 7	6 / 7	6 / -
Type of program (HE or HVET)	HE	HVET	HE	HVET	HVET
Duration [semesters] Bachelor/ Master	6 / 4	6 / 4	6 / 4	6 / 4	6 / 4
Balance between education in university and industry	60 -70% university, different models: 3 months 1/2 week	50 % university 50 % company (4x 12 weeks a 40h)	1 internship between 4th and 6th semester	working full time, studying at weekends	short placements in the hospital
curriculum integrated work-related work-based work-integrated	work - integrated	work - integrated	curriculum - integrated	work - based	work - integrated
formal contract	employment contract (+educational part)	employment contract (+educational part)	intership contract	employment contract	placement without payment

Source: H.Hochrinner, characterization of study programmes in Austria (EQF 6-7), 08.06.2020

3.2   Number of Credits per HE Cycle

1 academic year = 60 credits, with the decisive factor being the workload of an average student with hours in attendance and all other work items in connection with a course, 1 credit being equivalent to 25 hours of study, and the transcript of records, which is a confirmation of the courses and examinations taken and the credits earned.

The workload must comprise:

1.   for bachelor's degree programmes – 180 or 240 ECTS credits.
2.   for master's degree programmes – a minimum of 60 credits.
3.   for diploma programmes – 240 to 360 ECTS credits.
4.   for doctoral studies the duration is uniformly three years without the allocation of ECTS.

3.3 Relevant HE laws[15]

3.3.1 Universities Act 2002 (Universitätsgesetz 2002)

Under the Universities Act, the currently 21 Austrian universities were granted full autonomy. They have the status of legal entities under public law. The state, represented by the Ministry, still plays a statutory supervisory role and is the partner for the performance agreement with each university. Contracts, business transactions and recruitment will be managed by the universities on their own account. The senior bodies of the universities will be the university council, the rectorate and the senate.

3.3.2 Private HEIs Act (Privathochschulgesetz, PHG)

Based on this act, which entered into force in 2021, private institutions can obtain accreditation as a private HEI by the Agency for QA and Accreditation Austria; study programmes can be offered either in accordance with state programmes and degrees or without reference to them. This law provides general rules for accreditation and maintenance of private HEIs (private university colleges and private universities).

3.3.3 Universities of Applied Sciences Act (Fachhochschulgesetz, FHG)

Based on this act which was adopted in 1993, public and private institutions can obtain accreditation as an university of applied sciences ("Fachhochschule", FH) by the Agency for QA and Accreditation Austria Provisions governing the official recognition of study programmes as "Fachhochschule" study programmes and conferral of the designation "Fachhochschule" (Universities of Applied Sciences) as university-level study programmes that provide a sound scientifically-based education with regard to certain fields of academic professions. Aims and guiding principles, access, academic degrees, tasks of the "Fachhochschule" Council, provider.

3.4 QA and Accreditation[16]

The laws relevant to QA in the field of tertiary education are the University Act, the Act on the Organisation of University Colleges of Teacher Education, the Universities of Applied Sciences Act, the Private Higher Education Institutions Act, and the Act on Quality Assurance in Higher Education.

Federal Act on the External Quality Assurance in Higher Education and the Agency for Quality Assurance and Accreditation Austria (Act on QA in Higher Education) (Hochschul-Qualitätssicherungsgesetz, HSQSG 2011) Provision of the following elements (by this act): a cross-sectoral law on external QA; establishment of the Agency for QA and Accreditation Austria, integrating the former agencies (AQA, FH Council, Accreditation Council) in 2012, framework for QA procedures across sectors (e.g. obligation to publish outcome of procedures, possibility of certification or

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[15] https://eurydice.eacea.ec.europa.eu/national-education-systems/austria/higher-education
[16] https://www.aq.ac.at/en/about-us/responsibilities.php

accreditation, etc.), audit areas outlined by law, details defined by the Agency, QA procedures for audit or accreditation, installation of a student ombudsman office as an information and service centre for all students at HEIs,

notification procedures for degree programmes provided by foreign HEIs in Austria.

According to the Federal Act on External QA in Higher Education, public universities and universities of applied sciences must be evaluated through external audits, whether by an agency listed in the European QA Register for Higher Education (EQAR) or another internationally recognised and independent QA agency. Private HEIs have to be accredited by the AQ Austria.

In 2012, the Agency for QA and Accreditation Austria (AQ Austria) was established as an agency for QA for Austrian HEIs on the basis of the Act on QA in Higher Education (HS-QSG).

AQ Austria is responsible for[17]:

- developing and carrying out external QA procedures, as a minimum, audit and accreditation procedures, according to national and international standards;

- accrediting HEIs and degree programmes;

- continuously supervising accredited HEIs and degree programmes regarding accreditation requirements;

- reporting to the NCHE and publishing reports on the outcomes of the QA procedures;

- fulfilling the tasks according to the statutory provisions of the University of Applied Sciences Studies Act (FHG) and the Private Universities Studies Act (PrivHG);

- issuing certificates for educational institutions upon an audit;

- conducting studies and system analyses, performing reviews, and carrying out projects;

- providing information and advice in matters related to QA and quality improvement;

- notification of foreign degree programmes;

- international co-operation in the field of QA;
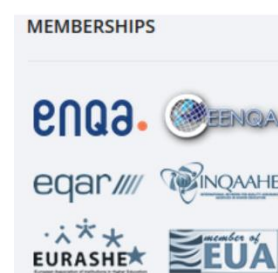
The HEIs bear the main responsibility for the quality of their activities and for QA and improvement.

AQ Austria understands its procedures as supplementary to an HEI's internal QA. It is independent in what it does and not bound by any instructions Decisions in QA procedures are made exclusively in accordance with quality criteria. QA procedures are modelled on international good practice standards, especially the ESG. Cooperation with HEIs and other interested parties is the basis for the development of procedure rules and standards or criteria.

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[17] https://www.aq.ac.at/en/

3.5   National Qualification framework within the study programs

The National Qualification Framework (NQF) is an instrument for mapping qualifications from the Austrian education system based on learning outcomes to one of the eight qualification levels of the National Qualifications Framework and the publication of the results of the mapping process for information purposes in the NQF-Register. The aims are to provide a transparency tool to facilitate the orientation within the Austrian education system and to support the comparability and comprehensibility of Austrian qualifications in Europe.[18]

NQF levels	Reference qualifications		EQF levels
8	Doctoral degree *Doktorgrade*		8
7	Master degree *Master- bzw. Diplomgrade*	Master builders *Baumeister* Civil engineers *Zivil Ingenieur*	7
6	Bachelor degree *Bachelorgrade*	Master craftsperson qualification *Meister*	6
5	VET college Reifeprüfung certificate and VET diploma *Reife- und Diplomprüfung der berufsbildende höhere Schule*		5
4	VET school qualification *Abschluss der Fachschule* Apprenticeship diploma *Lehrabschluss*		4

Austrian national qualifications framework[19]

The objective of the NQF-Act is to use the National Qualifications Framework as a tool for encouraging the transparency and comparability of qualifications in Austria and Europe and to promote lifelong learning, which comprises formal, non-formal, and informal learning. The NQF-Act does not decidedly define the mapping of non-formal or informal learning since further process specifications are needed for these.

3.6   Development of MCs in Austria

According to the Ministry of Education, Science and Research (BMBWF) in Austria as stated in the Position paper of Austrian HE: "*Austrian HE takes a positive view of the European developments in MCs, especially in the context of the increasingly important lifelong learning, and sees this as an opportunity*

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[18] https://www.qualifikationsregister.at/en/
[19] https://www.nok.si/sites/www.nok.si/files/dokumenti/93-file-path.pdf

for the universities to expand the quality of their educational offerings, open up new target groups and expand cooperation with non-university partner institutions. This can be an important contribution to strengthening the position of the universities in the intensifying competition on the education market."

The Austrian national approach according to Mr. Stephan De Pasqualin, DG HE/European HE Area from BMBWF started with a working group which consists of representatives from all four HE sectors, AQ Austria and the ministry. The tasks were to prepare the Position paper (stated above), accompanying the European discussions and plan the implementation phase in Austria. Integration of NQF is also one of the major issues in the working group.

Here are some of the key points from the Position paper:

- The definition of MCs should be as general as reasonable and yet as precise as possible, so that all stakeholders can act from this common basis.
- HEI see the MCs in all spheres of the educational society in the spirit of lifelong learning, training, reskilling and upskilling as part of the further education.
- The main component of the design of MCs is the common agreement on MC setup and possible parameters such as: ECTS, title, description, target groups, examination/assessment, QA, etc.
- Agreed extent of hours – as credit points.
- Mutual recognition among universities.
- As it is linked to ECTS points, it should be in the hands of HE sector.

3.6.1 QA and MCs

The QA of MCs in the HE sector is based on the national QA mechanisms and the ESG principles. The MCs QA must be ensured by the university's internal QM system.

3.6.2 MCs and the NQF

According to the statement of the Austrian working group on MCs and the position paper the MCs should not be assigned to the NQF due to the low workload.

3.6.3 MCs added value

- Universities are more agile, up-to-date and can quickly react to social and economic changes in the society. The main idea is to boost lifelong learning with "up- and reskilling" the skills of students.
- MCs can enrich and widen the universities offer on various topics.
- MCs can promote cooperation with industry and between universities – inland and internationally across many disciplines.

— With digitalization, MCs are accessible also for people/students who cannot travel or be physically at the university due to their social, personal, or economic situation.

Modular   **Stackable**   **Portable**

Digital   **Universal**

Source: https://microcredentials.eu/
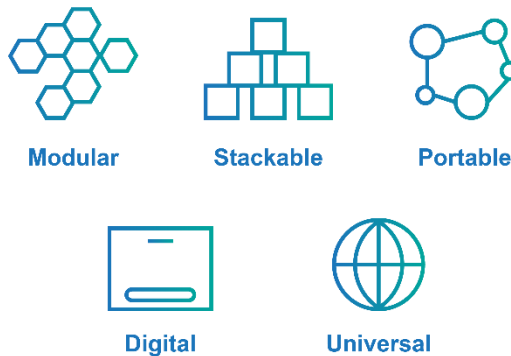
3.7 References and links to important regulations, laws, and agreements

1. Fachhochschul-Studiengesetz (FHG) (Bundesgesetz)
2. Hochschülerinnen- und Hochschülerschaftsgesetz 2014 (HSG_2014) (Bundesgesetz)
3. Hochschul-Qualitätssicherungsgesetz (HS-QSG) (Bundesgesetz)
4. Hochschul-Zulassungsverordnung (HZV) (Verordnung)
5. Hochschulcurricula-Verordnung (HCV_2013) (Verordnung)
6. Privathochschulgesetz (PrivHG) (Bundesgesetz)
7. Qualitätssicherungsrahmengesetz (QSRG) (Bundesgesetz)
8. Universitätsgesetz 2002 (UG_2002) (Bundesgesetz)
9. Council recommendation on a European approach to micro-credentials for lifelong learning and employability (2022/C 243/02); Council of the European Union, 16.6.2022

4 School system in Germany

Germany is one of the countries with the highest number of HEIs in the world, and studying at these institutions is almost free of charge (the only administration fee usually costs between 100-350 EUR per semester).

According to Statista[20], in 2020/2021, Germany had a total of 422 HE schools. Those consist of:

Germany's universities are internationally accredited - according to the Academic Ranking of World

210 universities for applied science *Fachhochschule or FH*	108 universities *Universität*	52 art colleges *Kunsthochschulen*
30 administrative training institutes *Verwaltungsfachhochschulen*	16 theological institutes *Theologische Hochschulen*	6 teacher training colleges *Pädagogische Hochschulen*

Universities (ARWU), 6 of the top 100 and 18 of the top 200 universities worldwide are German.

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[20] https://de.statista.com/statistik/daten/studie/247238/umfrage/hochschulen-in-deutschland-nach-hochschulart/#:~:text=Die%20Statistik%20zeigt%20die%20Anzahl,es%20in%20Deutschland%20107%20Universit%C3%A4ten

Being part of the QF-EHEA, Germany follows the directives of the Bologna Process with three levels of HE qualifications: Bachelor, Master, doctorate.

- The standard period of study in a Bachelor's degree programme in Germany is 6 semesters or 3 full academic years. After graduating with a Bachelor's degree, students can begin their professional career or apply for a Master's programme.

- A German Master's programme lasts 2 - 4 semesters, which is about 1-2 years. Many postgraduate programmes in Germany are offered in English.

- There is no standardised length of doctorate in Germany, as it is an in-depth and individual specialisation. The most important prerequisite for admission to doctoral studies is a Master's degree.

German HE landscape is presented as a field with plural actors, different forms of organisation and numerous formats of provision. The crediting and certification of these formats does not yet follow a uniform structure but regulated at the level of each individual federal state (since 1990, the Federal Republic of Germany has consisted of 16 states) with local acts and guidelines meaning there is no nation-wide legislation. This applies in particular to formats below the level of postgraduate programmes that have a low degree of standardisation due to different formulations of the state-specific HE laws[21]. Moreover, universities are given a lot of authority to define their own policies, as well as admission and application processes.

Thus, federalism, ideological and social pluralism are fundamental principles for the education system in the Federal Republic of Germany. The legal foundations for HE in Germany are the Higher Education Acts (R129-144) and Higher Education Acts for the Arts and Music (R145-147) of the Länder (Federal states). Within the framework of concurrent legislation (Art. 72 Basic Law - R1), the Federal Government is responsible for the areas of HE admission and HE degrees.

4.1   Role of MCs in Germany

Germany follows European trends in the field of HE, yet has its own reasons to strengthen efforts to implement MCs widely.

According to the comprehensive analysis conducted by the Boston Consulting Group (BCG), labour markets of the USA, Germany and Australia have similar trends. One of them is a shortage of skilled workers in STEM professions, which will worsen by 2030. As a result of ageing, health and care professions will also be in high demand[22].

As one of the ways to minimize the risks and consequences, BCG suggests governments of these countries, including Germany, should develop a new approach to MCs.

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[21] (Christmann, 2019, p. 12).
[22] https://de.linkedin.com/pulse/sind-micro-credentials-die-l%C3%B6sung-f%C3%BCr-den-und-wandel-alice-greschkow

Thus, the use of smaller learning formats will be of central importance in companies in German-speaking countries in the next three years - this is the assessment of 94% of the experts surveyed in 2021/22. In addition, three quarters of the respondents (77%) see MCs as an attractive opportunity for self-determined and informal learning[23].

In contrast, little is known about the perception and acceptance of MCs in application processes in German companies. However, non-representative surveys indicate that MCs are also perceived positively in job applications on the local labour market as long as they have a concrete reference to the respective job profile and if the digital platform offering the MCs or the experts behind the MCs are assessed and recognised as such[24].

Another factor, speaking for implementation of MCs, is defined by the DAAD President, Professor Dr Joybrato Mukherjee:

> ➢ "Micro-credentials are about flexibilising educational pathways in Germany and the European Union in an increasingly technology-oriented and highly complex work environment. It is gratifying to see that, in addition to their obvious use in connection with higher qualifications, they're increasingly being perceived as useful measures for the purpose of internationalisation and boosting short-term mobility in the EU".

It should be noted, that despite the growing interest in MCs, the attitude towards it as part of the traditional general education system in Germany is not as unequivocal. The Federal Government expresses scepticism and points out that MCs could represent a disproportionate administrative or financial burden for the Member States, as they could overlap with other existing structures. Moreover, from the German point of view, there is a general danger that the value of qualifications in all educational sectors will be diluted[25].

4.1.1 Development and spread of MCs in Germany

MCs (or in German: *Nano Degrees*, *Kleine Lerneinheiten/Kleinere Einheiten/Lernnuggets*) certainly have potential to develop within education system of Germany, as the German Council of Science and Humanities emphasises in its current recommendation: they can be "a supplement to a holistic study programme, just as certificate studies and modularised offers within the framework of continuing education at HEIs"[26].

According to the German Academic Exchange Service (DAAD — Deutscher Akademischer Austauschdienst), individual HEIs are already intensively addressing the potentials and challenges of implementing these small learning units - both in the context of lifelong learning and in the context of internationalisation.

[23] mmb Institut GmbH, 2022
[24] (Edukatico, 2020).
[25] (cf. European Commission 2022, p. 35)
[26] (Wissenschaftsrat, 2022, p. 32).

On December and January 2022, DAAD along with European University Networks conducted and presented the results of two surveys (figure 1 and 2), which reflect the trends in the development and spread of MCs in German educational system[27]. Among 160 German universities that took part in the first survey by the National Agency for Erasmus + University Cooperation in the DAAD (NA DAAD), 20 percent are already using MCs, another 23 percent are discussing a possible introduction, and for 37 percent it has not yet been an issue.

The second survey gathered information from 34 German universities that are involved in the EU initiative "European University Networks". Around 25 percent of them are already using MCs, and a further 65 percent of the universities surveyed are planning to use them as part of European alliances[28]. In both surveys, the universities see the most important area of application for the small learning units – mostly for which there is a fee – as scientific further education and lifelong learning. At the same time, MCs are also becoming more important for internationalization and mobility: In the NA DAAD survey, the majority of all universities surveyed rated the use of MCs as a useful accompanying instrument for internationalization.

For the universities in the European university networks, the establishment of joint offers at the level of the alliances and the increase in mobility and inclusion, in particular through shorter study visits, play a role. According to a survey, the universities see a need for regulation for MCs at European level; more than 50 percent of those surveyed were in favour of uniform EU-wide regulations.
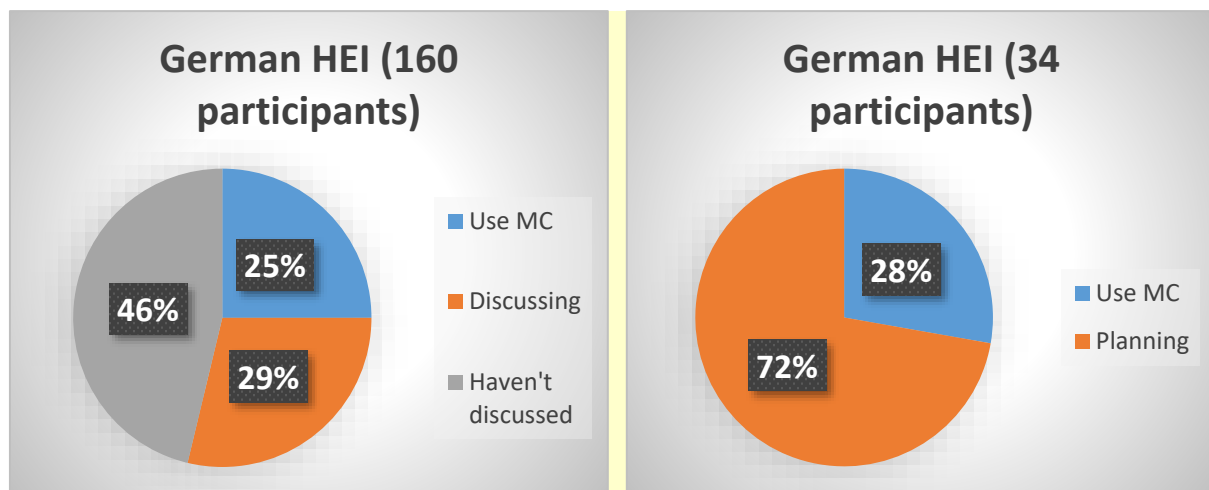
4.1.2 MCs implementation practice in Germany: policy and standards

The German Council of Science and Humanities emphasises the need for quality standards when it comes to further development of MCs. However, the standardisation of QA systems as well as the

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[27] NA DAAD survey, https://static.daad.de/media/daad_de/der-daad/kommunikation-publikationen/presse/eu04_infosheet_auswertung_mc-survey_final.pdf
[28] https://static.daad.de/media/daad_de/der-daad/kommunikation-publikationen/presse/auswertung_micro-credentials_eun_final.pdf

standardisation of cross-institutional credit regulations are still considered core challenges of MCs' implementation.

In Germany, the term "recognition" is generally used to refer to achievements or competences that have been attained or acquired at a HEIs and are to be recognised with the aim of continuing studies in another degree programme or at another HEI.

Corresponding regulations are based in particular on the Lisbon Convention drawn up in 1997 under the auspices of the Council of Europe and UNESCO. On the one hand, they are aimed at questions of access to HE and, on the other, at the recognition of periods of study and the qualifications previously completed[29].

In principle, however, the existing recognition regulations are limited to formal educational qualifications or achievements proven within the framework of such qualifications. Although the possibilities of embedding open digital learning formats in accredited degree programmes and the associated recognition issues were discussed early on with the increased emergence of MOOCs in Europe as well, there are still no uniform regulations for competences acquired in digital educational contexts. This circumstance proves to be a particular challenge in connection with the recognition potential for micro-learning offers, which are generally regarded as non-formal education offers.

Against this background, education policy initiatives and stakeholders have recently issued extensive recommendations for the recognition of learning outcomes acquired within the framework of digital learning formats. The core of these recommendations is the establishment of university-wide and transparent procedures, instructions and systems for credit transfer, which explicitly include digital learning opportunities. In addition, the European MicroHE Initiative proposes a so-called "Credit Supplement" that provides detailed information on the proof of MCs. It also suggested the conception of a metadata standard, which has now been implemented via the new Europass platform[30].

With the growing availability and use of digital learning opportunities, the possibilities for acquiring non-university competences have multiplied and simplified. The spectrum of informally acquired learning outcomes has grown in particular, for which corresponding credit options must be created - because in the future it can be assumed that more young people with very different prior knowledge will enter HE and will look for opportunities to have their digitally acquired, non-university learning outcomes credited to HE studies[31].

And although the formal principles of credit transfer explicitly include informally or non-formally acquired learning outcomes, there is still a lack of corresponding (uniform) regulations, methods and experiences. This applies in particular to non-university education providers, who are therefore recommended, among other things, to provide information on the intended learning outcomes,

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[29] Benning et al., 2017
[30] MicroHE Consortium, 2020.
[31] Burchardt, 2020; Rampelt et al., 2018

workload and examination form of their micro-credits. But also, in the academic sector, specific credit regulations at Länder or university level make it more difficult for prospective students to find their way around and lead to an increased need for guidance.

In addition to possible changes in educational policy, individual projects could also have a signal effect: Recently, the Rhineland-Palatinate Centre for Distance Learning initiated the development project "Knowledge Transfer and Innovation Development through Digital Continuing Education and Microlearning", which is funded with around 462,000 euros from the state programme for "Strengthening Digitisation at Universities ", and explicitly aims to expand micro-learning and Nano degrees.

4.1.3   MCs implementation practice in Germany — challenges

In the German context, in addition to the potential of MCs, there is also the criticism that their small size is favourable for marketing, but not sufficient to penetrate a complex scientific subject. In addition, there are difficulties with regard to standardisation, crediting, QA and a lack of resources.

With the growing offer of MCs, the question of their certification as well as the possibilities of having the learning achievements documented with them recognised or credited in different educational contexts is increasingly arising. Today, the international market offers a wide range of certificates for micro-courses - often with different designations.

Most of them, however, are simple certificates of attendance that do not show any assessment and merely document the course attendance. In most cases, 50 % to 60 % of the course content must be completed. Increasingly, the providers or their academic cooperation partners are also awarding ECTS for their MCs; in addition, the certificates of attendance can sometimes also be shared in the form of badges via the user profiles on professional online networks (e.g. LinkedIn).

In principle, the awarding of ECTS for MCs can facilitate their recognition. Although this criterion is by no means fulfilled by all offerings, most of the large digital learning platforms such as edX, FutureLearn or Coursera each have some MCs or micro-degrees in their portfolio for which ECTS are awarded by the cooperating universities and which can then be credited, for example, to complete MBA programmes or Master's programmes.

On the German education market, too, the few academic providers are evidently quite consistent in using their micro-degrees to increase permeability, at least within their own educational pathways - and thus also the attractiveness of their offers: They usually offer qualified certificates that awarded ECTS points and can then be credited to more complex degree or continuing education formats. For example, within the framework of the RWTH Aachen University's cooperation with edX, several micro-degrees can be stacked to form a complete micro-master's degree; and the private AKAD University credits a successfully completed nano-degree on "Digital Transformation" as a module towards a bachelor's degree or one of its more comprehensive continuing education programmes.

Despite their limited scope, micro-degrees are particularly expensive to create, as is the case for other digital formats. Generally speaking, they cannot be designed, produced and operated by individual teachers, rather this must be performed within the framework of interdisciplinary teamwork with the input of specialist, teaching and technical expertise. In the ideal case, an internal or external media service would be provided for this purpose.

In any case, the infrastructure and, in particular, personnel costs are so high that specific academic micro-degrees usually cannot be financed by the budgets of the participating departments. Models in which pilot projects are financed by project funding or, for strategic reasons, centralised funds are used, are prevalent – at least in Germany.

Compared to the wide range of MCs and micro-degrees offered on international digital learning platforms, the German education market is still quite reserved in this field. In the still young German market of MCs and micro-degrees, the public universities have so far only appeared sporadically and are generally rather sceptical about micro-learning offers.

The German Rectors' Conference (HRK) generally recommends that HEIs "proactively address the issue of MCs and badges — especially in order to anticipate innovative developments in the field of teaching and to remain competitive".

However, the possible fields of application are clearly limited: for example, MCs should be used primarily in the context of orientation courses for students, further training for staff or also in special extracurricular offers for so-called "high-potentials" — i.e., predominantly in the context of academic further education and the Studium Generale. In addition, the German Rectors' Conference does not see any added value in the integration of micro-degrees into the regular academic programmes. Instead, it fears a modularisation of degrees, speaks in its position paper of the danger of the fragmentation of the canon of knowledge[32] and criticises the often-commercial use of the micro-parts of conventional degree programmes.

The Federal Council and four of its committees come to a similar assessment in their joint proposal[33]. In it, the Federal Council makes it clear that the establishment of MCs and micro-degrees should not lead to "weakening or replacing initial education, HE, vocational education and training or traditional qualifications"[34]. The principle of holism and structure, the recommendation continues, should not be "replaced by the arbitrary accumulation of small and very small learning units". Stakeholders of vocational education and training take a similar view: they point out that vocational competence as a holistic, overarching qualification goal of dual vocational education and training in Germany cannot be

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[32] Hochschulrektorenkonferenz, 2020, p. 4
[33] "Proposal for a Council Recommendation on a European Approach to Microcredentials for Lifelong Learning and Employability", May 2022.[33]
[34] Bundesrat, 2022, p. 2

acquired on the basis of small-scale learning offers or their accumulation[35]. Due to the structural peculiarities of the German vocational education and training system alone, caution is advised when attempting to derive unrestricted scenarios for the German education market on the basis of international developments.

4.1.4 MCs in Germany: overview of good practices

As in the international market, the central characteristics of MCs and micro-degrees offered by German providers vary, such as cost, duration and designation. With the growing range of courses on offer, this could also make it increasingly difficult to find one's way around the market in Germany.

In Germany, three major DC projects with direct government involvement at the federal and national levels are currently underway. These are, on the one hand, the projects "Platform for International Student Mobility" and XHochschule, which are closely intertwined in terms of both contents and personnel, and, on the other hand, the Netzwerk Digitale Nachweise, with a preliminary focus on school certificates[36].

Speaking about the German public universities offering MCs, since 2017, RWTH Aachen University has been the first German university to offer the possibility of acquiring a Micro-Master's degree in "Managing Technology & Innovation: How to deal with disruptive change" via the digital learning platform edX. This can then be credited as part of a fully-fledged Master's programme. Also present on edX is the Technical University of Munich, which does not offer a Micro-Masters, but "Professional Certificates" in the use of the Sigma management system.

Private German universities are already visibly more active in this field, apparently seeking to open up an additional market for themselves with academic MCs and micro-degrees, often addressing the affluent target group of employees and lifelong learners. For example, the private Wilhelm-Büchner-Hochschule in Darmstadt has been offering Nano-credentials for a good year, covering topics such as IT security, app development, e-mobility and entrepreneurship. As is usually the case on the international market, the course content is taken from accredited Bachelor's or Master's degree programmes and thus ensures commercially exploitable synergy effects. In addition, the private Stuttgart-based AKAD University (a pure distance learning university) offers an online course on the topic of "Digital Transformation", which is also called a "Nano-Degree". Participants receive digital access to all learning content for a maximum of six months and can access it flexibly in terms of time. Those who subsequently pass the voluntary exam receive a digital certificate and can have their Nano-Degree credited as a module towards a Bachelor's degree or more comprehensive further education at AKAD[37].

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[35] (Deutscher Industrie- und Handelskammertag & Deutsche Industrie- und Handelskammern, 2021).
[36] https://www.iit-berlin.de/wp-content/uploads/2021/05/03-Kurzstudie-Digital-Credentials.pdf
[37] (von Elm, 2020).

Figure 1. Networking of German stakeholders on the topic of digital credentials in education
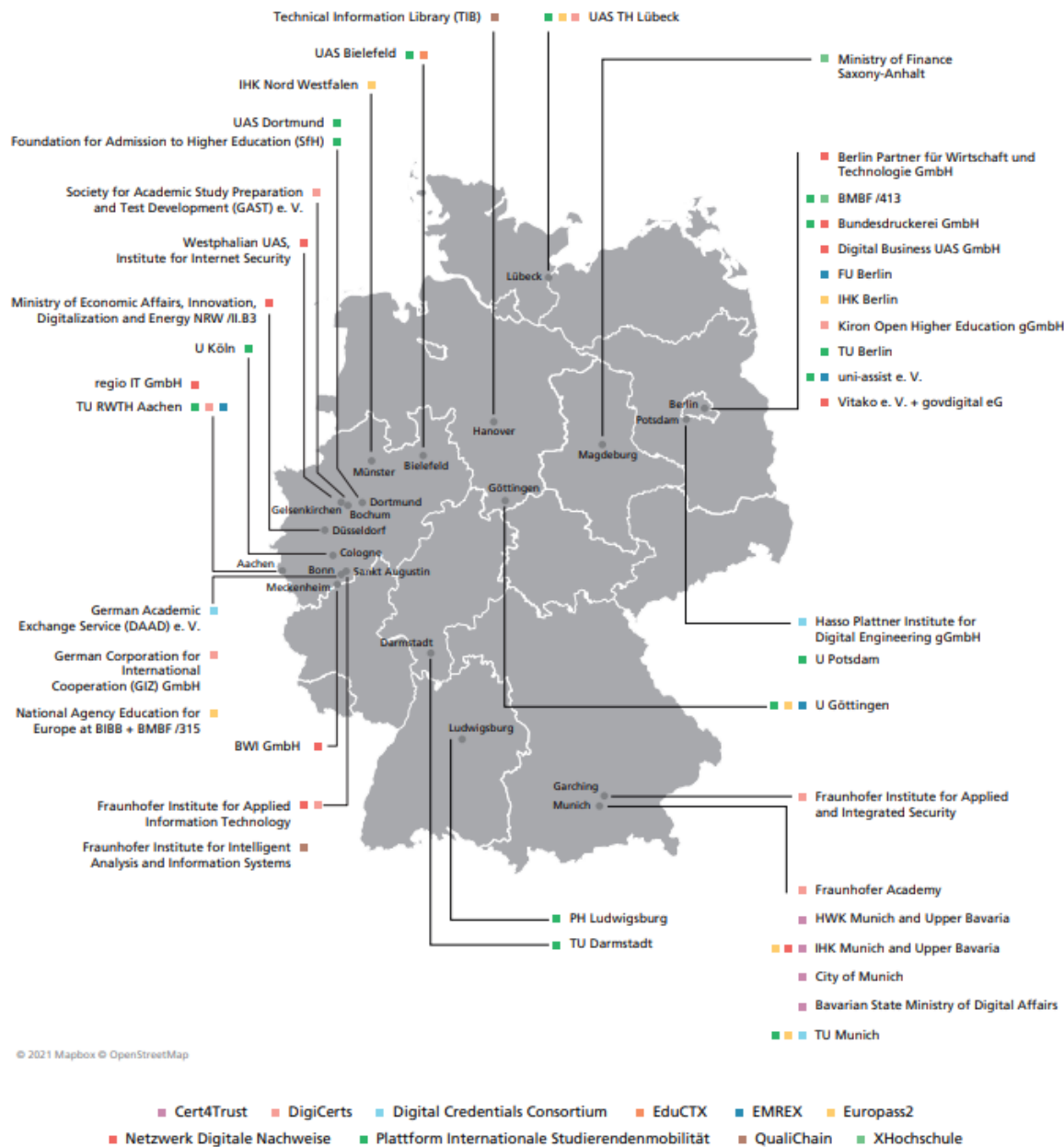
Another (private) HE provider for MCs is Euro FH, which currently offers three different "micro-courses" on human resources and political topics. Each of these concludes with a university-owned certificate.

In addition to the few university providers, private German educational institutions and tech companies are increasingly entering the micro-learning market. Google, for example, offers an internal qualification in the form of new certificates ("Google Career Certificates"), which it claims are comparable to university degrees: Within six months, Google employees qualify interested colleagues as UX designers or data analysts[38].

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[38] Seele, 2020; Sonnabend, 2021.

In cooperation with the digital learning platform Udacity, Bertelsmann University has been offering a scholarship programme since 2019 that focuses on strengthening technology skills such as cloud computing, data and artificial intelligence. According to the media group, it will invest several million euros over a period of three years to award a total of up to 50,000 tech scholarships on the digital learning platform. Nearly 10 % of the 15,000 technology scholarship holders for the Udacity Challenge courses each year also receive a scholarship for a full Udacity Nano-Degree programme in a subject of their choice. In addition to employees of the Bertelsmann Group, all adults who are interested can apply.

4.2   References and links to important regulations, laws, and agreements

1. European Commission, 2020, p. 10
2. Benning et al., 2017
3. MicroHE Consortium, 2020.
4. Burchardt, 2020; Rampelt et al., 2018
5. Christmann, 2019, p. 12
6. Edukatico, 2020
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8. Wissenschaftsrat, 2022, p. 32
9. Proposal for a Council Recommendation on a European Approach to Microcredentials for Lifelong Learning and Employability, May 2022
10. Bundesrat, 2022, p. 2
11. Deutscher Industrie- und Handelskammertag & Deutsche Industrie- und Handelskammern, 2021)
12. von Elm, 2020
13. Seele, 2020; Sonnabend, 2021
14. https://www.gew.de/fileadmin/media/sonstige_downloads/hv/Hochschule_und_Forschung/ read-me/Micro-Credentials-Bolognese.pdf
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21. https://data.consilium.europa.eu/doc/document/ST-9237-2022-INIT/en/pdf

22. https://www.taotesting.com/blog/5-reasons-why-micro-credentials-matter/

23. https://www.fzs.de/2021/09/22/statement-lebenslanges-lernen-massive-online-courses-und-micro-credentials/

24. https://de.statista.com/statistik/daten/studie/247238/umfrage/hochschulen-in-deutschland-nach-hochschulart/#:~:text=Die%20Statistik%20zeigt%20die%20Anzahl,es%20in%20Deutschland%20107%20Universit%C3%A4ten

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26. https://de.statista.com/statistik/daten/studie/247238/umfrage/hochschulen-in-deutschland-nach-hochschulart/#:~:text=Die%20Statistik%20zeigt%20die%20Anzahl,es%20in%20Deutschland%20107%20Universit%C3%A4ten

27. https://de.linkedin.com/pulse/sind-micro-credentials-die-l%C3%B6sung-f%C3%BCr-den-und-wandel-alice-greschkow

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30. https://www.fzs.de/2021/09/22/statement-lebenslanges-lernen-massive-online-courses-und-micro-credentials/

5 Overview of the educational system in Spain

The educational system in Spain is made up of five levels of education[39]:

— **Primary education** (between the ages of 6 and 12) is compulsory. It is fully covered by taxes in public and subsidized institutions, including books in some autonomous communities.

— **Secondary education** (separated into a compulsory part and a post-compulsory part). Compulsory Secondary Education (ESO) consists of four courses, between 12 and 16 years of age. Likewise, it is covered by taxes in public and subsidized institutions. Post-compulsory secondary education refers to four independent courses that require possession of the ESO title to be completed: the baccalaureate (two courses), intermediate level vocational training, intermediate level professional training in visual arts and design, and Middle Grade sports teachings.

— **HE** (with different access criteria, depending on the chosen education) includes, independently from each other, university education, higher artistic education, Higher Level professional training, professional education in plastic arts and undergraduate design, and Higher Grade sports education.

— The **Special Regime** Teachings are languages, arts and sports.

Everyone has the right to education. Freedom of teaching is recognized by the Spanish Constitution, article 27.12. — Education and teaching are constitutional rights of all Spanish people. The Spanish Constitution also recognizes the right of parents to freely choose the education of their children and the right for them to receive a moral and religious education in accordance with the beliefs and convictions of their parents.

In the following scheme levels, school types and possible schooling paths are shown.

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[39] https://www.educacionyfp.gob.es/dam/jcr:a77ed4f2-cae7-401c-8fb3-5b6c04d5f692/sisedu1617.pdf

Educational system in Spain[40]

[40] https://www.educacionyfp.gob.es/contenidos/in/sistema-educativo.html
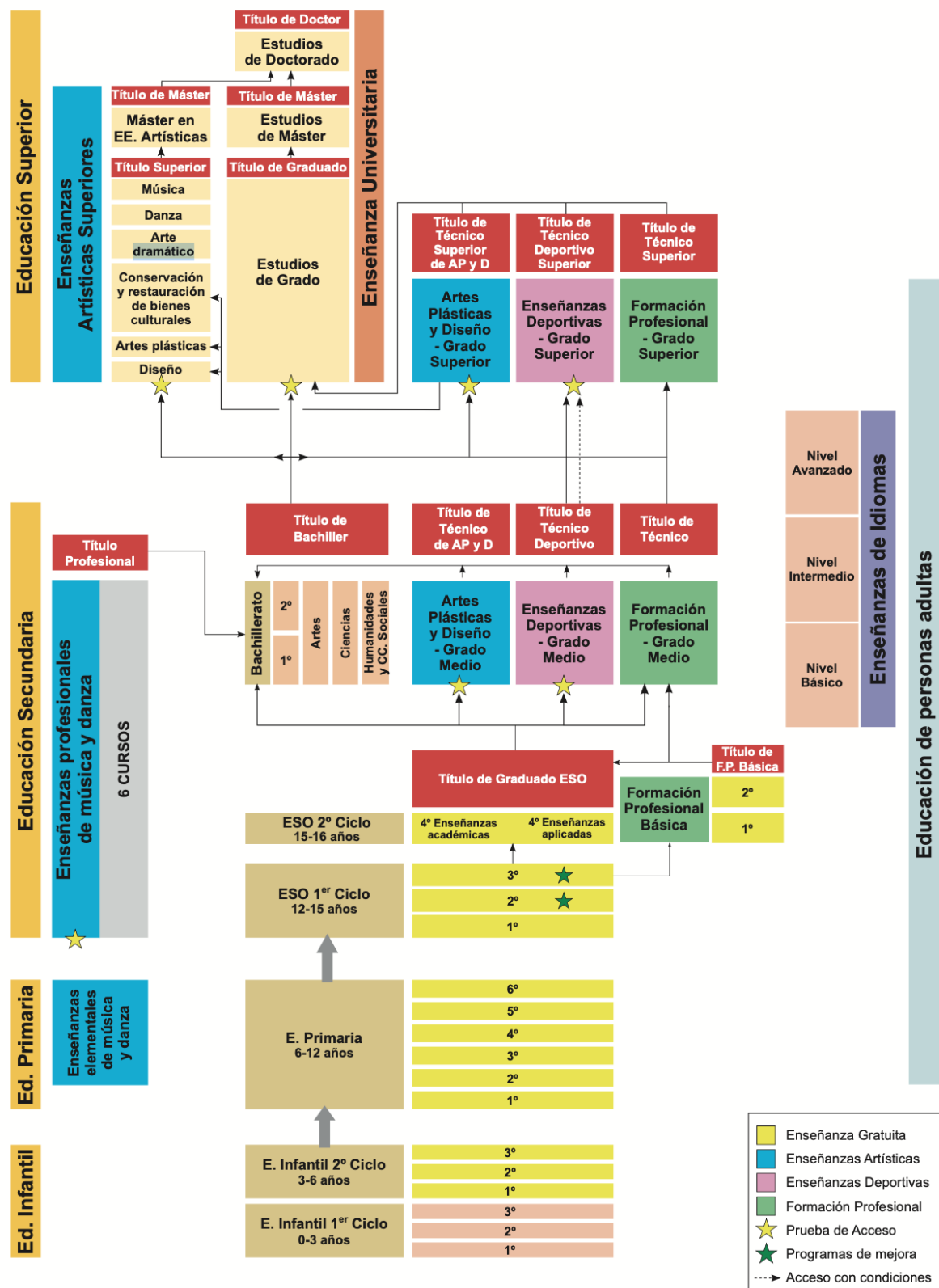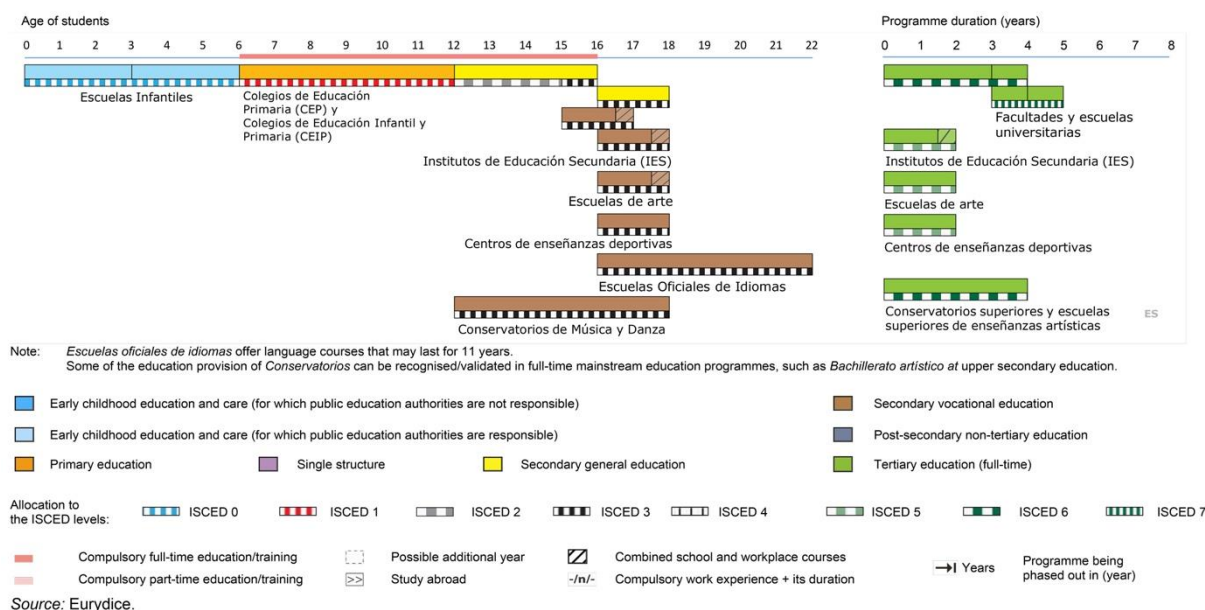
Scheme of Educational system where the corresponding ages can be seen[41]

5.1 HE in Spain

HE is integrated by:

– **university** education;

– some non-university education:

  o **advanced vocational training**;

  o the majority of **artistic education** (in particular, advanced professional studies in plastic arts and design, and advanced artistic education) and **advanced sports education**. These are all part of the specialised education programmes.

University education is regulated by Organic Law 6/2001 on Universities (LOU), as amended by Organic Law 4/2007. The rest of the studies are regulated by Organic Law 2/2006 on Education (LOE), as amended by Organic Law 3/2020 (LOMLOE).

University education is organised into Bachelor, Master's and PhD programmes. Each university designs every year the organisation of the academic year. As a general rule, the university school year establishes between 130 and 150 school days, excluding exam periods, organised in two semesters. Universities, at their discretion, hold extraordinary examinations in June or July. Some universities hold their extraordinary exam sittings after the end of the corresponding ordinary sittings in each semester.

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[41] https://eurydice.eacea.ec.europa.eu/sites/default/files/inline-images/ES.jpg

5.1.1 Official university Bachelor education

Official university degree[42] programmes have a duration of **240 credits** according to the European Credit Transfer System (ECTS), except for those that are subject to specific legislation or to European Union Law regulations, which require them to have 300 or 360 credits. Their sequential structure is set at 60 credits per year and degree. Exempt from this consideration are international joint degrees arising within the framework of the European Commission's European University Programme and those covered by the sixth Additional Provision of Royal Decree 822/2021.

Official university degree programmes with 180 ECTS credits which, upon the entry into force of Royal Decree 822/2021 (19 October 2021), were considered official, have a period of two years to apply for a modification of their syllabus in order to adapt it to 240 credits. These programmes are assigned to one of the thirty-two fields of knowledge listed in Annex I of Royal Decree 822/2021.

5.1.2 Official university Master education

The curricula leading to the award of a university Master's degree[43] have 60, 90 or 120 ECTS credits and a duration of one or two academic years. These programmes are assigned to one of the thirty-two fields of knowledge listed in Annex I of Royal Decree 822/2021[44].

A university Master's degree may include one or more specialisations that must be included in the verified report of the degree curriculum. These incorporate complementary and specific training in a thematic or professional area in accordance with the overall training project of the Master's degree. The number of ECTS credits that constitute a specialisation may not exceed fifty per cent of the total number of credits that make up the Master's degree curriculum.

5.1.3 Official university doctoral education

Official doctoral[45] studies are organised by means of programmes, in the manner determined by the statutes of the universities and in accordance with the criteria established in Royal Decree 99/2011. Doctoral programmes correspond to the various fields of scientific, technological, humanistic and artistic knowledge, as well as to an interdisciplinary approach to knowledge. Successful completion of a doctoral programme and the presentation and approval of a doctoral thesis will entitle the holder to obtain the official university qualification of Doctor (PhD).

5.2 HE qualification framework

HE qualifications correspond to the levels and qualifications established in the Spanish Qualifications Framework for Higher Education (MECES) and to the levels established in the European Qualifications Framework:

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[42] https://eurydice.eacea.ec.europa.eu/national-education-systems/spain/bachelor
[43] https://eurydice.eacea.ec.europa.eu/national-education-systems/spain/second-cycle-programmes-masters
[44] https://www.boe.es/buscar/act.php?lang=en&id=BOE-A-2021-15781&tn=1&p=#ai
[45] https://eurydice.eacea.ec.europa.eu/national-education-systems/spain/third-cycle-phd-programmes

CHE-QF LEVELS	QUALIFICATIONS					LEVELS MECES	LEVELS EQF	LEVELS QF-EHEA
	Upper Vocational Training	HE Study Programmes In Arts	University					
4				PhD Diploma Not typically credit-rated 3 years		4	8	Third Cycle
3		Master's Degree in Arts 120 ECTS 2 years	Master's Degree 120 ECTS 2 years	Integrated Bachelor's Degree 360-ECTS 6 years		3	7	Second Cycle
		60-ECTS 1 years	60-ECTS 1 years					
2B			Advanced Bachelor's Degree 240 ECTS 4 years			2	6	First Cycle
2A				300-ECTS 5 years				
1	Advanced Technician in Vocational Training, Advanced Technician in Plastic Arts and Design, Advanced Technician in Sports Education (Advanced Technician) 120 ECTS 2 years	Bachelor's Degree in Arts 240 ECTS 4 years	Bachelor's Degree 180 ECTS 3 years			1	5	Short Cycle

Qualification Framework in Spain (MECES) and correspondence with Catalan QF (CQF) and European QF (EQF and QF-EHEA)[46].

5.3 Development of MCs in Spain

The rapid changes in society driven by technology, global challenges and geopolitical conflicts demand university-level training for a continuous adaptation, with focus on employability. This demand is transferred to HEIs for designing and implementing more flexible training programmes to meet this demand. Within this context, Short Learning Programmes (SLPs)[47] appear to be one of the best responses. This SLP should be linked to MCs: an exam of a student's learning practices after an SLP. In addition, SLPs serve as an excellent gateway between the education system and the occupational training system, while promoting lifelong learning.

The student-centered learning approach claimed in the 2015 ESG revision[48] could also be part of this new reflection on a modularisation of the study programmes towards a more international and

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[46] https://www.aqu.cat/en/Universities/Methodology/Catalan-Higher-Education-Qualifications-Framework-CHE-QF

[47] European Commission, Directorate-General for Education, Youth, Sport and Culture, Orr, D., Pupinis, M., Kirdulytė, G., *Towards a European approach to micro credentials : a study of practices and commonalities in offering micro-credentials in European higher education : analytical report*, Publications Office of the European Union, 2020, **https://data.europa.eu/doi/10.2766/7338**

[48] https://www.eqar.eu/kb/esg/

interdisciplinary diploma. The diverse and challenging European Universities Initiative[49] run by the European Commission could also benefit from this approach.

The implementation of MCs in Spain is moving very slowly. There is a common agreement on the importance of developing and there has been some documents reflecting on the challenges for its implementation, but there have hardly been any experience.

The lack of a clear definition and framework for the development of MCs in Spain is one of the main reason for this slow progress in the country.

5.4   ANECA Statement 2020

On September 2020, the Spain National Agency for Quality Assessment and Accreditation (ANECA) published a Statement[50] on Short teaching and Learning Packages (SLP) and the recognition of the credentials related to them. This Statement is included in the efforts made by ANECA to give QA advice and, where necessary, support to the Spanish universities and to potential students interested in both offering or applying to current such types of short HE courses or those that might be delivered in the future.

The Statement focuses on:

- any kind of HE delivery: face to face, blended or fully online
- independently of the nature of the provider behind the HE course: formally established universities and HEIs, private corporations or companies, on-line platforms, etc.
- QA procedures regardless the focus at the institutional, programme, etc. level
- shorter-term educational courses leading to a particular credential or independent modules or teaching & learning parts belonging to a regular HE programme expressed in terms of achieved learning outcomes
- mechanisms to favour the recognition of a wide array of credentials coming from a very diverse ecosystem of providers awarding multiple credentials in both length and learning outcomes

Regarding the QA of these SLP, the statement makes some considerations. The flexibility of the internal QA model facing any external QA procedure concerning SLPs is going to be subject to continuous challenges, and given that the initiatives are extremely innovative in terms of technology and academics. It is essential to have versatile QA tools that can deal with two significant independent variables: the protection of the student's solvency in the course in which he/she is enrolled and the quality of the academic resources and the academic staff that teach it. The only contribution to be made by QA agencies is the definition of a set of guidelines aimed at supporting universities in ensuring

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[49] https://education.ec.europa.eu/education-levels/higher-education/european-universities-initiative
[50] https://www.aneca.es/documents/20123/81862/200915_ANECA+Statement+on+QA+Short+Educationa+Packages+and+their+Credentials.pdf/262b1d00-6b8f-4946-82f5-f2e7085a74b1?t=1656325974930

the quality of SLPs. The Statement also pays a significant attention to the issues of recognition of the credentials associated to such SEP type of provisions.

Sustainability of QA for MCs
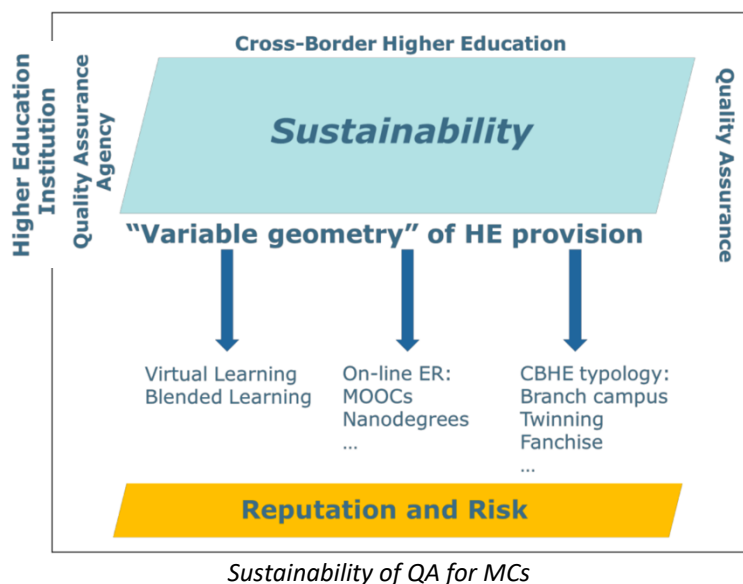
The focus on the management of the SEPs within the IQAS of the HEIs provides an immediate framework of quality management at the institutional level that ensures that:

- this types of provisions comply with the internal QA mechanisms in terms of design of the educational package,
- delivery of the contents by appropriate academic staff,
- sufficient technical and communicational support where online provision is involved,
- fair assessment system for students and safe and sound identification of students in terms of authentication and protection of personal data,
- number of ECTS or a clear reference to a recognised and cumulative teaching and learning pattern,
- clear assignment of the SEP to a particular level within the National Qualifications Framework or its counterpart in the corresponding level of the UNESCO ISCED level and
- clear identification of the awarding body backing the credential issued, as well as the nature and location of the register or archive where the credential and the data of the student is kept.

The above information could be submitted in a sort of supplement to the credential or issued independently.

5.4.1 ANECA survey study on MCs QA in Spanish University System

ANECA has recently published a Study on QA in the Alliances of European Universities, European Degrees and MCs in the Spanish University System[51]. The study is based on the received responses to a survey sent to all the universities in Spain. Responses from 39 Universities were received. Out of these 39, only 12 % declare that they are offering MCs.

The main problem with this result is that each university is referring as a MCs to different things, which make the results very untrusty, to the authors of this report. Responses were collected from 39 universities (47% of the total), 30 from public universities (60% of the group) and 9 from private universities (27% of the group). 69% of the universities that responded to the question stated their agreement with the definition of MC given in the Report[52]. However, 28% consider that it is a too broad definition, which should include more data about the dedication (measured in hours or, where appropriate, in credits), its reference to the qualifications framework, its format , etc.

Of special interest to ANECA was to know the degree of implementation of MCs in the Spanish university system. In this sense, only 12% affirm that they currently grant MCs, distributing an equal percentage of those that grant them in relation to modules of official title subjects (6%) and those that grant MCs made up of their own and independent training experiences (6%). For their part, 69% of the universities that responded to the questionnaire state that they do not currently offer MCs, but that they are working on designing a strategy in anticipation of its implementation. Only 19% of the universities participating in the study state that they do not offer MCs at this time and do not plan to implement them.

The concept of MCs among the universities that are currently offering them **varies enormously from one to another**. Both in the terminology used (micro-title, challenge and micro-module, own title, etc.), as well as in the MECES level in which they are framed (Degree, Master), in the dedication they imply (formulated in terms of minimum and maximum number of ECTS that integrates it) or in the methods of evaluation of the learning results (systems specific to the official titles in which they are integrated, or specific modalities such as carrying out projects, reality evaluation or design methodologies thinking). In this sense, **it should be noted that they cover different types of learning**: short learning programs that allow students to acquire new skills that help them respond to the rapid social and technological changes of our time; University Master's or Senior University modules, challenges or micro-modules.

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[51] Estudio sobre el aseguramiento de la calidad en las Alianzas de Universidades Europeas, los Títulos Europeos y las Microcredenciales en el Sistema Universitario Español.
https://www.aneca.es/documents/20123/81862/Estudio-ATM_NIPO.pdf/a55dab5c-5a5c-9a8c-245e-e471dfe1e324?t=1672840598579
[52] *"a proof of the learning outcomes that a learner has acquired following a short learning experience. These learning outcomes have been assessed against transparent standards"*,
https://education.ec.europa.eu/education-levels/higher-education/micro-credentials

In general, it can be seen that currently the MCs offered are aimed primarily at Bachelor's and Master's students, requiring the same access requirements as for admission to an official Spanish degree.

The recognition of the learning experience to the supervisors is also different, since in some cases their participation is recognized based on the dedication (the ECTS imparted), in others a short-term economic remuneration is conferred, if Its inclusion in the teaching assignment is expected in the medium term, and in the long term its inclusion in the metrics aimed at its evaluation as a teaching activity susceptible to teaching recognition.

Likewise, **different QA activities are being carried out** depending on the training experiences they cover. Thus, to the extent that they are made up of official degree courses that already exist and have been duly accredited, the QA of MCs is the same as that of the official degree. On the other hand, when the MCs constitutes an independent training experience, own evaluation systems and student surveys are foreseen.

Given the different learning modalities that they cover, depending on the universities that teach them, different forms of recognition are foreseen within the training programs offered in each institution: either in official titles, or in own titles or by referring to the new possibilities. (methodological strategies for teaching innovation, specific curricular structures) that are opened in the recently approved regulations (Royal Decree 822/2021, of September 28, which establishes the organization of university teaching and the insurance procedure of its quality.

In any case, in a majority percentage it is considered that the MCs offered by the universities that have already implemented this formative modality include sufficiently detailed information so that they can be recognized as part of a training program by another institution, although in a relevant percentage (a 45%) there is still no record of such recognition.

For their part, the universities that currently offer MCs have developed policies for the recognition of MCs granted by HE providers external to the corresponding institution, either when those providers are other universities or when they are partners of the university in the offer of MCs.

Regarding the current consideration of MCs within the university's training offer, it focuses on permanent training courses and activities subject to recognition of credits within official titles under the formats, mainly, of non-university teaching. official, university activities of the student body and mobility programs; and to a lesser extent as a transfer of credits or non-curricular external practices. To these formulas that contemplated the regulations prior to the implementation of Royal Decree 822/2021, is added the possibility of considering MCs, as a format of own teachings (specifically, MCs or micro-modules are a specific concept within the permanent training teaching) or as an integrated element in official teaching, through specific curricular structures and methodological strategies for teaching innovation that lead to the globality of an official university degree.

5.5 Study Case in Catalonia

The only complete experience for implementing MCs in Spain has been done in Catalonia, conducted in collaboration with the Autonomous Government of Catalonia, the Catalan University Quality Assurance Agency (AQU Catalunya), and the 12 universities (public and privates) in the Catalan university system[53].

The Government of Catalonia participated in the project through the Secretariat for Universities and Research, the Catalan Public Employment Service, and the Catalan Continuous Training Consortium. Consequently, all government actors responsible for HEIs, the promotion of work, and lifelong training of workers were involved in a pioneering way in the region.

In this Project, SLPs have been defined according to the following key features[54]:

− Provider: universities

− At level 6 or 7 under the European Qualifications Framework

− Credit load: between 4 and 30 ECTS

− ECTS credits earned are recognisable in accredited programmes

− They meet labour market needs

− Target public: non-traditional students

It is important to point out that, until now, throughout Spain training for employment has been established at levels 1 to 4 in the EQF, organised according to levels 1 to 3 in the National Catalogue of Professional Qualifications (CNCP, from its acronym in Spanish). The real nature of the labour market, however, means that given the skills required in many cases lifelong learning needs to be at CNCP levels 4 and 5, which correspond to levels 6 and 7 of the EQF. These are unexplored training levels for the Catalan Public Employment Service where, at most, managed training was delivered corresponding to the EQF level 4, specifically the "advanced technician in vocational training". Accordingly, the project became a new challenge, but also an excellent opportunity to continue to reduce the gap between HE and vocational training system in Spain.

Bearing in mind that legislation in Spain does not provide for the consideration of SLPs within institutional accreditation, a methodology for programme-by-programme accreditation has been developed. In order to prepare this ex-ante evaluation process, the main references considered are the ESGs[55] and the Guide to ex-ante accreditation of official university degrees[56]. Alignment with the ESGs ensures the future recognition of programmes accredited by the various European HEIs, as well

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[53] Casadesus, M., Huertas, E., & Edo, C. (2022). A European perspective on accrediting short learning programs: First experiences are out. Industry and Higher Education, 0(0). https://doi.org/10.1177/09504222221132129
[54] https://www.aqu.cat/en/Universities/Programmes-Assessment/Short-learning-programmes-Micro-credentials
[55] https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf
[56] https://www.aqu.cat/en/doc/Universitats/Metodologia/Guia-d-acreditacio-GM-EN

as the possibility that they will later be registered in the Database of External Quality Assurance Results (DEQAR) compiled by the European Quality Assurance Register for Higher Education (EQAR).

With these conditions, a guide[57] was designed for (ex-ante) accreditation of SLPs and was later approved by the Institutional and Programme Assessment Committee (CAIP, from its acronym in Catalan) of AQU Catalunya.

To analyse the validity of the entire process, an assessment of different programmes was carried out. The project focused on the digital sector. The programmes were specifically and jointly designed by the 9 universities (from the Catalan system of 12) that wanted to participate in the project and the entity Barcelona Digital Talent. The latter is a consortium of 12 of the largest companies operating in Catalonia in the digital, public and private sector with the aim of helping to train the 10,000 technicians the sector is expected to need over the next few years. This alliance was a relevant driver for the success of the project as, more specifically, was the support of the Mobile World Capital Barcelona foundation, which was part of the project and funded it.

This pioneering collaboration is certainly one of the strengths of the project. *The Dictionary of Digital Professionals* developed by Barcelona Digital Talent[58] (2021) was specifically used as the basis for the design of the required training. Based on extensive fieldwork, this document lays down the necessary competences within each of the 30 professional digital, senior and junior profiles which are most greatly demanded in the sector.

On this basis, 7 different programmes were designed, 6 of them corresponding to EQF level 6 and one to EQF level 7. They were implemented differently by 9 universities as described in the following table. 34 proposals were designed and, consequently, assessed with an ECTS value ranging from 8 to 16.

- When designing these programmes, the following must be taken into account:
- The description of the programme
- The justification for its creation
- The internal QA system (IQAS)
- The objective and learning outcomes
- Student access and admission, and student support
- Planning
- Teaching and support staff
- Material resources and services
- Expected outcomes

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[57] https://www.aqu.cat/en/doc/Universitats/Metodologia/Ex-ante-accreditation-of-short-learning-programmes
[58] https://barcelonadigitaltalent.com/report/competencias-digitales-y-talento/

Collaborating in the 2020 project to assess short learning programmes were the Secretariat for Universities and Research, the Catalan Public Employment Service (SOC) and the Consortium for Lifelong Learning in Catalonia. It also received support from the Barcelona Digital Talent alliance, which includes, among others, Mobile World Capital - Barcelona.

The project assessed seven short learning programmes linked to the field of information and communication technologies taught in different Catalan universities.

Short learning programme	Universities								
	UAB	UdG	UdL	UOC	UPC	UPF	URL	URV	UVic
Java Back End Web Developer	●					●	●		
Open Source Back End Web Developer	●						●		●
Front End Developer	●		●	●	●	●	●	●	●
Android Mobile Developer	●		●	●	●		●	●	●
Consultor CRM	●	●			●				
Cloud Deployer	●			●	●	●	●		
Data Scientist	●	●		●		●	●		
TOTAL	7	2	2	4	4	4	6	2	3

List of SLPs in the field of ICTs assessed during 2020 (UAB: Universitat Autònoma de Barcelona; UdG: Universitat de Girona, UdL: Universitat de Lleida, UOC: Universitat Oberta de Catalunya, UPC: Universitat Politècnica de Catalunya, UPF: Universitat Pompeu Fabra; URV Universitat Rovira i Virgili; UVIC-UCC: Universitat de Vic)

It should be noted that although the content of the programmes was identical for each of the 7 proposals, implementation was not. This depended on the strategies, characteristics, and resources available at each of the participating universities.

The results of the project and the programmes offered are presented here: https://www.aqu.cat/en/Universities/Programmes-Assessment/Short-learning-programmes-MCs/Assessment-2020

6 Conclusion

It is not surprising that all Partner countries share a lot of similarities regarding their HEA organisation — after all, they all belong to the QF-EHEA, sharing the same ESG principles. However, there are some differences regarding MCs implantation in HE. First, Serbia is the only one among four Partners countries that didn't yet developed MCs. Second, even if MCs exists in Austria, Germany, and Spain, they HE implementation significantly differs. For example, it seems that in Catalonia, but not in Spain as a whole, the MCs QA system has been farthest progressed because of the Catalan University QA Agency efforts. In Austria, the MCs QA system is under development, and, so far, defined only in form of the Ministry of Education Position paper, and the statements of the Austrian working group on MCs. It is interesting to note that MCs, according to the working group, should not be assigned to the NQF due to their low workload, which is in direct collision with the European Commission position regarding this issue. Finally, the German HE market is still quite reserved in this field, at least in domain of public universities. Even if German Rectors' Conference generally recommends that HEIs should proactively address the issue of MCs, their possible fields of application are still very limited. In addition, the German Rectors' Conference does not see any added value in the integration of micro-degrees into the regular academic programmes, while the Federal Council took a stand that the MCs and micro-degrees should not lead to weakening or replacing initial education, HE, vocational education and training or traditional qualifications. Therefore, it could be said that MCs implementation practices in Partner countries in general share similar weaknesses, such as lack of appropriate legal framework, lack of MCs initiative in public HE as compared to the private HEIs, or lack of MCs final assessment, with many questions still to be unanswered, such as the matter on the QA bodies and procedures, the logic behind the ECTS assignment, or link to the NQFs.

7 List of MCs examples of good practices in Partner countries

7.1 Austria

1. Technical University Graz:
Link to webpage: Kurse – microcredentials.at
Developed MCs:
1. Decarbonisation & sustainability management
2. Power System Protection
3. Accounting and Controlling
4. Business Administration
5. Business Administration for Engineers

2. University of Applied Science FH JOANNEUM:
Link to webpage: CORSHIP.eu - corporate edupreneurship
Developed Microcredential:
1. Co-Innovation MasterClass

3. Platform iMooX:
Link to webpage: https://imoox.at/mooc/
1. Developed 119 online courses (MOOCs)

4. Fern FH Ferdinand Porsche:
Link to webpage: https://www.fernfh.ac.at/fileadmin/user_upload/FernFH/Fernstudium/Micro-
credentials/Folder-Micro-Credentials-FernFH.pdf
Developed MCs:
Betriebswirtschaft und Ökonomie:
1. Betriebswirtschaft Basics
2. Business Engineering
3. Internationales Human Resource Management
4. Internationales Marketing & Management
Digital Business:
5. Digital Leadership
6. E-Business-Management
7. E-Commerce Konzeption
8. Entwicklung digitaler Prozesse
Softwareentwicklung
9. Human-Centred Software Engineering
Wissenschaften Allgemein
10. Quantitative und qualitative Forschungsmethoden
Gesundheitswesen
11. Diversitätssensible Gesundheitsförderung im Alter
12. Gerontologie
13. Public Health
Psychologie
14. Allgemeine und Persönlichkeitspsychologie
15. Allgemeine und Sozialspsychologie
16. Wirtschafts- & Entscheidungspsychologie
Daten, Informationssysteme und IT-Management:
17. Datenanalyse-Tools
18. Digital Essentials
19. Entwurf und Betrieb resilienter IT-Systeme
20. IT-Beratung
21. IT-Management und Service Integration
22. IT-System-Koordination

7.2   Germany

1. RWTH Aachen University: Aachen University or Rheinisch-Westfälische Technische Hochschule Aachen is a German public research university. With more than 47,000 students enrolled in 144 study programs, it is the largest technical university in Germany..

Link to webpage:
https://www.edx.org/micromasters/rwthx-managing-technology-and-innovation-how-to-deal-with-disruptive-change

Developed MCs: "Managing Technology & Innovation: How to Deal with Disruptive Change". Micro-degree was launched in May, 2017 that made RWTH Aachen University the first German university out of 23 HEIs-pioneers providing such a course. It is an English-taught Micro-degree, developed by the Technology, Innovation, Marketing, Entrepreneurship (TIME) Research Area at RWTH's School of Business and Economics. The program is supported and certified by the newly founded RWTH Business School. Successfully completed, the credential can be recognized as credit towards a full-time Master's degree program.

Structure: 6 graduate-level courses
Duration: 9 months, 6 - 8 hours per week
Price: 1,089-1,210 €
Language: English
Credits: 15 ECTS
ZFU number (Approval by the State Central Office for Distance Learning): Not found

2. AKAD University: The AKAD Group sees itself as an innovative distance learning provider, offering the widest range of distance learning and further education in digitization & innovation, business & management, IT etc.

Link to webpage:
https://www.akad.de/lp/studienangebote/?utm_source=google&utm_medium=cpc&utm_campaign=Brand_Exact&gclid=Cj0KCQjw--2aBhD5ARIsALiRlwDS0TLrgfCcjFY7kGBBFC0yRNkSJb

Developed MCs: "Digital Transformation Nanodegree". So far 63 participants have rated the course. The current overall rating is 4.5 stars. The categories of flexibility, value for money and digital learning were rated particularly well. 97% of the participants would also recommend the course. If you would like to test the course first, the institute offers you a test phase (4 weeks).

Format: 100% online distance learning
Duration: 4 months
Price: about 996 €
Language: German
Credits: 5 ECTS
ZFU: 173017c

3. The Wilhelm Büchner University: The WBU is a part of the Stuttgart Klett Group. The Klett Group is a leading educational company in Europe and is represented internationally in 18 countries. The university offers many other Nano-degrees such as "Einführung in die it-sicherheit", "Grundlagen des software engineering", "It-sicherheit-management" and others.

Link to webpage: https://www.wb-fernstudium.de/kursseite/big-data-grundlagen-methoden-und-technologien.html

Developed Microcredential: "Nano Degree Big Data: Grundlagen, Methoden und Technologien"
(Nano Degree Big Data: Basics, Methods and Technologies). A final exam to be taken for university certificate (incl. creditable ECTS points for bachelor's degree). The program has 8000 graduates and 7000 current students. 97% of all graduates are satisfied with the program.

Format: 100% online distance learning
Duration: 2 months
Price: 1150 €
Language: German

Credits: 8 ECTS
ZFU: 180518c

4. Euro-FH European Fernhochschule Hamburg: German private distance learning university based in Hamburg. It started operations in 2003 and offers bachelor's and master's degree programs. The university offers other Nano-degrees, such as "Gesunde Führung", "Personaldienstleistungen und HR-Consulting in der Praxis", and etc.
Link to webpage: https://www.euro-fh.de/hochschulkurse-mit-zertifikat/politische-ideen-im-spiegel-der-zeit/
Developed Microcredential: "Politische Ideen im Spiegel der Zeit (Political Ideas in the Mirror of Time). This course is state-approved by the ZFU (Staatliche Zentralstelle für Fernunterricht in Cologne). The ZFU also checks, for example, the terms of contract, withdrawal and termination deadlines, compliance with consumer protection regulations, impeccable advertising behavior and the quality of guidance.
Format: 100% online distance learning
Duration: 3 months
Price: 891-990 €
Language: German
Credits: Yes, but amount is not mentioned
ZFU: 180518c

5. Technical University of Munich: The TUM is a public research university in Munich, with additional campuses in Garching, Freising, Heilbronn, Straubing, and Singapore. A University of Excellence under the German Universities Excellence Initiative, TUM is consistently ranked among the leading universities in the European Union. It proposes 14 courses on EDX and 2 programs.
Link to webpage: https://www.edx.org/course/six-sigma-define-and-measure?source=aw&awc=6798_1667381288_caffa8199003df1cd2f6da3ff5e641a2&utm_source=aw&utm_medium=affiliate_partner&utm_content=text-link&utm_term=301045_https%3A%2F%2Fwww.class-central.com%2F
Developed Microcredential: "Six Sigma – Define and Measure". Upon successful completion of this program, learners will earn the TUM Lean and Six Sigma Yellow Belt certification, confirming mastery of Lean Six Sigma fundamentals to a Green Belt level. The Professional Certificate is designed as preparation for a Lean Six Sigma Green Belt exam.
Format: 100% online distance learning
Duration: 2 months
Price: Free course, certificate is available for $99.00
Language: English
Credits: No, professional certificate instead
ZFU: 180518c

7.3 Spain

ACREDITACIÓ 'EX ANTE' DE PROGRAMES DE CURTA DURADA VINCULATS AL CATÀLEG D'ESPECIALITATS FORMATIVES DEL SERVEI PÚBLIC D'OCUPACIÓ DE CATALUNYA
AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Android mobile developer

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional, la durada de la formació, modalitat d'impartició i oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament.

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la

coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineix adequadament el perfil i el nombre de professors i professores necessaris amb relació a les característiques del programa de curta durada i al nombre d'estudiants.

D'altra banda, s'estableix de manera adequada el personal de suport a la docència necessari per impartir el programa de curta durada.

7. Recursos materials i serveis

Es defineix de manera adequada els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada.

A tall de síntesi es presenten a continuació unes propostes de millora per a la seva implantació immediata:

Propostes de millora:

- S'han de revisar exhaustivament els continguts perquè no hi hagi disfuncions en els textos al llarg del document. S'ha fet un redisseny dels coneixements i habilitats que sembla adequada. Hi ha algunes discrepàncies menors entre el redactat en alguns punts de la memòria i d'altres (p. ex. "la competència "desenvolupar projectes en entorns col.laboratius de forma coordinada" apareix d'aquesta forma en una part del programa i com a "desenvolupar projectes en entorns col.laboratius reals de forma coordinada" en d'altres. S'han de repassar coneixements i habilitats perquè el redactat sigui coherent a tot el document. Hi ha un coneixement que està repetit "Connexió amb servidors i bases de dades externes" i a més apareix en el text també com "Connexió d'una aplicació amb servidors i bases de dades externes")
- Quan s'imparteix formació de tipus virtual s'hauria d'explicitar si aquesta és síncrona o asíncrona per les implicacions que té, per exemple, per als alumnes a l'hora de matricular-se en el curs.

El president de la Comissió d´Enginyeria i Arquitectura,

Ángel Ortiz Bas

València, 19 de novembre de 2020

Agència
per a la Qualitat
del Sistema Universitari
de Catalunya

ACREDITACIÓ 'EX ANTE' DE PROGRAMES DE CURTA DURADA VINCULATS AL CATÀLEG D'ESPECIALITATS FORMATIVES DEL SERVEI PÚBLIC D'OCUPACIÓ DE CATALUNYA

AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Cloud Deployer

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional, la durada de la formació, modalitat d'impartició i oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament.

Es diu que es necessita una experiència mínima de 5 anys en l'àmbit TIC, s'hauria d'explicitar si és algunes especialitats concretes o en general

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de **Catalunya**

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineix adequadament el perfil i el nombre de professors i professores necessaris amb relació a les característiques del programa de curta durada i al nombre d'estudiants.

D'altra banda, s'estableix de manera adequada el personal de suport a la docència necessari per impartir el programa de curta durada.

7. Recursos materials i serveis

Es defineix de manera adequada els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada.

A tall de síntesi es presenten a continuació unes propostes de millora per a la seva implantació immediata:

Propostes de millora:

- Incloure a la secció 5 les hores de treball autònom dels alumnes en cada mòdul
- Quan s'imparteix formació de tipus virtual s'hauria d'explicitar si aquesta és síncrona o asíncrona per les implicacions que té, per exemple, per als alumnes a l'hora de matricular-se en el curs.

El president de la Comissió d´Enginyeria i Arquitectura,

Ángel Ortiz Bas

València, 19 de novembre de 2020

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AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Consultor CRM

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional, la durada de la formació, modalitat d'impartició i oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament, encara que s'hauria d'afegir en els criteris de selecció "Coneixements bàsics sobre ERPs".

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la

coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineix adequadament el perfil i el nombre de professors i professores necessaris amb relació a les característiques del programa de curta durada i al nombre d'estudiants.

D'altra banda, s'estableix de manera adequada el personal de suport a la docència necessari per impartir el programa de curta durada.

7. Recursos materials i serveis

Es defineix de manera adequada els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada.

A tall de síntesi es presenten a continuació unes propostes de millora per a la seva implantació immediata:

Propostes de millora:

* A la taula de la secció 5 s'ha de modificar la informació referent als ECTS del M01 que han de ser 2,4 i no 0,75 com posa actualment.
* Quan s'imparteix formació de tipus virtual s'hauria d'explicitar si aquesta és síncrona o asíncrona per les implicacions que té, per exemple, per als alumnes a l'hora de matricular-se en el curs.

El president de la Comissió d´Enginyeria i Arquitectura,

Ángel Ortiz Bas

València, 19 de novembre de 2020

Agència per a la Qualitat del Sistema Universitari de Catalunya

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AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Data Scientist

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional, la durada de la formació, modalitat d'impartició i oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament.

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la

coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineix adequadament el perfil i el nombre de professors i professores necessaris amb relació a les característiques del programa de curta durada i al nombre d'estudiants.

D'altra banda, s'estableix de manera adequada el personal de suport a la docència necessari per impartir el programa de curta durada.

7. Recursos materials i serveis

Es defineix de manera adequada els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada.

A tall de síntesi es presenten a continuació unes propostes de millora per a la seva implantació immediata:

Propostes de millora:

- S'ha d'incloure la H14 en el mòdul 3 de la secció 5
- Quan s'imparteix formació de tipus virtual s'hauria d'explicitar si aquesta és síncrona o asíncrona per les implicacions que té, per exemple, per als alumnes a l'hora de matricular-se en el curs.

El president de la Comissió d´Enginyeria i Arquitectura

Ángel Ortiz Bas

València, 19 de novembre de 2020

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AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Frontal developer

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional, la durada de la formació i oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament.

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la

coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineix adequadament el perfil i el nombre de professors i professores necessaris amb relació a les característiques del programa de curta durada i al nombre d'estudiants.

D'altra banda, s'estableix de manera adequada el personal de suport a la docència necessari per impartir el programa de curta durada.
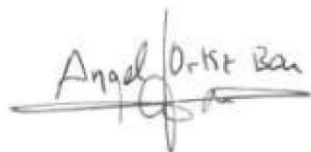
7. Recursos materials i serveis

Es defineix de manera adequada els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada.

El president de la Comissió d´Enginyeria i Arquitectura,

Ángel Ortiz Bas

València, 19 de novembre de 2020

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AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Java Back-end web developer

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional i l'oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament.

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineixen adequadament les característiques del perfil del professorat necessari per impartir el programa de curta durada.

D'altra banda, s'estableix la informació a aportar sobre el personal de suport a la docència necessari per impartir el programa de curta durada.

7. Recursos materials i serveis

S'estableix la informació a aportar sobre els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada i són adequats.

A tall de síntesi es presenten a continuació unes propostes de millora per a la seva implantació immediata:

Propostes de millora:

- Quan s'imparteix formació de tipus virtual s'hauria d'explicitar si aquesta és síncrona o asíncrona per les implicacions que té, per exemple, per als alumnes a l'hora de matricular-se en el curs.

El president de la Comissió d´Enginyeria i Arquitectura,

Ángel Ortiz Bas

València, 19 de novembre de 2020

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AVALUACIÓ DEL DISSENY DEL PCD

Denominació: Open Source Back end web developer

Resultat: FAVORABLE

1. Descripció del programa

La denominació del títol és adequada, coherent amb la disciplina i no dona lloc a errors sobre el seu nivell o efectes acadèmics.

S'informa adequadament sobre la vinculació amb l'especialitat professional i l'oferta de places de nou ingrés.

2. Justificació

Es presenta una justificació ben fonamentada que es relaciona amb les necessitats del mercat laboral.

3. Objectiu i Resultats d'aprenentatge

S'ha definit de manera adequada l'objectiu del programa. Els resultats d'aprenentatge són coherents i estan en general ben redactats, ajustant-se de manera correcta al contingut del programa de curta durada. Els resultats d'aprenentatge estan correctament distribuïts entre els mòduls.

4. Accés de l'estudiantat

S'inclou informació sobre les vies i requisits d'accés al programa de curta durada. Es defineixen de manera adequada les vies d'accés al programa. Els requisits mínims que han de complir els i les estudiants per accedir al programa estan definits correctament.

5. Planificació

La informació sobre la Planificació del programa es considera favorable en relació amb la coherència del conjunt de mòduls amb els resultats d'aprenentatge previstos en el programa i en relació amb la coherència interna entre els resultats d'aprenentatge i els mètodes d'ensenyament, i les activitats d'avaluació dels mòduls.

6. Personal docent i de suport

Es defineixen adequadament les característiques del perfil del professorat necessari per impartir el programa de curta durada.

D'altra banda, s'estableix la informació a aportar sobre el personal de suport a la docència necessari per impartir el programa de curta durada.

7. Recursos materials i serveis

S'estableix la informació a aportar sobre els recursos materials i serveis necessaris per impartir el programa de curta durada.

8. Resultats previstos

S'informa sobre els resultats previstos en el programa de curta durada i són adequats.

A tall de síntesi es presenten a continuació unes propostes de millora per a la seva implantació immediata:

Propostes de millora:

- Quan s'imparteix formació en modalitat virtual s'hauria d'explicitar si aquesta és síncrona o asíncrona per les implicacions que té, per exemple, per als alumnes a l'hora de matricular-se en el curs.

El president de la Comissió d´Enginyeria i Arquitectura,

Ángel Ortiz Bas

València, 19 de novembre de 2020