Sparks

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Conceptual Framework for Gamified E-Learning Programs

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Project Information

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Introduction

The advance of the Information and Communication Technologies had a significant impact on the pedagogical approaches adopted in the teaching-learning process: the traditional repetitive and behavioural models seem to be no longer appropriate to meet the growing learning needs of students, thus requiring the transformation to adaptive practices which include active participation and collaboration between learners (C. Gütl, C. Cheong, F. Cheong, V. Chang, S. Z. Nau, J. Pirker, *Expectations of the generation NeXt in higher education*, 2015; J. Chauhan, S. Taneja, A. Goel, *Enhancing MOOC with Augmented Reality, Adaptive Learning and Gamification*, 2015). Many educational games were developed to respond to this issue in order to increase the engagement and motivation of students in learning, increasingly unmotivated with the current educational system (B. B. Lambruschini, W. G. Pizarro, *Tech—Gamification in university engineering education: Captivating students, generating SBC*, 2015). Nevertheless, teachers and trainers do not often use these tools due to, inter alia, the difficulty of balancing pedagogical objectives and entertainment (D. Dicheva, K. Irwin, C. Dichev, S. Talasila, *A course gamification platform supporting student motivation and engagement*, 2014). In this context, the **Sparks project** consortium, through this Conceptual Framework for Gamified E-Learning Programs, aimed at producing a **balanced structure to let teachers and trainers create their own gamified online learning programs**, to combine game elements in different online learning stages and boost the engagement and motivation of their students.

The Framework embeds the concept of "Onlife" learning experiences, integrating online and offline experiences to reflect the changes of a hyperconnected world, where the distinction between online and offline does not exist anymore, where humans are informative organisms that live and interact with other informative agents into the Infosphere (Floridi L., *The Onlife Manifesto, Being Human in a Hyperconnected Era,* Springer, 2015). Considering that, in order to create value in the Infosphere, soft skills like relation, communication, interpretation, critical and creative thinking and negotiation skills are strongly needed, the Framework includes based on gamification dynamics, participative and active learning techniques in order to design new learning experiences which integrate relational and semantic capital, which can provide students with guidance and tools to give meaning to what they learn through the exchange and comparison of different information, perspectives and points of view with other learners.

THE PROJECT

Sparks is a Partnership for Digital Education Readiness project, co-funded by the Erasmus+ Programme of the European Union.

General objectives:

- developing innovative practices and tools for VET providers to use digital technologies for learning in a creative and collaborative way, and
- increasing the ability of VET learners, teachers and trainers to adapt to online learning.

Specific objectives

- Providing VET organizations, teachers and trainers with innovative tools to enhance students' engagement and motivation in e-learning through gamification;

- Increasing VET teachers and trainers' digital competencies;
- Increasing VET providers' knowledge and understanding of game-play mechanics and dynamics applied to education and training practices;
- providing VET learners with opportunities to improve their transversal and lifelong skills.

To achieve the project objectives, a consortium of six organisations, nonprofit entities and small-medium sized enterprises from Italy, Greece, Spain, Poland, Portugal and Romania, in two years (2021-2023) will engage over 600 VET teachers and trainers, 1.000 VET learners and 300 representatives of the six involved countries' vocational education and training system in shaping new innovative gamified educational resources and tools for VET.

Project results

1. **International Research** on "Gamification and Game-Based Learning: Best Practices and Requirements for Digital Environments", carried out in the six countries involved. The six national and the comparative research reports, including the findings and conclusions of transnational research of best practices and focus groups with VET teachers, trainers and learners, are available at www.projectsparks.eu.

2. This **Conceptual Framework** for Gamified E-Learning Programs, to support teachers and trainers in designing their own gamified courses, combining game elements in different online learning stages.

3. **Templates** of Gamified E-Learning Programs, applying the Conceptual Framework and designed with mixed groups of VET teachers and trainers, through Co-design Labs, to be customizable, flexible and work with any curriculum.

4. The ProjectSparks.eu **E-Learning Platform**, which will provide a builder to create gamified learning programs by choosing and filling out the desired Template, manage the program and monitor learners' progress, behaviour and engagement. The platform will be tested in pilot with VET providers and learners and refined accordingly. The platform will also host a long-term virtual **transnational community** of education and training providers interested in innovating their practices through digital game-based learning and sharing knowledge and experiences.

5. **Support** Material for the platform users, including video tutorials, e-learning modules and use cases for teachers and trainers, and an interactive user manual for learners.

THE CONSORTIUM

The Sparks project consortium is composed of six organisations, SMEs and non-profit entities, with complementary experience and expertise.

LASCÒ

Caserta, Italy | www.lascò.com

Lascò is an innovative SME, founded in 2013 to guide people and organisations in pathways towards **innovation and digital transformation.** The company is specialized in digital products, including e-learning platforms and LMS, complex ERPs and management software for corporates, apps, eCommerce and marketplaces, platforms based on *Blockchain* technology, Marketing Automation and Data Analysis systems, as well as methodologies and tools to carry out innovation projects within

corporates, Adult, Vocational and Higher Education entities.

Together with its national and international partners, Lascò designs and implements training experiences to foster digital skills, innovation management competences and entrepreneurship among young people, adults, and corporates. The company regularly runs workshops with the Startup Grind community, supported by *Microsoft for Startups*, to inspire and connect innovators, holds coaching and mentorship activities for professionals and innovative teams, and design workshops to think, work and design through Lean, Design Thinking and Agile methodologies and frameworks.

Femxa Formación S.L.U.
Vigo, Spain | www.grupofemxa.es

Femxa Formación S.L.U is a company specialized in consulting and training for employment, addressed to companies, public administrations, professional offices, training centres, and individuals. Its goal is to increase organizations' competitiveness and people's employability and professional qualification. Since 1999, Femxa has been developing and implementing training plans for diverse business sectors in Spain and Latin America, providing tailored training solutions, conferences, coaching sessions and workshops. The company has:

- designed and implemented over 1.300 training projects, training more than 550.000 students;
- delivered more than 400 face-to-face and e-learning projects, training workers from all over Spain, as well as staff from corporations and universities in Mexico, Peru, Colombia, and Romania;
- carried out consulting, virtualization, and e-learning platform services for large institutional and corporate clients, such as Inditex, Walmart, Bosch, Bayer, Nestle, Easter, BorgWarner, etc.

Kyttaro Enallaktikon Anazitiseon Neaon - KEAN
Athens, Greece | www.kean.gr

Founded in 2004, KEAN is a nonprofit organization, developing and implementing humanitarian programs to protect the social and physical environment. The organization has wide experience and expertise in implementing projects aimed at promoting employability and entrepreneurship. It offers young people and adults a wide range of opportunities to participate in EU programs (Erasmus+, DAPHNE, REC, HorizonEurope, EuropeAid), vocational training opportunities and volunteering. Furthermore, KEAN developed the "Planetbook Game", the first educational board and floor game about the environment and climate changes, successfully delivered in three continents.

Bexley C-Level IT (BCLIT)
Constanta, Romania | www.constantahub.ro

BCLIT is an SME founded in 2017 as an entrepreneurial hub specialized in IT solutions

for education. Its business model gained recognition and funding from a national government program supporting startups. BCLIT provides digital teaching solutions for educational organisations (i.e., kindergartens, high schools, VET schools, universities, NGOs, and SMEs), delivering education to youth and adults. In the local environment, BCLIT accelerates interactions between academia, government institutions, industry and civil society (quadruple helix) to create learning opportunities for individuals and development opportunities for organisations, including NGOs, universities, schools and enterprises. Target groups of its activities are school and university students, youth (including young NEETs, young people at risk of marginalizations, migrants or with migrant background), youth workers and NGOs volunteers, professors, trainers, youth workers, youth organizations, schools, and universities staff.

ECOS - Cooperativa de Educação, Cooperação e Desenvolvimento, CRL
Faro, Portugal | www.ecos.pt

ECOS is a social cooperative, founded in the region of Algarve in 2010. Its mission is to contribute to the promotion, recognition and valorization of methodologies that can enhance learning, personal development, and social transformation, to contribute to social inclusion and strengthen social cohesion, towards the community's sustainable development. Its main areas of activity are:

- creation of spaces for structured dialogue, cooperation, and collective construction among different actors, such as social, business, and institutional actors;
- promotion, design, implementation, and evaluation of educational, social, cultural, and sustainable development projects, informal and non-formal spaces;
- development of organizations' capacity towards more efficient management of their resources and projects through training and new ITC;
- monitoring, support, assessment, and consultancy to individuals, organizations, institutions, and respective educational programs and social intervention projects;
- promotion, recognition, and validation of non-formal education and other alternative pedagogical methodologies that contribute to social transformation.

Center for Innovative Education (CIE)
Warsaw, Poland | www.ciedu.eu

Center for Innovative Education is a foundation, established in 2015 as a training institution of the Mazowieckie voivodship in Poland. Working with regional and national governments, employers organizations, EU institutions and research centres worldwide, it creates and promotes social innovation, in particular in the field of education. CIE's educational activities are addressed to children, adolescents and adults and include formal, informal, and non-formal forms of education. CIE has many years of experience in creating and implementing its own educational solutions, focusing on learning programs that strengthen basic skills and transversal competencies.

Main areas of activity:

- development of educational models, programs, and solutions to improve professional training, based on the changing needs of the labour market;
- design and implementation of research and innovation projects with regional and EU structural and investment funds;
- management of an international platform of experts and authorities dedicated to sharing good practices in education and the labour market, tourism, agritourism, new technologies, and food by organizing the New Education Forum;
- development of recommendations for EU institutions and cooperation with them on the improvement of labour market policies and influencing national and regional governments as to their implementation.

Development Process

The Conceptual Framework for Gamified e-Learning Programs was developed following **five main phases**:

1. Data collection and analysis
2. Pattern identification and analysis
3. Categorisation of the target groups
4. Analysis of the target groups' needs
5. Development
6. Validation

❖ PHASE 1. DATA COLLECTION AND ANALYSIS

The first stage of the data gathering and analysis process was implemented in the Sparks project design phase: exploratory research was carried out by the project promoters to map and select data sources to support the high-level definition of the Framework. The research consisted of literature review, analysis of books, scientific papers and articles about Gamification and Game-based learning to have more in-depth insights about the topic and to work on the further development of existing ideas or intuitions. These sources were analysed and screened by adapting and adopting as reference the Systematic Mapping Process of S. de Sousa Borges, V. H. S. Durelli, H. M. Reis and S. Isotani ("A systematic mapping on gamification applied to education", Proceedings of the 29th Annual ACM Symposium on Applied Computing, 2014): some of their inclusion and exclusion criteria were applied, and others were elaborated by the project promoters. In detail, the source was included if it: embraces definitions and frameworks on gamification only focused on an educational context; is focused on the use of gamification in the study of the cognition of 18-40-year old learners; analyses e-learning processes and dynamics and online tools for learning. Viceversa, the source was excluded if: focused on gamification in lower secondary school students; focused on gamification in children's cognition; focused on the corporate environment. After the screening, out of 142 sources, 53 articles were selected and therefore analysed to prepare the high-level structure of the Framework.

The second stage of the data analysis process concerned the results of the Transnational Research on "Gamification and Game-Based Learning: Best Practices and Requirements for Digital Environments", carried out by the project consortium in Greece, Italy, Poland, Portugal, Romania and Spain. In the scope of the research, best practices of Game-Based Learning and Gamification in education and training were identified and analysed, and the needs and expectations of VET teachers, trainers and students were gathered through local focus groups in each of the partner's countries.

❖ PHASE 2. PATTERN IDENTIFICATION AND ANALYSIS

The project team researched, identified and analysed the patterns in applying game elements to the successful online learning experiences identified in the best practices collected. The team analysed the patterns emerging around the use of game dynamics, mechanics and components in the different stages of the gamified or game-based e-learning experiences identified deviations from the patterns and the related explanatory factors. Ultimately, the game elements to embed in the Framework were identified.

❖ PHASE 3. CATEGORISATION OF THE TARGET GROUPS

An analysis of the national VET systems of the countries involved was carried out to identify a shared categorisation of the groups of learners to be targeted by the Framework's implementation.

❖ PHASE 4. ANALYSIS OF THE TARGET GROUPS' NEEDS

The analysis of the characteristics, needs and challenges of the different target groups was developed around the experiential inputs and needs gathered within the focus groups implemented in the scope of the transnational research, which involved 72 VET students and 72 VET providers, and through the implementation of additional **semi-structured interviews** with no. 80 VET students (i.e., 15 students per partner country). The interviews aimed at assessing the most challenging obstacles for the different target groups in the five main stages of e-learning, as identified in the "Five-Stage Model" developed by Prof. Gilly Salmon, Professor of E-learning and Learning Technologies at the University of Leicester (2004):

1. Access and motivation;
2. Online socialisation;
3. Information exchange;
4. Knowledge construction;
5. Development.

❖ PHASE 5. DEVELOPMENT

Lascò, supported by the partners' experts, reassessed the patterns of game elements identified in the best practices analysed concerning the target groups' needs to develop the conceptual structure to design gameful learning experiences that address the challenges learners face in the different stages of online learning.

❖ PHASE 6. VALIDATION

The Framework was validated through a survey addressed to VET teachers and trainers from the six participating countries. One hundred thirty-eight experts were involved in evaluating the following characteristics of the Framework:

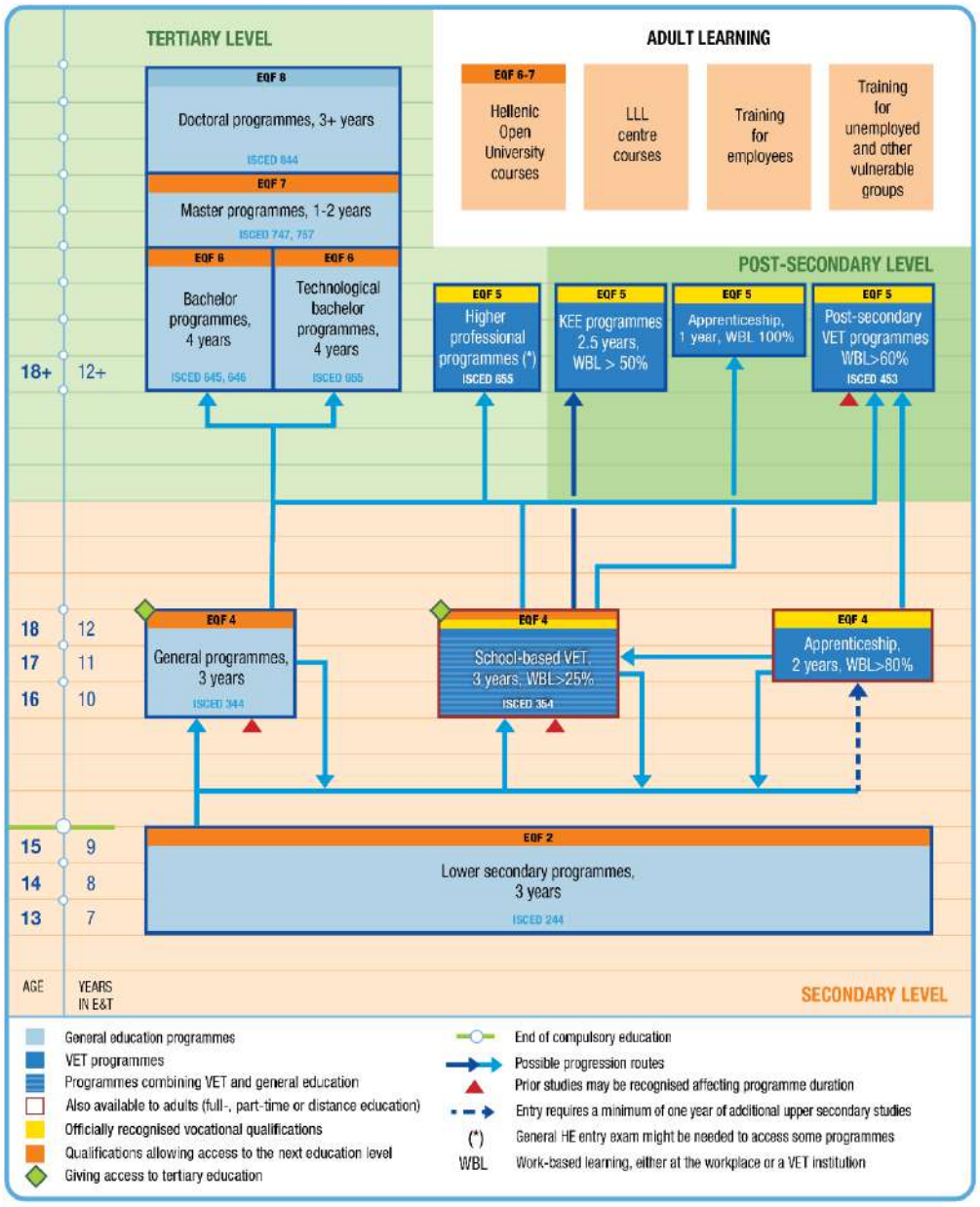
- clarity,
- logic,
- effectiveness,
- suitability for the target groups, and
- comprehensiveness.

Analysis of the target groups

National VET Systems

Greece

Chart of the national education and training system in Greece



NB: ISCED-P 2011.

Source: Cedefop and ReferNet Greece, 2020.

Vocational education and training (VET) in Greece is strongly State-regulated and, until recently, mostly offered **through a school-based approach.** The institution overall responsible for the national VET system in Greece is the Ministry of Education, Research and Religious Affairs, in cooperation with the Ministry of Labour, Social Security and Social Solidarity.

Providers of Vocational Education and Training

- **Upper secondary vocational education**

Upper secondary vocational education programmes are part of 'formal VET' according to the national context. At the national level, 'formal' VET leads to the acquisition of certificates recognised nationally by public authorities and is part of the education ladder. Formal education also includes education for **adults** through evening EPAL (vocational) schools.

Regarding upper secondary VET (Law 4386/2016), students have the following options in addition to the general upper secondary school:

1. **initial vocational education** within the formal education system in the second cycle of secondary education at a vocational upper secondary school (**EPAL, day or evening school**). According to the law on secondary education (Law 4186/2013) and its amendments, upper secondary vocational education programmes are provided by the vocational upper secondary schools. These schools (public or private) are founded exclusively by the Ministry of Education and may be day or evening schools. The minimum age for enrolling in a vocational evening school is 15;
2. **initial vocational education at an apprenticeship school (EPAS)** at the upper secondary level. The function of EPAS schools supervised by OAED (*the Greek Public Employment Service)*;
3. **initial vocational training** (outside the formal education system, referred to as non-formal) in post-secondary vocational training institutes (IEK), centres for lifelong learning and colleges, and also the postsecondary apprenticeship year (or apprenticeship class) for EPAL graduates.

- **Continuous VET – LLLCs (Vocational Training Centres – Informal VET)**

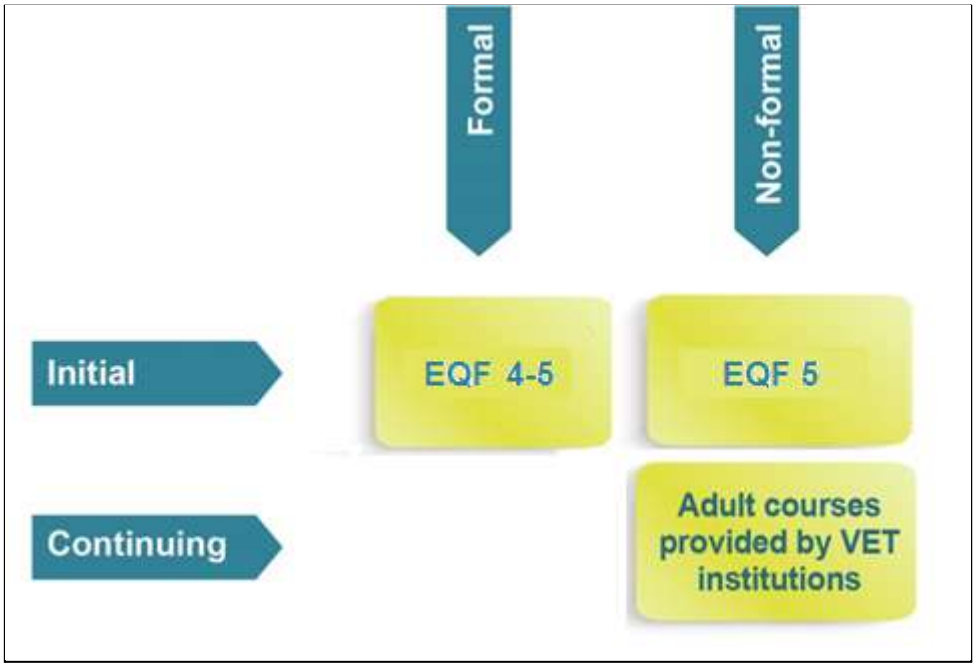
In Greece, continuous vocational training and general adult education is provided by lifelong learning centres (LLCs). The Ministry of Education, through EOPPEP, is responsible for safeguarding the quality of non-formal education, evaluating these centres and monitoring their operation.

Continuing VET programmes are also provided by most universities, including the Hellenic Open University, in various subjects (including ICT, tourism studies, accounting, economics and administration, energy and environment, food safety, production management, and programmes for international students and repatriated Greeks).

Moreover, almost all the ministries and their supervisory bodies implement continuing vocational training programmes for their staff or broader groups (distance learning for Greek language teachers, cross-cultural communication, youth entrepreneurship, job-seeker training courses in green occupations, training for mediators, and health professionals, judges, etc.).

Currently, qualifications that are acquired through continuing vocational training are not correlated to levels of the national qualifications framework.

Formal, non-formal, initial and continuing VET



Source: https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/greece-2019

Both formal and non-formal learning provide the knowledge, skills and attitudes necessary to enter the labour market. Only **initial VET is linked to professional rights (licences).** Some initial VET programmes give learners access to the next qualification level (post-secondary or tertiary level). **Non-formal continuing VET is part of adult learning. It is partially recognised in the private sector of the labour market.**

Formal VET leads to qualification level 4 and non-formal VET to qualification level 5 (of NQF and EQF), apart from the non-formal continuing VET certificate for "Security staff" awarded to professionals, which is at NQF level 3 (law 4229/2014). The VET standard specifies the volume, learning outcomes, conditions for completion and continuation of studies for each VET type.

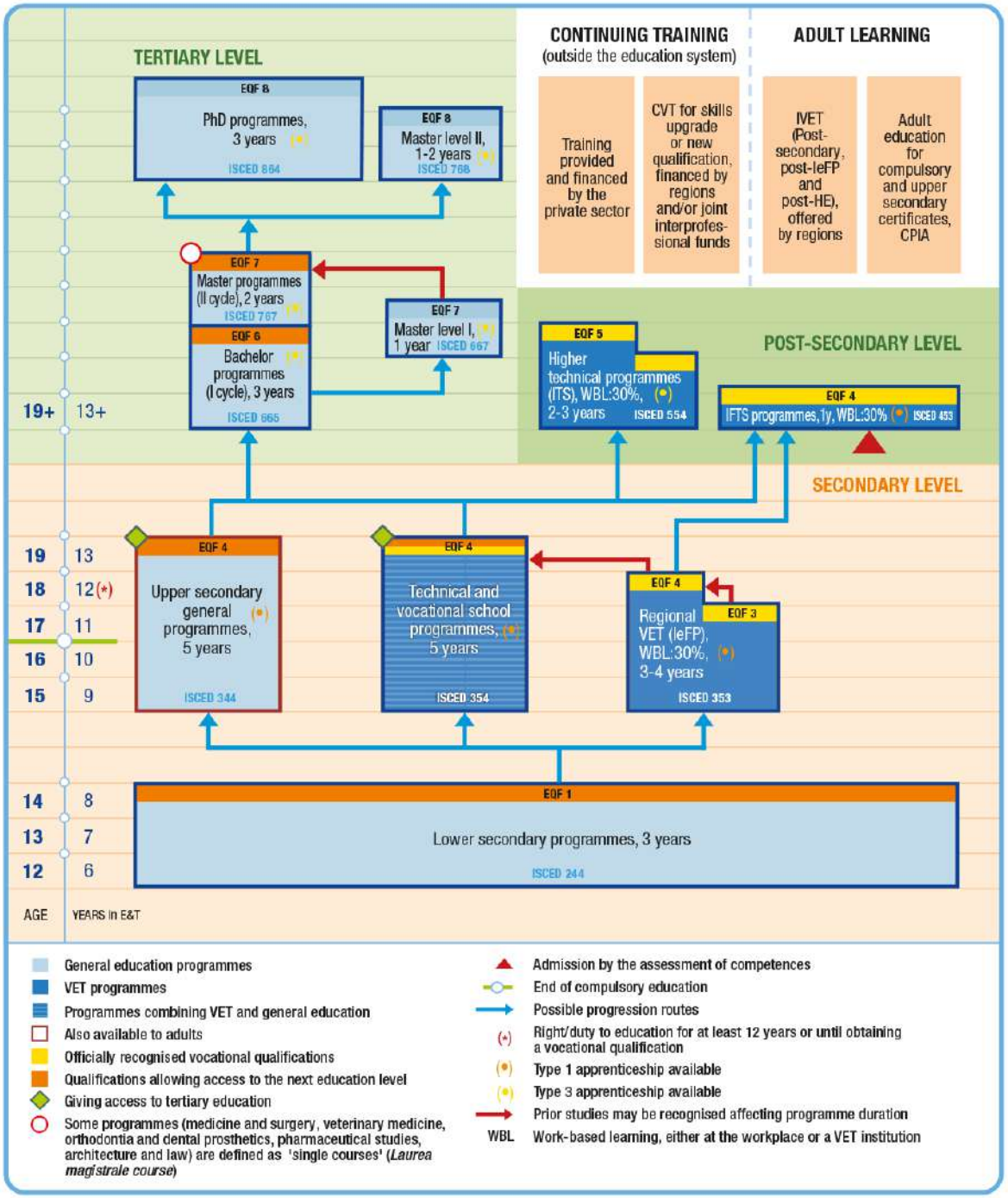
There are several VET learning options:

- school-based learning;
- work practice (including internships and apprenticeships);
- self-learning (too partial).

The title of VET programmes is awarded to learners after state examinations that certify their qualifications. The examinations are usually learning outcomes-based and include a theoretical and a valuable part. The education ministry or the National Organisation for the Certification of Qualifications and Vocational Guidance (EOPPEP) or the labour ministry are responsible for the certification procedure.

Italy

Chart of the national education and training system in Italy



NB: ISCED-P 2011.
Source: Cedefop and ReferNet Italy, 2019.

Compulsory education lasts 10 years, up to age 16. At age 14, learners choose between general education and VET. They have the 'right/duty' (diritto/dovere) to stay in education until age 18 to accomplish 12 years of education and/or vocational qualification.

VET in Italy comprises the following main features:

- education and employment ministries lay down the rules and general principles, but the regions and autonomous provinces are in charge of VET programmes and apprenticeship-type schemes;
- there are three types of apprenticeship with one type (Type 2) not corresponding to any education level but leading only to occupational qualifications recognised by the labour market;
- continuing VET is mainly directed towards employed people;
- in January 2018 Italy adopted the national qualifications framework which is very important for the re-designing of qualifications.

Providers of Vocational Education and Training

- **Upper secondary vocational education**

All upper secondary education programmes are **school-based** but could also be delivered as apprenticeships (type 1).

In **technical school** programmes (*istituti tecnici*), learners can acquire knowledge, skills and competences to carry out technical and administrative tasks. These programmes start at the age of 14 and finish at 19. They offer an upper secondary education diploma – **Technical schools EQF 4** (such as tourism, graphics and communication, administration, finance and marketing).

In **vocational school** programmes (*istituti professionali),* learners acquire specific theoretical and practical preparation enabling them to carry out qualified tasks in production fields of national interest. These programmes start at the age of 14 and finish at 19. **They offer an upper secondary education diploma**.

VET for adults is provided by different **public and private providers**. It includes programmes leading to upper secondary VET qualifications to ensure progression opportunities for the low-skilled. These are provided by **Provincial Adult Education Centres (CPIA - *Centri Provinciali per l'Istruzione degli Adulti*)** under the remit of the education ministry.

- **Post-secondary VET**

The post-secondary education and training system consists of two different training types: **Higher Technical Education and Training (IFTS)** and **Higher Technical Education (ITS)**. Each with their specific characteristics, the two pathways are a key segment of the Italian education system.

Higher Technical Education and Training (IFTS) are higher technical training programmes. IFTS programmes are to be provided by various providers (on the precondition that a school, a university, an

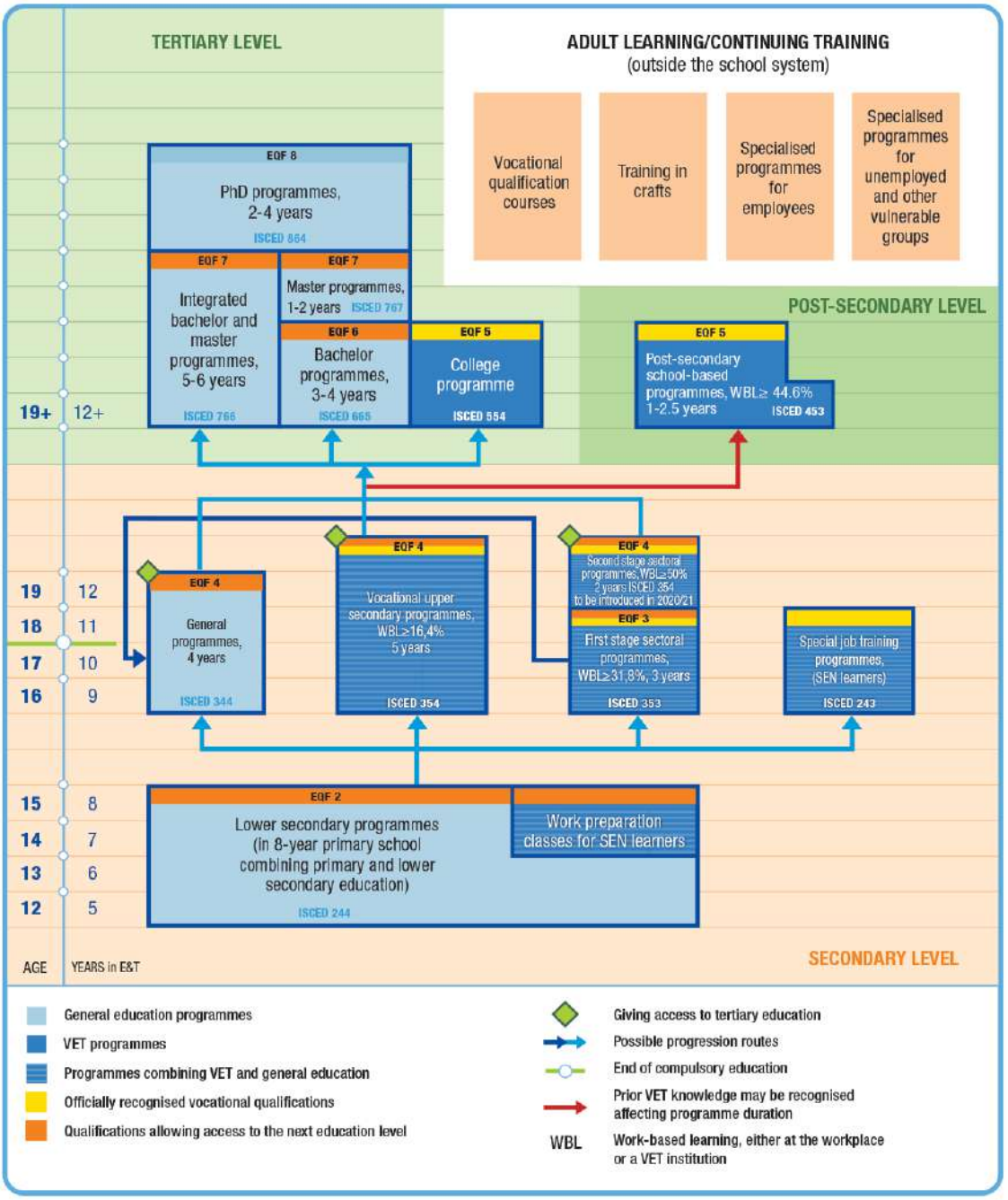
accredited training institution and a company that aggregate into a Temporary Association of Companies (ATI) or a Temporary Purpose Association (ATS) participate

- **Continuing Vocational Education and Training (CVET)**

CVET mainly addresses the employed, consists of a set of training initiatives that are promoted based on some legislative measures and some support tools coordinated and managed by the labour ministry, the economic development ministry, the regions and autonomous provinces and the social partners.

Poland

Chart of the national education and training system in Poland



NB: ISCED-P 2011.
Source: Cedefop and ReferNet Poland, 2019.

Over the past three decades, Poland's education system has undergone several profound changes in its structure, forms of organisation and management, as well as of the core curriculum. As a result of these changes, distinctive VET features were developed:

- a flexible VET system allows changing pathways at any point;
- a register classifying occupations (COVE), each comprising one to three qualifications that can be acquired in IVET and CVET. The register is consistent with the classification of occupations in the labour market. A VET qualification diploma can be issued only when all qualifications required for employment have been acquired (on passing State vocational examinations).

Providers of Vocational Education and Training

- **Upper secondary and post-secondary VET**

VET in Poland is provided at upper secondary and post-secondary levels that are **mainly school-based**. At the upper secondary level, students can gain vocational qualifications **at a three-year basic vocational school** or a **four-year upper secondary technical school**.

Polish VET at **technical schools** and **post-secondary schools** is mainly school-based with a share of 50% practical training in VET programmes, while in **basic vocational schools,** the practice and theory proportion is 60% and 40%, respectively.

VET schools are autonomous in choosing optional curricula for VET: either subject-centred or modular curricula, which can be easily modified, depending on labour market needs.

- One VET core curriculum for all occupations. Separate VET qualifications within specific occupations are described in the core curriculum as a set of expected learning outcomes: knowledge, occupational skills, and personal and social competences allowing learners to handle their occupational tasks independently;
- vocational qualification courses enable adults to acquire qualifications faster than IVET learners;
- possibility to validate qualifications obtained in different learning contexts, including professional experience, by taking external examinations.

- **Adult learning and continuing VET**

Adult learning and continuing VET in Poland is available in

- Continuing Education Centres,
- Practical training centres,
- Further training and professional development centres, and
- Initial VET schools.

Continuing education centres (CKU) in Poland are public institutions – continuous, free education for adults to enable them to get a profession.

Governance

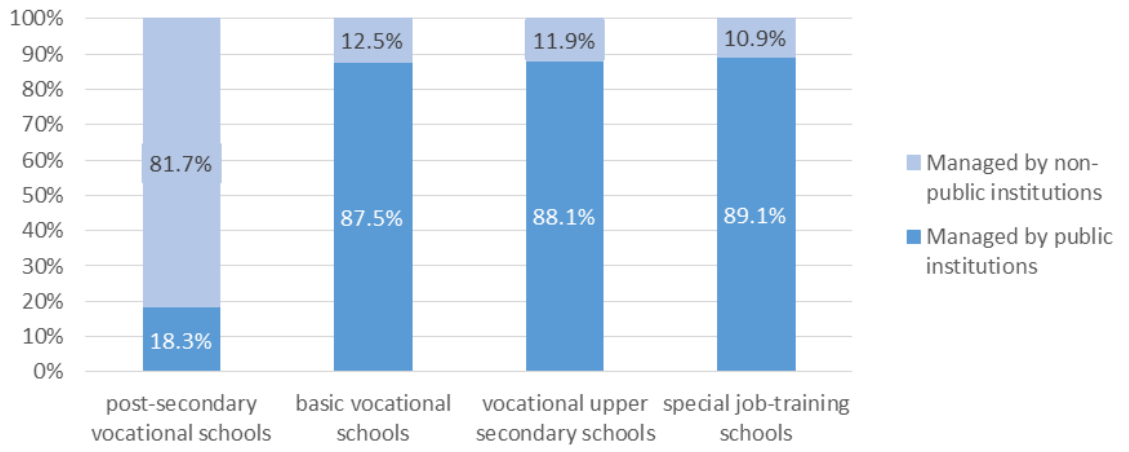
VET in Poland has **three governance levels**:

- national (ministries),
- regional (school superintendents, mainly in pedagogical supervision)
- and county (powiat – managing schools).

The **education ministry is in charge of VET policies at the secondary level**, supported by other ministries responsible for particular occupations. The Ministry of Science and Higher Education is responsible for higher VET. Social partners advise policymakers on necessary changes in VET.

Local government units manage the majority of public education institutions in Poland. Counties (powiaty) are responsible **for upper secondary schools**, including **vocational schools**, and schools for children with special needs; the regions (województwa) are responsible for schools of regional and trans-regional significance (e.g. groups of schools or vocational schools important for the regional economy).

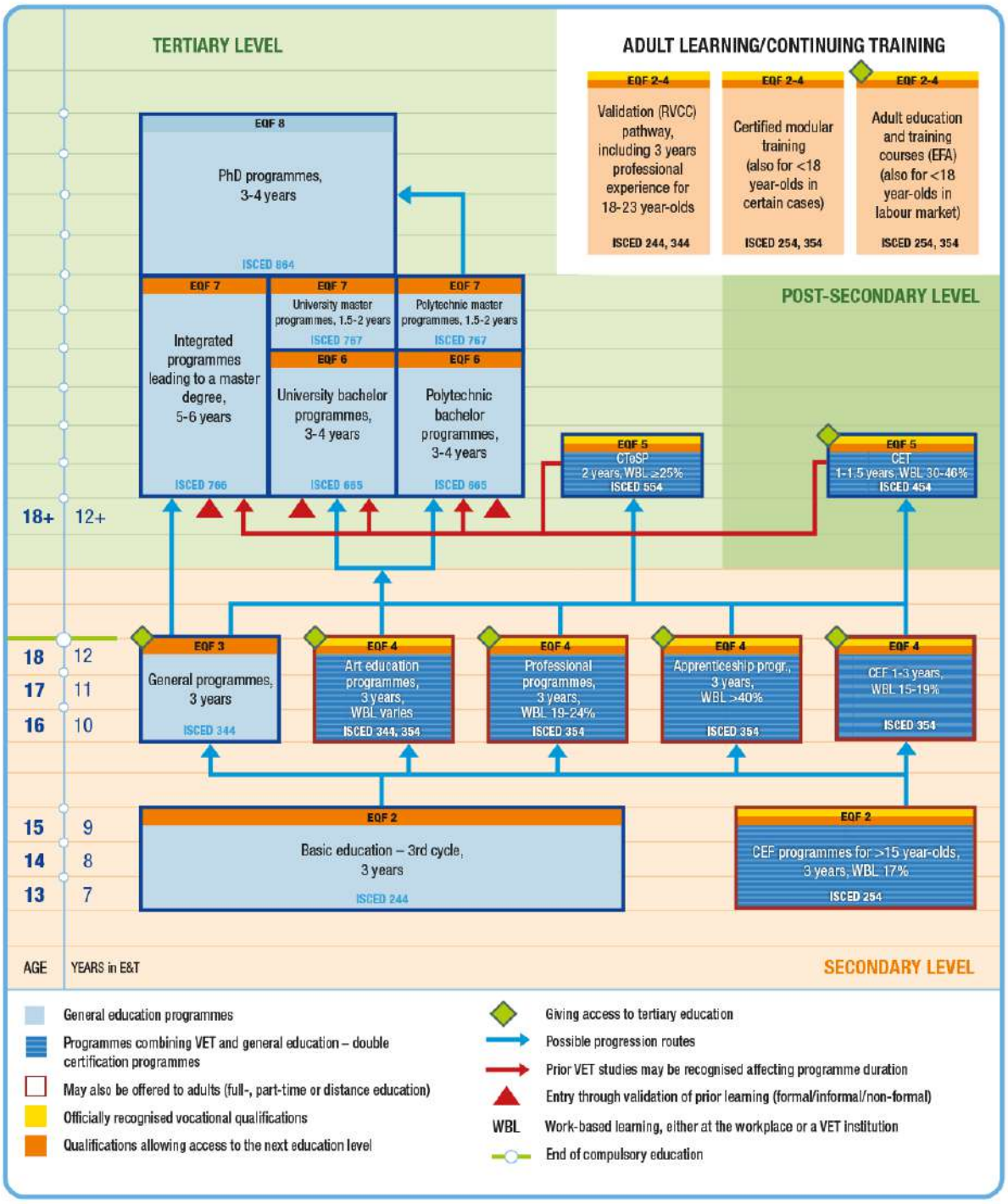
Central government units (usually ministries) often manage vocational and fine arts schools. All types of schools can also be established and managed by non-public institutions, such as religious and social associations. Generally, in Poland, the higher the education level, the higher the share of non-public institutions. The chart below presents the structure of vocational schools by type and management institution in 2016.



Source: ReferNet Poland calculation based on Local Data Bank, Statistics Poland, https://bdl.stat.gov.pl/BDL/start, at https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/poland-2019

Portugal

Chart of the national education and training system in Portugal



NB: ISCED-P 2011.
Source: Cedefop and ReferNet Portugal, 2019.

VET in Portugal offers a wide range of programmes, flexible in type and duration. The national qualifications system has reorganised VET into a single system where programmes lead to a double certification. VET for adults is an integral part of the national qualification system, having education and training programmes for adults and recognition and validation of prior learning as key elements.

Providers of Vocational Education and Training

The main providers of VET in Portugal are:

- networks of public, private and cooperative schools;
- professional schools;
- IEFP vocational training centres (directly and jointly managed);
- accredited training providers; linked with community entities, namely local authorities, enterprises or business organisations, other social partners and local or regional associations, set up by protocols aimed at maximising physical structures and human and material resources.

- **Secondary education programmes**

VET programmes are usually part of secondary education, but in 2004, education and training programmes for young people were introduced in the second and third cycles of basic education.

The following are secondary education VET programmes:

- professional programmes;
- apprenticeship programmes;
- specific curricula programmes;
- specialised artistic programmes

- **Initial VET (IVET)**

In Portugal, IVET offers four types of CEF (cursos de educação e formação de jovens) programmes based on the previously achieved educational level. These projects are **not** part of the formal educational system and their main objective is to reduce the early leavers from education and training. CEF programmes are provided by a network of:

- public, private and cooperative schools
- professional schools
- vocational training centres
- accredited training providers linked with local authorities, enterprises or business organisations, social partners and local or regional associations.

- **Post-secondary education programmes**

Technological specialisation programmes (*cursos de especialização tecnológica, CET and CTeSP*) are IVET **post-secondary education** programmes that **are** part of the formal education and training system.

CET and CTeSP programmes are available for young people and adults. To enter these programmes, learners should fulfil one of the following requirements:

- be secondary education graduates;
- have completed the 11th year of compulsory education, and enrolled in the 12th but without graduating;
- have a CET diploma or a higher education degree.

CET programmes are carried out by **public, private and cooperative schools**, IEFP vocational training centres, technical schools, and other training providers certified by the labour ministry. Providers develop their programmes in collaboration with relevant stakeholders, such as employer associations and company representatives adopting different training methods, including traineeships. When the provider is subject to public funding, the CET programmes are free.

CTeSp programmes or high technician training programmes (Cursos de Técnicos Superiores) are also provided by private and cooperative training centres or schools and universities. CTeSP programs take a minimum of two years, and providers develop them according to the equivalencies system for higher education curricula and the collaboration with the same relevant stakeholders as CET programs.

- **VET for adults - Continuing VET**

As far as VET for adults is concerned, there has been an emphasis on recognising, validating and certifying competencies gained in formal, informal and non-formal contexts, and vocationally oriented education, creating conditions of access in both cases, an integral element of SNQ and aims to fulfil many of its main objectives. This programme focuses on lifelong learning, addresses adults' learning needs and increases their employability by upgrading their knowledge, skills and competences. Upskilling adults make use of the RVCC process (recognition of prior learning) and two main programmes:

- EFA programmes: adult education and training courses, (Cursos de educação e formação de adultos - Cursos EFA), extending the network of recognition, validation and certification of competences centres, later called **New Opportunities Centres** (Centros Novas Oportunidades - CNO), now Qualifica centres, and certified training providers.

Focusing on the employed adults, already integrated into the labour market or still during the final stages of an apprenticeship or internship, specialised professions are regulated by governing bodies that demand:

- training courses provided by governing bodies of specialised professions: initial training to gain access to the professional licence,
- and mandatory regular training for the update of knowledge and skills, to maintain the professional licence

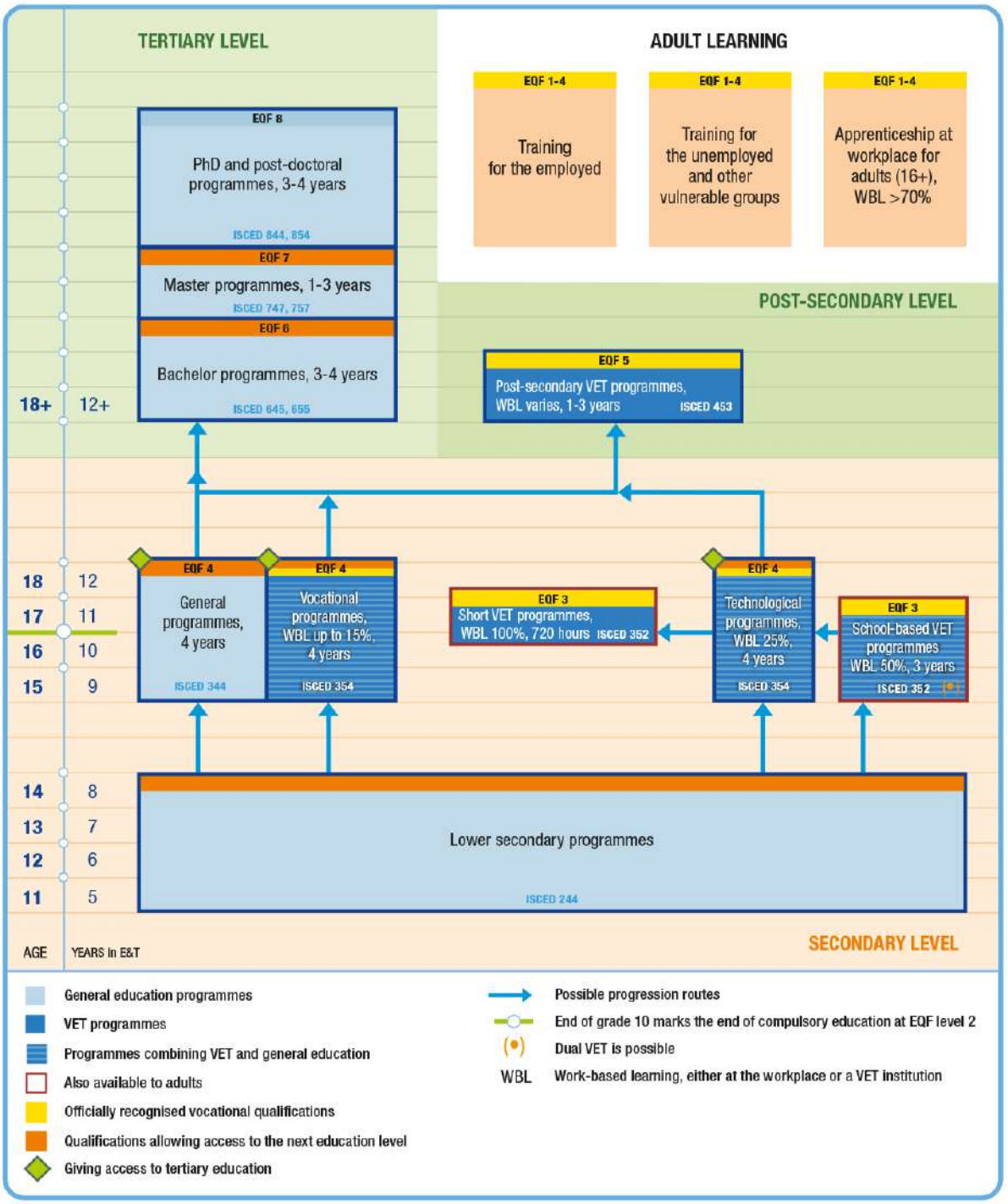
- **OFP programs for adults**

OFP (Outra Formação Profissional) offers other innovative training courses and specialise mainly in STEM careers. The curricula of these training courses are more flexible and updated in short periods to follow the fast pace of science and technological progress. The OFP are not part of the formal education and training system, and accredited training providers are highly specialised and linked with local authorities, enterprises, or business organisations.

Depending on the specific OFP, it may be certified as post-secondary training or a VET for adults training courses.

Romania

Chart of the national education and training system in Romania



NB: ISCED-P 2011.
Source: Cedefop and ReferNet Romania, 2019.

Providers of Vocational Education and Training

- **Initial VET**

Initial VET is provided at **upper secondary and post-secondary levels**. Learners may enrol in upper secondary VET at age 15 (grade 9). Qualifications can be acquired in upper secondary VET through vocational, technological and professional (called 'school-based VET') programmes.

At the upper secondary level, there are four types of VET programmes:

1. three-year professional programmes (ISCED-P 352, învățământ profesional,
2. called **'school-based VET'** provide graduates with a professional qualification of 'skilled worker' at EQF level 3 (i.e., cook, baker, carpenter). It is provided by '**professional schools'** that cooperate with employers who provide compulsory in-company training.
3. four-year technological programmes (ISCED-P 354, liceu tehnologic) offer graduates an upper secondary school-leaving diploma and the EQF level 4 'technician' qualification in services, natural resources, environmental protection and technical study fields (such as technician in gastronomy, industrial design technician etc).
4. short VET programmes (ISCED-P 352 stagii de practica) provide learners, who have completed two years of a technological programme (completed grade 10) with a professional qualification.
5. four-year vocational programmes (ISCED-P 354, EQF level 4, liceu vocational) provide graduates with a professional qualification in military, theology, sports, arts and pedagogy as well as with an upper secondary school-leaving diploma.

Initial VET providers are:

- technological high schools/colleges (licee tehnologice/ colegii tehnice), which provide four-year technological programmes leading to EQF level 4 or three-year professional programmes; all high schools fulfilling criteria set by the education ministry may apply for a 'college' title, which is recognition of the quality of their education and training programmes:
- professional schools, which provide three-year professional programmes;
- (vocational) military, theology, sports, arts and pedagogy high schools/ colleges, which provide vocational programmes.
- post-secondary high schools (or 'post-high schools'), which provide postsecondary VET programmes; these are often independent departments under technical colleges or universities.

- **Continuing VET**

Continuing VET (also known as adult vocational training) is available for learners from age 16. Training programmes help develop competences acquired in the existing qualification, the acquisition of new competences in the same occupational area, the acquisition of fundamental/key competences or new technical competences, specific to a new occupation.

Adult training courses are offered by authorised training providers or by employers to adults willing to obtain a qualification, specialisation or key competences:

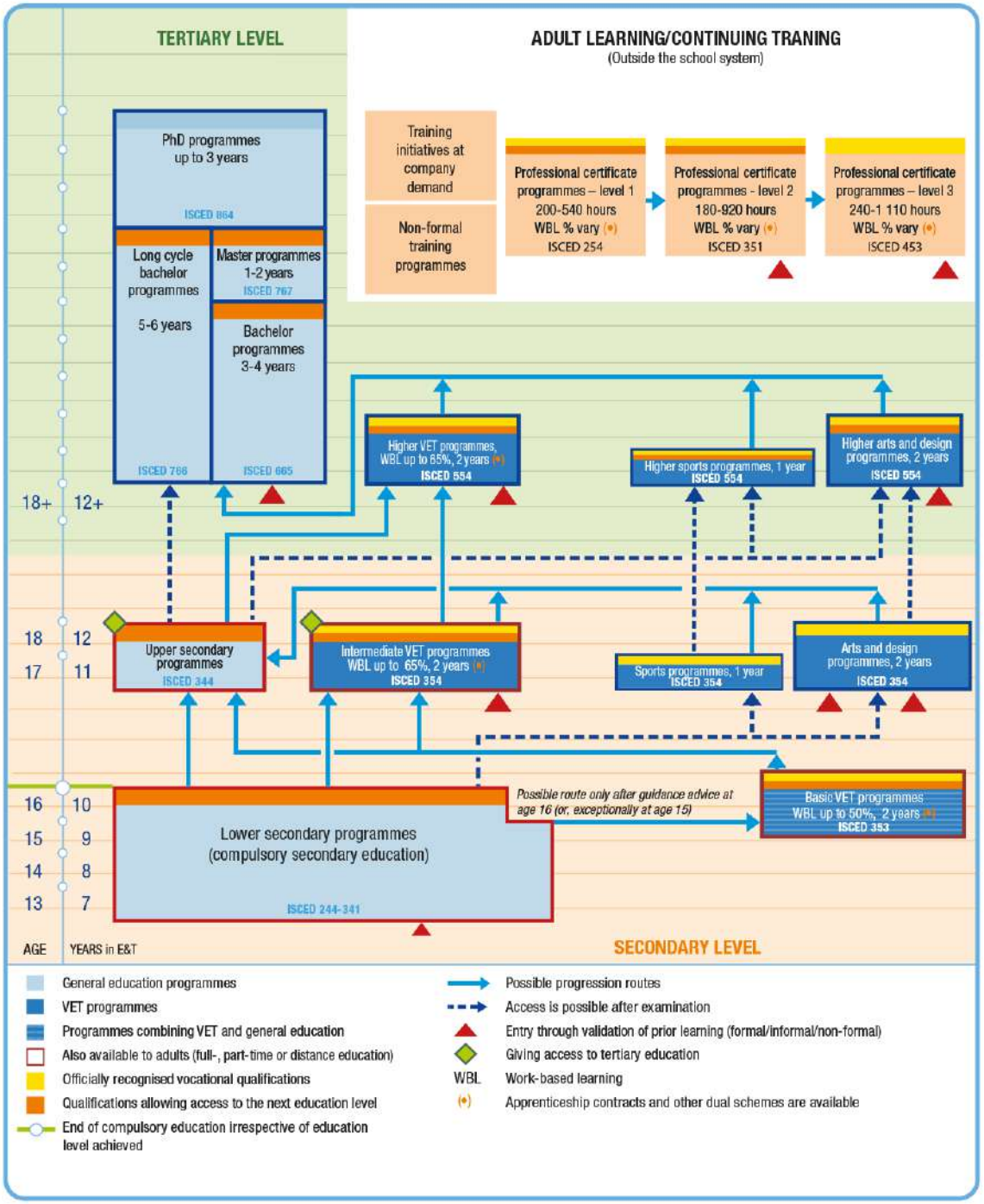
- authorised courses for the unemployed, employees, people who resume work after maternity leave or long sickness leave, Roma, groups at risk and other groups;
- courses organised by employers for their staff without issuing nationally recognised certificates;
- internship and specialisation, including periods of learning abroad;
- all other forms of training.

The National Agency for Employment offers continuing VET programmes based on analysis of vacancy and jobseeker data and formulated in the annual national plan for vocational training.

Adult vocational training providers are authorised, in line with Government Ordinance No 129/2000, to carry out vocational training based on occupational/vocational training standards after authorisation by the county commission.

Spain

Chart of the national education and training system in Spain



NB: ISCED-P 2011. The Spanish education system is not referenced to EQF levels.
Source: Cedefop and ReferNet Spain.

Providers of Vocational Education and Training

Main education authority providing VET in Spain include:

- public, publicly-funded private and private institutions approved by the competent education authority;
- in some cases, integrated training centres which are public and provide both initial vocational training within the education system, and vocational training for employment.

Public, publicly-funded private and private centres are the main providers of VET programmes (only one in four learners attends private centres).

- **Basic VET and Upper Secondary VET**

Basic VET (or *FP Básica* in Spanish) is open to Lower secondary education (known as *ESO* in Spanish) **students aged 15 years**, who meet certain age and academic requirements. Students passing this basic VET programme are awarded a diploma with academic and professional validity (Título profesional básico). Basic VET cycles run in a 2-year programme of 2 000 hours of theoretical and practical training, of which a minimum of 240 hours are completed in workplaces. It gives direct access to intermediate VET cycles and the possibility of sitting the exam to obtain the ESO diploma, opening up access to upper secondary general education programmes. Students who finish basic VET will obtain the ESO diploma directly if the teaching staff considers they have achieved the objectives and necessary skills of ESO level. Upper secondary education comprises high school (the general academic route, bachillerato in Spanish) and intermediate VET, neither of which is compulsory.

The Spanish initial vocational education and training system, IVET, is organised at basic (lower secondary ISCED 353), intermediate (upper secondary ISCED 354) and higher (tertiary ISCED 554) levels.

- **Adult education**

The aim of adult education is to offer people over 18 (in some cases over 16) the possibility to acquire, update, complete or expand their knowledge and skills for their personal and professional development. To achieve this goal, the education authorities collaborate with other public authorities responsible for adult learning and particularly with the labour authorities, as well as with local government and social partners (employers and trade union organisations; as well as chambers of commerce in dual VET). Education authorities provide basic education for adults who for different reasons do not hold the end of compulsory education qualification (título ESO). It comprises primary education, lower secondary education, vocational training, and language education (non-formal education and training programmes). Post-compulsory studies (Bachillerato and vocational training for adults) are also provided. Programmes for adults may be offered on a full time, part-time or modular basis.

- **Continuing VET**

Vocational training for employment falls mainly under the remit of the labour ministry. It includes training programmes for both employed and unemployed workers, with the aim of improving the employability of the population through professional training or retraining. It also provides an opportunity for people who left education with low or no qualifications to improve their competences and skills or level of qualification.
There are two main types of VET programmes that target people who do not hold any qualification (partial or full) or who need to upskill their qualifications so as to improve their employability:

- programmes linked to the national catalogue of occupational standards (CNCP) which provide training to obtain a professional certificate (Certificados de Profesionalidad in Spanish - CdP);
- programmes not linked to the National Catalogue of Occupational Standards, some of which are included in the Catalogue of Training Specialities of the state public employment service.

Common categories

1. Upper secondary vocational training students. Main providers: Formal Educational System (vocational/technical/ secondary schools), (ages 14+)
2. Initial VET students: **Main providers: Public and private vocational training centres (ages 18+)**
3. Continuous vocational training students: Compared with initial VET, training is often shorter in Continuous vocational training centres. **Main providers: Public and private continuous vocational training centres. (ages 18+).**

In Greece, Poland, Romania and Spain, the minimum age to enter VET is 15, whereas in Italy the minimum age is 14.

The main providers are categorized as follows:

Country	Upper-secondary VET providers	Initial VET providers	Continuing VET providers	Adult
Greece	School-based VET (EPAL & EPAS)	Initial Vocational Education Centers (IEK)	**Continuing** Vocational Educational Centres, Non-formal Centres, Lifelong Learning Centres (LLL)	Adult Vocational Educational Centres (KEK) Specialised programmes for employed people
Italy	School-based VET Technical schools Vocational schools	linitial vocational education and training (VET) centres/ institutions five-year programmes (EQF level 4) at technical schools (istituti tecnici) & vocational schools (istituti professionali)	VET provided and financed by the private sector/ CVET for skills upgrade by regions or joint interprofessional funds	Provincial Adult Education Centres
Poland	School-based VET - three-year basic vocational schools - four-year upper secondary technical school	Post-secondary school based programmes technical schools &	Outside the school system/ Vocational centres offering vocational qualification courses/	Outside the school system/ Vocational centres offering vocational qualification courses/ specialized programmes for

		post-secondary schools	specialized programmes for employees/ for unemployed etc	employees/ for unemployed etc Continuing Education Centres, Practical training centres, Further training and professional development centres, and Initial VET schools.
Portugal	School-based VET, public & private schools apprenticeship programmes, provided by specific training providers	Public, private and cooperative schools, IEFP vocational training centres, technological schools and other training providers certified by the labour ministry	The same as adult VET Governing body of specialised professions	New Opportunities Centres (Centros Novas Oportunidades - CNO), now **Qualifica centres** Universities and specialised training centres (private and public) for CTeSP and OFP Continuing Education Centres, Practical training centres, Further training and professional development centres, and Initial VET schools
Romania	School-based VET professional schools' Vocational High schools	Post-secondary VET providers Technological high schools/colleges post-secondary high schools	Vocational training providers Authorised training providers	Adult vocational training providers authorised training providers
Spain	School-based VET: Lower secondary VET programmes/ Intermediate VET	Higher VET/ Higher VET programmes/ Higher sports programme/ Higher arts and	Outside the school system/ Professional certificate programmes Levels 1, 2 & 3/	Outside the school system/ Professional certificate programmes Levels 1, 2 and 3/ Non-formal training centres

		design programmes	Non-formal training centres Public, publicly-funded private and private centres	Public, publicly-funded private and private centres

Challenges and needs in the Five Stages of E-Learning

"*More than ever, we believe that learners are at the centre of the teaching and learning process. As teachers, we can filter, highlight, guide, give feedback, and encourage, but the biggest variable in what determines final performance is what the learners bring to the table. The learners' prior knowledge and its structure, their learning strategies, goals, beliefs, self-efficacy, and motivations all contribute to their learning.*
- Dr Marilla Svinicki

Learning is a process that students themselves achieve. Interrelated factors influencing this process are cognitive, social and motivational.

Cognitive factors

Intellectual aspects in the learning process refer to the thinking processes and mental procedures involved. These factors include:

1. Student's prior knowledge background and educational and other experiences:

   If the pre-existing experience or misconceptions struggle with the newly acquired knowledge, this may hinder the learning process and can obstruct meaningful and lasting educational effort.

2. Student's learning strategies and skills:

   The lack of learning to learn competence can significantly challenge the whole learning process. If learner doesn't know how to organize themselves and their study throughout the learning process, they will struggle to absorb new information. An experienced learner focuses their education around the core issues or concepts, whereas inexperienced one around facts and formulas they have to memorize. As a result, the novice student will lack contextualized understanding of the course.

   Further, if the learner's approach to education is based on memorizing and reproducing the content learnt on an exam, the result of studying will be shallower then that of a student who aims at understanding what they are learning, who are actually interested in the subject and have a time to pursue this interest.

Social factors

Social process, understood as learner's interaction with instructors and classmates, is a very important part of learning. Online learning environments may affect the learning experience through numerous challenges, including

1. setting proper instructor-student interactions;
2. ensuring diverse course demographics;
3. enhancing student-student interactions;
4. fostering ethical social content in the course;

5. facilitating frequent interrelations by the course guide;
6. setting positive classroom climate and dynamics.

Motivational factors

Internal psychological processes of learning play a fundamental role in its outcomes. Students' emotions and motivations, including how they feel about their learning may enhance or disrupt the educational process. Hence, its two aspects should be taken into account:

1. Relevance – if the student is motivated to pursue higher goals and has a feeling that they are in control of the learning process.

2. Expectations – if the student believes they can successfully finish the course, i.e. doesn't believe that the talents are prerequisite.

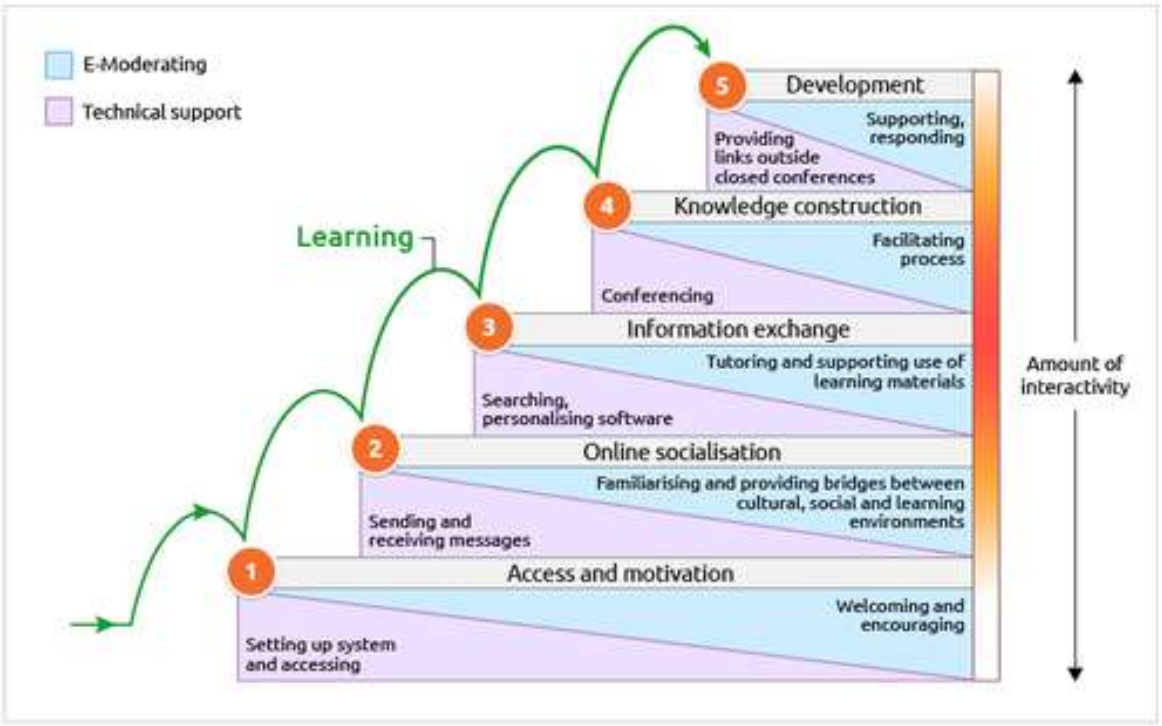
Their determination lasts longer and is stronger during the learning course.

At different stages, though, learners face diverse challenges and needs. The stages considered for the analysis of challenges and needs of the target groups of the Conceptual Framework are those identified in "Five-Stage Model" developed by Prof. Gilly Salmon, professor at the University of Leicester.

The ***Five-Stage Model*** is a research-based seminal model developed by Gilly Salmon, Professor of E-learning and Learning Technologies at the University of Leicester, in 2004. The Model provides a framework for learning designers to create structured and paced e-learning programs to support the students' online learning journey.

The Model is based on five stages learners go through:

1. *Access and motivation;*
2. *Online socialisation;*
3. *Information exchange;*
4. *Knowledge construction;*
5. *Development.*



Five-Stage Model by Prof. Gilly Salmon
(Source: https://www.gillysalmon.com/five-stage-model.html)

Stage 1: Access and motivation

In the first stage, learners are still transitioning to the new learning environment. They will need easy access to the platform, processes and systems in place, and purpose for reasons to spend time and effort in the online learning experience throughout the units of study.

Challenges

- Having easy access to the learning environment
- Becoming engaged in a new undertaking
- Lacking confidence in individual's ability to master the course content, being and staying determined
- Having pre-existing misconceptions about the course content that interfere with learning
- Lacking prerequisite or background knowledge for the course
- Asking questions during class

Needs

- A spark – small piece of information stimulating change
- A place for individual contribution of each student
- Responding to other students' contribution
- Receiving feedback from the moderator
- One clear message with all instructions
- Authentic tools for assessment
- Help in maintaining self-motivation in order to continue

Takeaways from the interviews with VET learners

Most of the interviewed students reported that one of their bigger issues during online learning experiences is the organization of their own learning. Particularly, one of the most common challenges reported is the lack or low frequency of synchronous interactions. Interviewed learners, in fact, shared the need for:

- more and more frequent feedback from teachers during e-learning or distance learning experiences, requiring the opportunity to promptly interact with teachers or trainers to clarify their doubts, often challenged by either the lack of open conversation channels, or because conversations are not extensive enough via a chat or a forum;
- the use of communication and collaboration tools to interact with their peers in real-time and foster cooperative classes

Furthermore, time management issues have been frequently reported as one of the key challenges during e-learning experiences, mainly associated with:

- lack of motivators since they feel alone in their learning process, and they would prefer to have more contact with the teachers and other students;
- lack of constraints, such as feeling the pressure to perform well and within a set timeframe.

Stage 2: Online socialisation

In Stage 2, individuals will be establishing their personal identities with the learning group and then finding others to learn with. This stage can be facilitated by creating a micro-community through active and interactive learning and teaching.

Challenges	• Establishing personal identity within the learning group • Team building and collaboration
Needs	• The moderator to help get to know the landscape • Finding other students within the online environment • Working in small groups

Takeaways from the interviews with VET learners

Lack of interaction with other learners or instructors is one of the most common problems faced by VET learners. It's also one of the inherent problems with online classes in general—at least in their strictly asynchronous version. During an e-learning experience, it is complicated to feel like belonging to a group that is studying the same thing if they can't match names with faces other peers are not having their cameras on, making it very difficult to interact with them. The lack of space for conversation is also an obstacle, as several participants don't have opportunities to share things about themselves and their expertise in the field. Therefore, they cannot match the name with the face, and they cannot read their

body language. The presence of icebreakers and game-like activities would make it easier for participants to build trust and become comfortable in sharing and participating.

Stage 3: Information exchange

In Stage 3, learners will engage in a mutual exchange of information and make their own course-related contributions. To facilitate this stage, learning design should be planned around the learning outcomes, the pedagogical objectives and the interactions between the group of learners. Cooperation between individual learners begins to occur and students support each other and the achievement of the goals of others while they work together.

Challenges	• Cooperating with other students • Information interchange • Students just wanting to know “the right answer” • Setting their own personal goals and seeing the relevance of the course content to the chosen career/course
Needs	• Not too difficult tasks but move upwards with the assistance of a guide • Being supported by the learning community • Assessment tools

Takeaways from the interviews with VET learners

All interviewees stated a significant deterioration in peer relations. The only contact that students made with each other took place outside the classroom, on other platforms used by young people. However, these relationships were very superficial as they were limited to exchanging information about homework or tests.

VET learners in consortium countries reported that in online training there are participants who are close to each other, which facilitates sharing and exchange of information if they are together in simultaneous rooms. When they are placed with people with whom they are unfamiliar there is the challenge of being comfortable in sharing their ideas.

A summary of each course in text format would help them retain the information easily, followed by a diagram, or a scheme. Quizzes to test the information are also nice. Allowing learners to create decks of flashcards with the information they just followed, is a must-have when the information’s course is heavy. In this way, it is easy to come back to the information at any time.

Stage 4: Knowledge construction

At this Stage, interactions can become more collaborative and team-oriented. Learners will be ready to engage in multiple and more complex activities that pursue group goals and contributions. Students

can be more than just consumers of knowledge: they could become contributors. Activities focused on critical thinking, judging, evaluating can be introduced, as well as other activities to increase creativity, discovering and inventive work.

Challenges
- Establishing joint goals and true partnership with classmates
- Resistance to group work and reluctance to collaborate within learning community
- Nourishment structuring to avoid forgetting one unit of material shortly after class moves on to a new one
- Properly estimating how much time is needed to devote to learning, including assignments and ability to break down assignments into manageable parts of the material

Needs
- Guidance through complex portals of knowledge
- Collaborative activities
- Assessment tools

Takeaways from the interviews with VET learners

Among the challenges reported by VET learners for this learning stage, the most stringent is the lack of group engagement. The courses were mainly static, with lecturers presented by the instructor. They were tempted to do other tasks at the PC during the lectures, even though they knew they would miss much information. Some learners suggested reducing the size of the groups so that interaction at the lecturer-student level as possible during classes would mobilize students to authentic participation in lectures and exercises; They also proposed to change the working methods used by lecturers to more interactive and activating (including games, quizzes). They mentioned that if there were more group work tasks, it would be necessary for all the people involved to work together.

Stage 5: Development

Participants are comfortable working together and can fully exploit the teamwork for their learning and the technology used. Students at this stage should own more responsibility for their learning and the group. They can also look backwards to what they learned during the previous stages. Students should be prepared to learn about how they are learning to promote self-awareness and become independent learners. Activities at this stage should include reflection, evaluation, and critiquing the learning experience.

Challenges
- Becoming fully responsible for the learning process, i.e. coming to class unprepared
- Being evaluated and critiqued
- Looking at the horizon to help with future courses.

Needs
- Guidance through complex portals of knowledge
- Collaborative activities
- Assessment tools

Takeaways from the interviews with VET learners

Some respondents mentioned that the self-assessment tests are helpful to understand their actual level of knowledge and know the areas where they need to study more deeply. In addition, many of the interviewed VET learners consider that collaboration in small groups works beneficial, allowing them to learn from each other.

Validation

Methodology

The aim of the validation work was to assess, through expert judgment, the following desired charachteristcs of the Framework:

- **Clarity** - The Framework is written in a clear and understandable manner;
- **Logic** - The Framework is presented and organized in a logical manner;
- **Effectiveness** - The Framework is capable of producing its desired result, such as to provide teachers and trainers with a balanced structure to design autonomously their gamified online learning programs and enhance students' learning journey;
- **Suitability** for the target groups, and therefore Upper Secondary, Post-secondary and Continuing VET learners;
- **Comprehensiveness** - The Framework is appropriate to support students in all the five different stages of online learning, and therefore is appropriate to:

[Stage I: Access and motivation]
- ease learners' transition to a new learning environment;
- motivate learners to spend time and effort in the new online learning experience;

[Stage II: Online socialisation]
- let learners establish their personal identities with the learning group;

[Stage III: Information exchange]
- facilitate learners' mutual exchange of information.
- design the learning journey around the learning outcomes and pedagogical objectives;
- design interactions between the group of learners, enhancing cooperation between individual learners;

[Stage IV: Knowledge construction]
- foster students' critical thinking, judging, evaluating and creativity skills;

[Stage V: Development]
- favour students' reflection, evaluation and critiquing of the learning experience.

The respondents were invited to rate 17 statements describing the characteristics on a 4-point Likert scale:

1 - Completely disagree;
2 - Disagree;
3 - Agree;
4 - Completely agree.

Target groups. The targeted groups of validation were identified in teachers and trainers of Upper, Post-secondary and Continuing VET institutions of the six countries of the Sparks Project Consortium: Greece, Italy, Poland, Portugal, Romania and Spain. Participants' working sectors and fields were diverse, to favour the collection of multidisciplinary perspectives on the Framework's validity.

Implementation method. The validation was carried out from 26 January to 11 February 2022 in three main phases:

1. **Presentation of the Framework**

Each partner organisation's researcher presented the Framework to the targeted experts in the Vocational Education and Training field, and invite them to provide their evaluation through an online survey. The

presentations was implemented via email, phone interviews or online meetings, and structured as follows:

- introduction of the discussion topic;
- presentation of the Sparks project and the highlight of the key role the Framework plays in the project;
- presentation of the Framework's structure;
- instructions to read the Framework and to fill in the questionnaire.

2. Data collection

A minimum number of 120 questionnaires was required for the validation. Each partner organisation was responsible for promoting participation in the survey at local, regional, and national levels in order to engage min. 20 experts in the VET field.

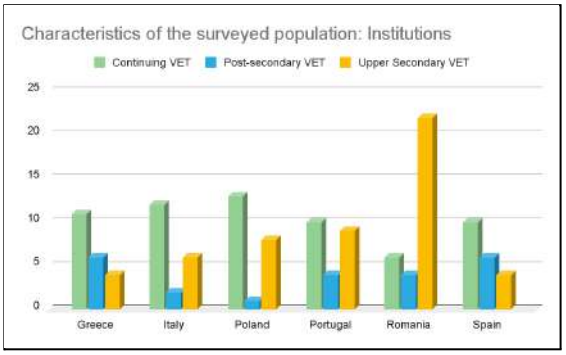
3. Data analysis

The third phase included the recollection, disposition and analysis of the data obtained with the survey. Organization and visual presentation of the results. Data interpretation and conclusions development.

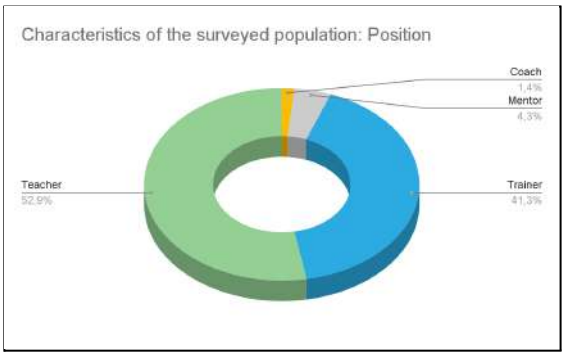
Results

138 VET experts participated in the survey,

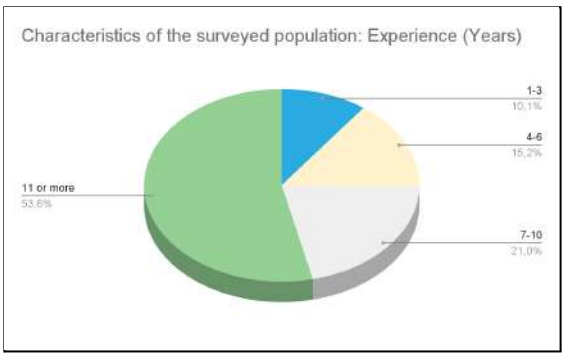
- 62 from Continuing VET entities,
- 53 from Upper Secondary VET entities and
- 23 from Post-secondary VET institutions.



The majority of the respondents were teachers (53%), followed by trainers (41%) and mentors, tutors and coaches (6%).

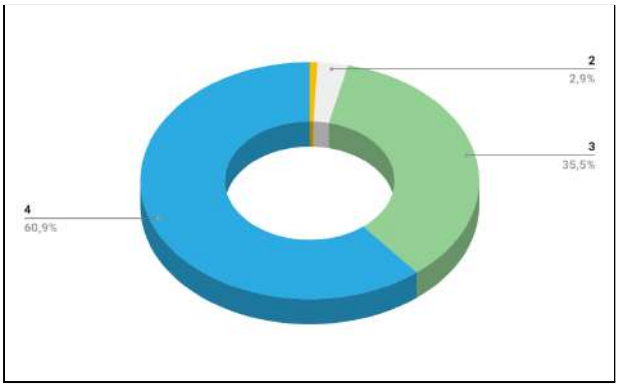


90% of the surveyed population had at least four years of working experience in their position. The majority of the population (54%) was composed of professionals with "11 or more" years of experience.

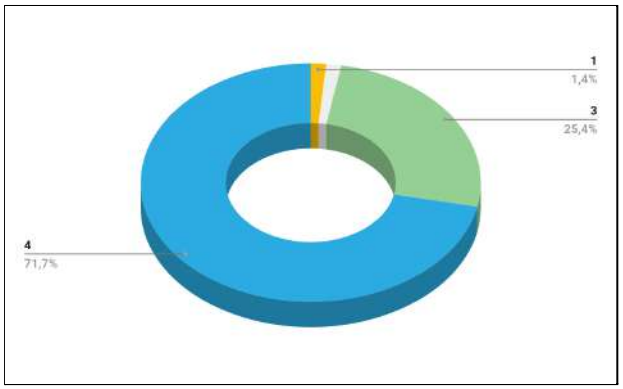


The respondents attributed to the statements an **average rate of 3.5**, as detailed in the following pages.

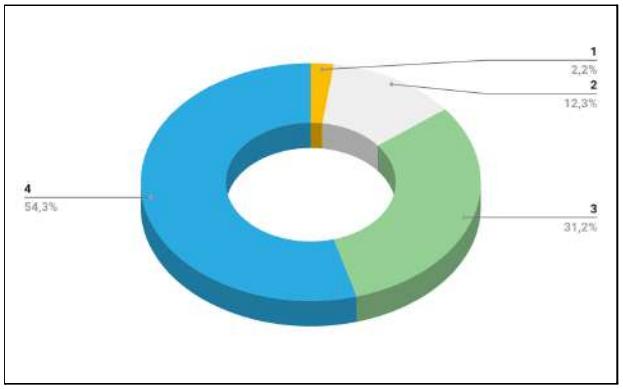
1. The Framework's items are **written in a clear and understandable manner**.



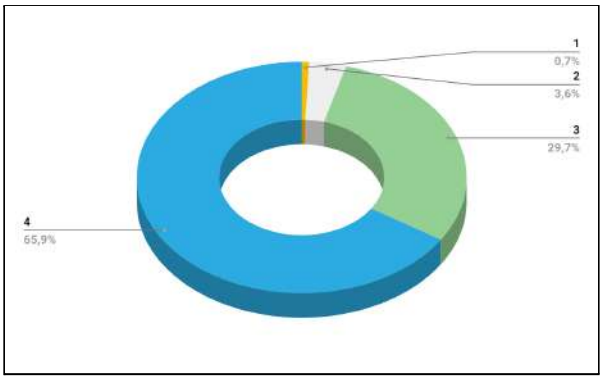
2. The Framework's items are **presented and organized in a logical manner**.



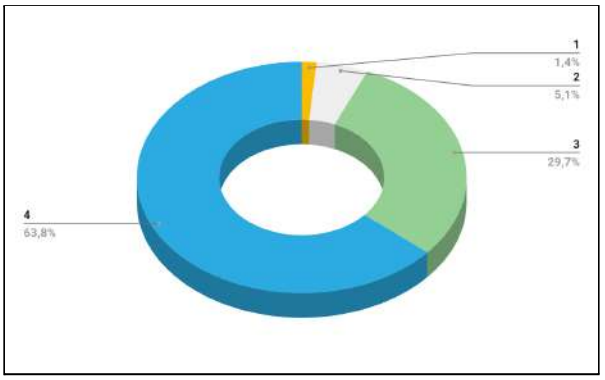
3. The Framework provides **enough information to let teachers and trainers autonomously gamify online programs.**



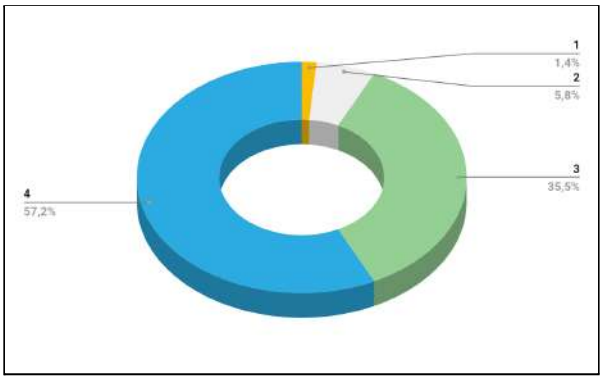
4. The Framework's combinations are suitable to **enhance students' online learning journey**.



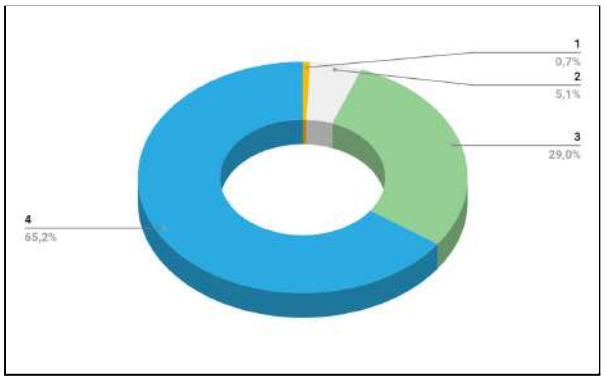
5. The Framework is suitable for **Upper secondary VET learners**.



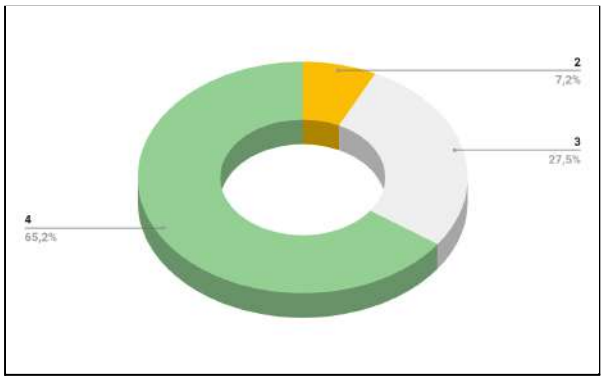
6. The Framework is **suitable** for **Post-secondary VET learners**.



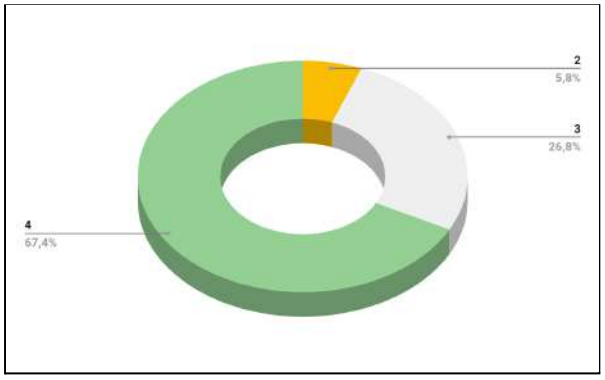
7. The Framework is **suitable** for **Continuing VET learners**.



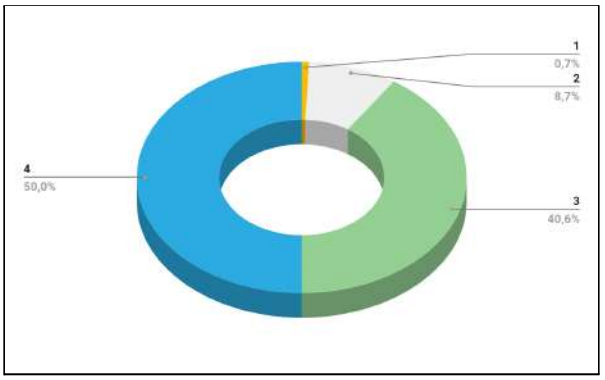
8. The Framework is appropriate to **ease learners' transition** to a new learning environment.



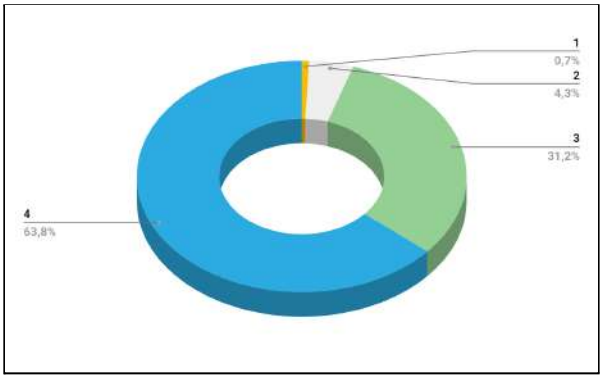
9. The Framework is appropriate to **motivate learners** to spend time and effort in the new online learning experience.



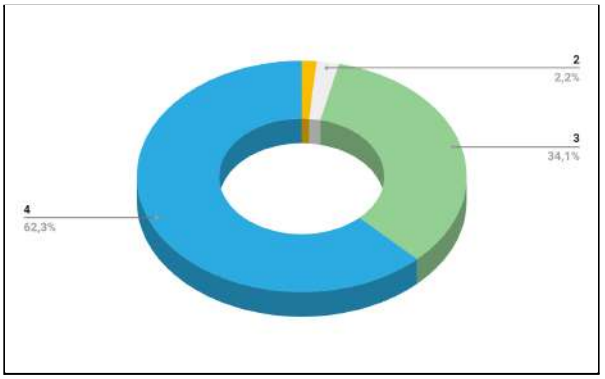
10. The Framework is appropriate to let learners **establish their personal identities** with the learning group.



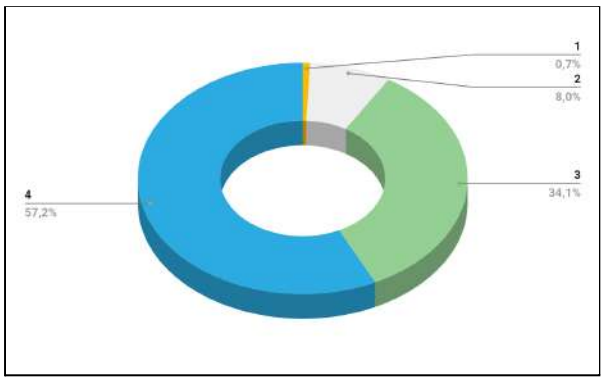
11. The Framework is appropriate to facilitate **mutual exchange of information** among learners.



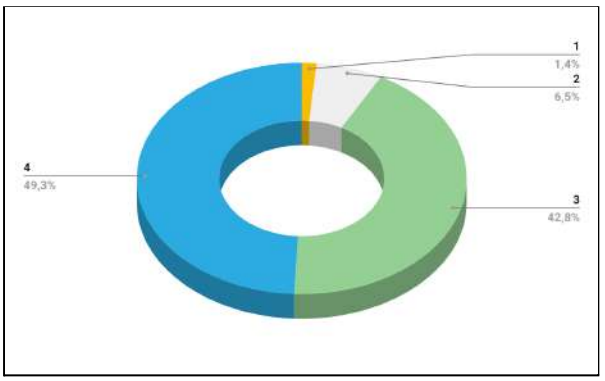
12. The Framework is suitable to design the learning journey around the **learning outcomes and pedagogical objectives**.



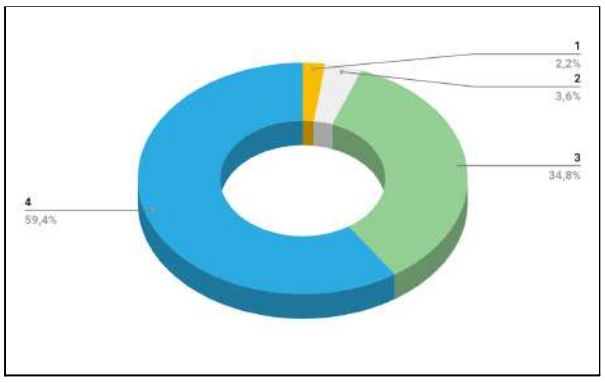
13. The Framework is appropriate to foster students' **critical thinking**.



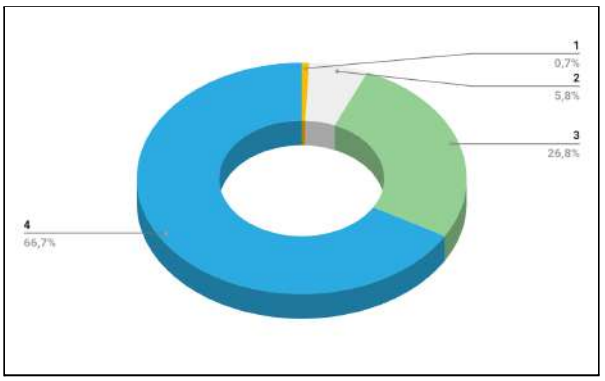
14. The Framework is appropriate to foster students' **judging skills**.



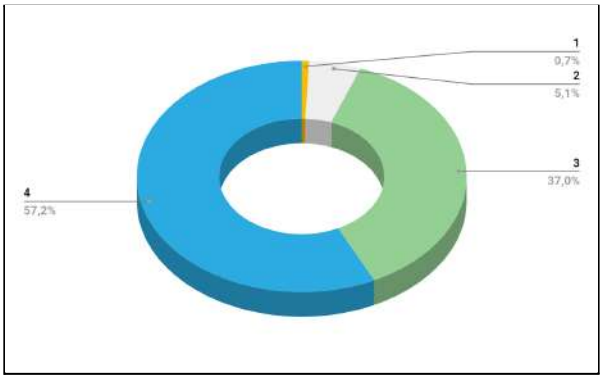
15. The Framework is appropriate to foster students' **evaluation skills**.



16. The Framework is appropriate to foster students' **creativity**.



17. The Framework is appropriate to foster students' **reflection, evaluation, and critiquing of the learning experience**.



Conceptual Framework for Gamified E-Learning Programs

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The Framework's Structure

The Conceptual Framework for Gamified E-Learning Programs aims to build a reference structure for teachers and trainers in the planning phase of an entire course or single learning experience through an iterative and incremental approach.

Incremental — The design process is **split into small** and more **manageable chunks**, known as increments. Each increment builds on the previous version so that improvements can be made step by step.

Iterative — The course design activities are **repeated systematically** in loops, known as iterations. A new version of the model is produced after each iteration until the optimal model is achieved.

The Framework is divided into eight conceptual blocks, representing the **eight key phases** of the iterative and incremental design process. Each phase is articulated in multiple **actions** associated with combinations of **game elements**. The following paragraphs detail the characteristics of the three components.

❖ The design phases

The Framework is structured into **eight design phases blocks**, named *knowledge areas*, which represent **design phases** that must be implemented together to fulfil specific purposes. However, the blocks can be structured sequentially, as long as at the end of each block, we proceed with testing and verifying the consistency of all elements with the other blocks before actual implementation.

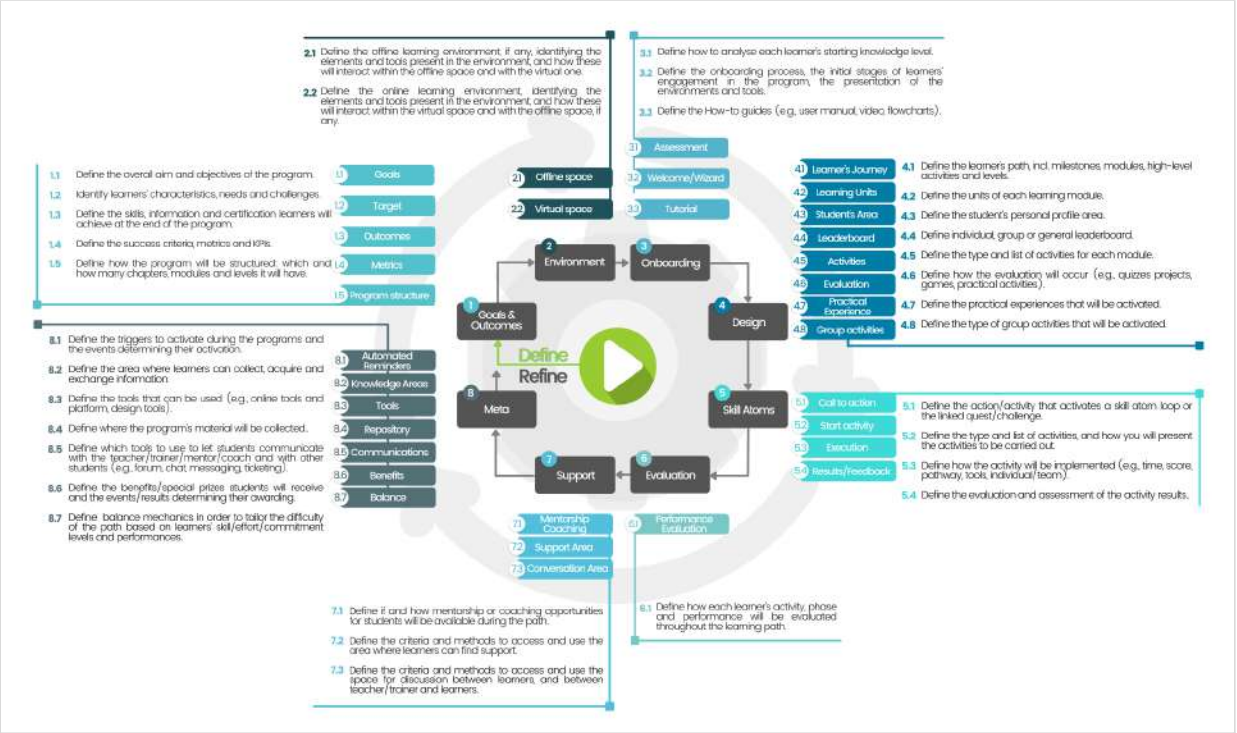
Phase	Goal
Goals and Outcomes	To define the **structural framework of the learning path** in its constituent elements, namely: objectives, analysis of the target, competences and skills to be developed, certifications, metrics and KPIs, structure of the course.
Environment	To define the **learning environments**, the **elements** and **tools that characterise them,** and make them consistent, to make the learning experience fluid regardless of the space used.
Onboarding	To define the actions aimed at **orienting, motivating** and **engaging** learners as soon as they start their learning journey.
Design	To define **how learners will explore, interact with each other and learn**. This phase is the core of the whole architecture of the learning journey, outlining the exploration phases, the group work mechanisms, the high-level practical activities and the pathway for achieving the objectives and sharing knowledge. It is important to define and make activities and modules consistent through experiential, social and formal learning methods.
Skill Atoms	To define in **detail each activity** of the learning path, and particularly how learners acquire new skills.
Evaluation	To define a **clear and consistent monitoring action** to evaluate the path and students' performance.
Support	To define **support and discussion activities** between peers and between students and teachers/trainers at all stages of the learning experience..
Meta	To **review, make consistent and balance the whole learning path**, based on all the activities defined in the previous phases.

❖ The actions

Each phase is articulated in multiple **actions**, related to the phases key **domains**.

Phase	Domain	Actions
GOALS & OUTCOMES	**Goals**	Define the overall aim and objectives of the program.
	Target	Identify learners' characteristics, needs and challenges.
	Outcomes	Define the skills, information and certification learners will achieve at the end of the program.
	Metrics	Define the success criteria, metrics and KPIs.
	Program structure	Define how the program will be structured: which and how many chapters, modules and levels it will have.
ENVIRONMENT	**Offline space**	Define the offline learning environment, if any, identifying the elements and tools present in the environment, and how these will interact within the offline space and with the virtual one.
	Virtual space	Define the online learning environment, identifying the elements and tools present in the environment, and how these will interact within the virtual space and with the offline space, if any.
ONBOARDING	**Assessment**	Define how to analyse each learner's starting knowledge level.
	Welcome/Wizard	Define the onboarding process, the initial stages of learners' engagement in the program, the presentation of the environments and tools.
	Tutorial	Define the How-to guides (e.g., user manual, video, flowcharts).
DESIGN	**Learner's Journey**	Define the learner's path, incl. milestones, modules, high-level activities and levels.
	Learning Units	Define the units of each learning module.
	Student's Area	Define the student's personal profile area.
	Leaderboard	Define individual, group or general leaderboard.
	Activities	Define the type and list of activities for each module.
	Evaluation	Define how the evaluation will occur (e.g., quizzes projects, games, practical activities).
	Practical Experience	Define the practical experiences that will be activated.
	Group Activities	Define the type of group activities that will be activated.

SKILL ATOMS	**Call to Action**	Define the action/activity that activates a skill atom loop or the linked quest/challenge
	Activity Start	Define the type and list of activities, and how you will present the activities to be carried out.
	Execution	Define how the activity will be implemented (e.g., time, score, pathway, tools, individual/team).
	Results/Feedback	Define the evaluation and assessment of the activity results.
EVALUATION	**Performance Evaluation**	Define how each learner's activity, phase and performance will be evaluated throughout the learning path.
SUPPORT	**Mentorship/Coaching**	Define if and how mentorship or coaching opportunities for students will be available during the path.
	Support Area	Define the criteria and methods to access and use the area where learners can find support.
	Conversation Area	Define the criteria and methods to access and use the space for discussion between learners, and between teacher/trainer and learners.
META	**Automated Reminders**	Define the triggers to activate during the programs and the events determining their activation.
	Knowledge Areas	Define the area where learners can collect, acquire and exchange information.
	Tools	Define the tools that can be used (e.g., online tools and platform, design tools).
	Repository	Define where the program's material will be collected.
	Communications	Define which tools to use to let students communicate with the teacher/trainer/mentor/coach and with other students (e.g., forum, chat, messaging, ticketing).
	Benefits	Define the benefits/special prizes students will receive and the events/results determining their awarding.
	Balance	Define balance mechanics in order to tailor the difficulty of the path based on learners' skill, effort and/or commitment levels and performances.



❖ The game elements

Each **action** is associated with combinations of integrable **game elements**. The Framework includes the **fifty-four game elements** identified in the best practices of gamification and game-based learning and literature:

1. Avatars
2. Badges
3. Balance
4. Beginner's Luck
5. Booster
6. Challenges
7. Chance
8. Competition
9. Conflict
10. Constraints
11. Conversation
12. Creativity Tools
13. Content Crowdsourcing
14. Curiosity
15. Customization
16. Emotions
17. Expected Value
18. Feedback
19. Free Lunch
28. Levels
29. Mastery
30. Mentorship
31. Milestone Unlock
32. Motivation
33. Narration
34. Object
35. Oracle Effect
36. Progression
37. Penalty
38. Puzzle
39. Quests
40. Random Rewards
41. Relationships
42. Reputation
43. Rewards
44. Rules
45. Scarcity/Rarity
46. Sensation

20. Forced Choice
21. Gifts
22. Interest
23. Interface
24. Intrinsic Motivation
25. Knowledge Share
26. Leaderboard
27. Lenses
47. Skill Atom Loop
48. Skill Chain
49. Space
50. Transactions
51. Turns
52. Tutorials
53. Voting
54. Win States

#	Element	Description
1	Avatars	Visual representations of the players.
2	Badges	Visual representation of achievements.
3	Balance	Mechanism to balance the complexity of the phases of a path, balancing positive and negative events and compensating for all the possible student's behaviours. The balance may be an unexpected quiz or task, or elements that increase or decrease the complexity of a task.
4	Beginner's luck	An unexpected reward or a result achieved by luck rather than actual skills acquired.
5	Booster	Special power-ups that can be purchased or won during the gamified learning experience.
6	Challenges	Tasks that require an effort, challenging the player.
7	Chance	An unexpected possibility offered to a learner, a random event or the probability of receiving a reward of different value.
8	Competition	Competition with other players or with oneself.
9	Conflict	Phases or moments of exchange/discussion that represent a challenge and an important stimulus to improve. For example, competition with classmates, other classes or even with the teacher is a game element that works.
10	Constraints	Limitations or forced actions.
11	Conversation	Conversations between peers or between teacher and students, to favour the transition from connection to relationship and increase the exchange and acquisition of knowledge, models, perspectives and ideas concerning the issues to be explored.
12	Creativity Tools	Tools that enhance an individual or group's creative thinking.
13	Content Crowdsourcing	Act of involving multiple people or the community in the process of creating or acquiring content.
14	Curiosity	Curiosity is a stimulus to action, motivating responses and behaviours such

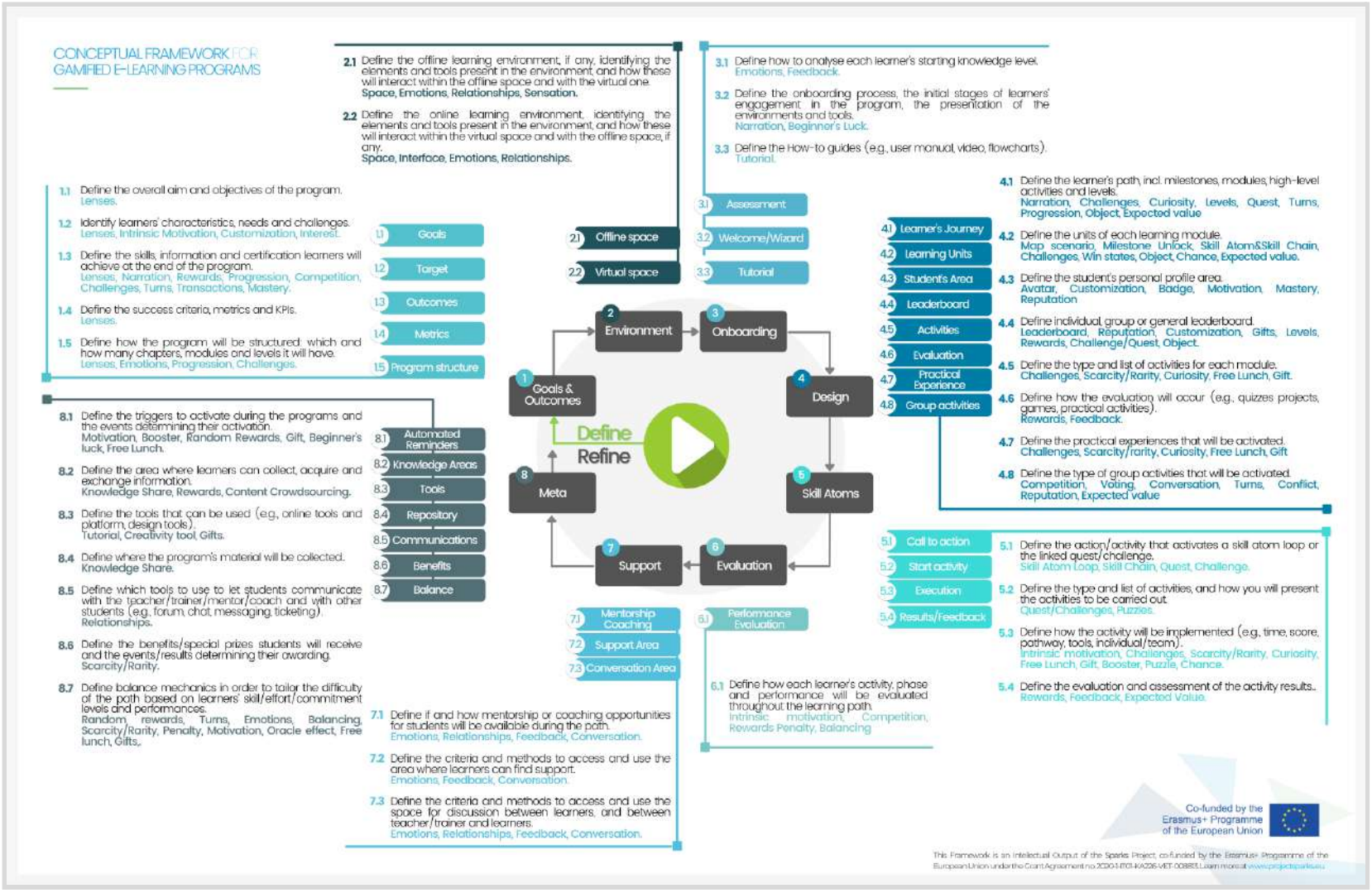
		as exploration, experimentation and interaction.
15	Customization	Customization is the element enabling the tailoring of the training path around students' behavioural habits and learning styles. It includes both dynamic paths that adapt to the results and behaviour of users (e.g., sending reminders and notifications differentiated according to the learning style), and the opportunity for the student to autonomously customise their interface and related elements to reflect their individual learning habits and methods.
16	Emotions	Competitiveness, curiosity, frustration. Through games, people learn, experiment, understand their own and others' emotions in a "safe and secure" context.
17	Expected Value	The expected value measures what the student hopes to achieve at the end of the learning journey, completing a task or activity.
18	Feedback	Feedback about how the player is proceeding.
19	Free Lunch	Free lunch is a type of prize that a student receives at no cost.
20	Forced Choice	A forced choice occurs when the student has to face a decision if they want to advance in the gamified learning path.
21	Gifts	Special rewards or items/assets can be given away or shared with other people to help them achieve their goals
22	Interest	The feeling of wanting to learn more and proceed on the learning journey. To introduce this element in a gamified learning experience, teachers may include special or unexpected quests, or benefits and rewards for students levelling up.
23	Interface	Aesthetics play a crucial role in engaging students and helping them get immersed in the experience. The interface should be simple, fast and intuitive, enriched with decorative elements that enhance the learning context.
24	Intrinsic Motivation	Intrinsic motivation is what drives an individual to engage in an activity just because they derive personal satisfaction from it. The sole fact of engaging in the activity is in itself satisfying, regardless of the chances to be rewarded or gain external recognition. See also "*Motivation*".
25	Knowledge Share	Spaces or moments for sharing and conversation, where students can exchange information and knowledge to improve their path or achieve a goal.
26	Leaderboard	Visual representations of the player progression. Rankings are available in different models; most commonly, they can be relative or absolute, by team or by group, and refer to a particular time frame.
27	Lenses	Developed from an idea of the famous game designer Jesse Schell (2008), lenses represent a prompt of questions for designers to analyse the principles and elements of a game. In this context, the element refers to the

		training designer's ability to identify the questions that will guide the design of the entire learning journey.
28	Levels	States of progression or difficulty. Levels and objectives help map a user's progression through a system.
29	Mastery	The desire to excel in or be more skilled at something. Mastery drives individuals to action.
30	Mentorship	Guidance from a more skilled or experienced actor in the learning environment. In the Framework's context, mentorship especially refers to peer-mentorship: training designers could include in the program the opportunity to ask for the support of a peer-mentor in completing demanding tasks, and rewarding the mentor (e.g., awarding benefits, prizes, or badges, or increasing their points).
31	Milestone Unlock	Unlocking of intermediate milestones at the completion of a significant event in the learning path. The use of milestones is essential for learners to manage their productivity and effort better. For teachers, they are helpful to monitor and verify, more easily, the results achieved.
32	Motivation	Drivers of human behaviours that could be extrinsic, if driven by external factors (e.g., rewards, prizes, recognition), or intrinsic, if driven by internal rewards (e.g., feeling of accomplishment in acquiring new knowledge and skills, or in developing relationships).
33	Narration	A consistent and continuous storyline. The game's narrative design defines the game's story structure and core elements, including theme, plot, characters and dialogue. Stories generate context, meaning, plot and purpose.
34	Object	An object represents a conceptual or practical tool or technique learners can interact with. It is a digital educational resource created to assist students in learning.
35	Oracle effect	The Oracle effect as a game element refers to the ability to predict a certain outcome of a particular activity or event.
36	Progression	The player's path of growth and development within the learning experience.
37	Penalty	The penalty system, complementary to the rewards system, is generally used to encourage the player not to assume incorrect behaviour or attitudes and avoid failures.
38	Puzzle	Games and mini-applications that simulate an activity through a small game or quiz that involves the use of logic, pattern recognition or deduction.
39	Quests	Predefined challenges with a set of specific objectives and rewards. Missions give users a clear and defined goal to achieve. They are often structured in a series of connected challenges.
40	Random	Intermittent or rotating variable rewards, making the learning experience

	Rewards	more stimulating and engaging.
41	Relationships	Social interactions generate altruism, status, fellowship.
42	Reputation	The opinion people have about someone, determining their credibility and recognition within a group. In a gamified learning experience, reputation is associated with badges, recognitions, achieved special prizes or customised graphics. These elements help to give visibility and perception to each student's activities, past and future, and determine a perceived or actual attractiveness in other students' eyes.
43	Rewards	Benefits upon accomplishments.
44	Rules	Directions that must be followed to proceed across the learning journey correctly or to tackle a specific challenge.
45	Scarcity/Rarity	Limited or rare items, collection, exclusive of items, objects or benefits. The concept is linked to extrinsically limited resources within the environment that can further stimulate students to embrace virtuous behaviour in exchange for an uncommon benefit.
46	Sensation	To be stimulating, the experience must be multisensory. Therefore, visual or sound stimulation, an activity involving multiple senses, becomes more engaging and exciting.
47	Skill Atom Loop	It describes how the player acquires a new skill during the game/training path. The game is broken down into elementary skills (called **atoms**), the acquisition of which allows the individual to advance to subsequent challenges and levels. The cycle consists of four phases: 1. **Action** - The player performs an action. *Example: The player presses a key.* 2. **Simulation** - Based on the action performed, an effect is generated in the game. *Example: The player opens a door and steps forward.* 3. **Feedback**: the game provides feedback to the player to let them know that the action performed generated an effect or a change of state. This feedback can be a sound, an image or an object. *Example: A "Congratulations" message appears once the player has opened the door and stepped forward.* 4. **Modelling**. As a final step, the player absorbs feedback and updates their mental models based on the success of their action. If they perceive that they have made progress acquiring a new skill, they will feel pleased and gratified. On the other hand, if they feel their action was in vain, they will feel bored or frustrated.

48	Skill Chain	A Skill Chain is the result of a concatenated set of multiple skill atoms. A game, as well as the training experience, can be represented as sequences of fundamental and complementary skills to be acquired.
49	Space	The virtual or physical environment in which the training experience takes place.
50	Transactions	Trading actions between players, directly or indirectly.
51	Turns	Alternating players for sequential participation.
52	Tutorials	A tutorial is a "guide", a text or a video that illustrates how to use a game element, explaining its functionality and features with practical examples.
53	Voting	Point voting is a tool used to prioritise items or make decisions in a group setting democratically. It is a simple way to narrow down alternatives and converge towards a set of concepts or ideas.
54	Win States	Accomplishments making one or more players the winners, upon the alignment between the learning objectives and the players' goals.

The Framework at a glance



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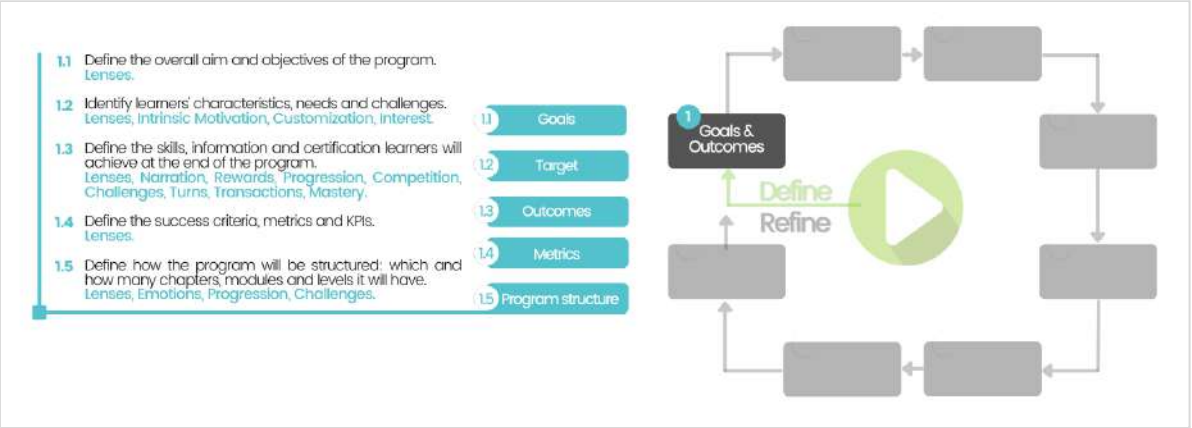
Step-by-step Guide

1. Goals and outcomes



The goal of this phase is to **define the structural framework of the learning path** in its constituent elements, namely: objectives, analysis of the target, competencies and skills to be developed, certifications, metrics and KPIs, the structure of the course.

As a design tool, the use of *lenses*, especially if we are working in a team, helps to ask the right questions, focus on relevant issues, issues and dynamics, and question the methodologies and metrics to be adopted.

The program objectives will then be defined. It will be important at this stage to write down both the training objectives and the type of output of the entire training experience, which skills do we want learners to acquire at the end of the course and which soft skills to cultivate, the emotions linked to all phases and activities to be address and what type of approach to suggest to learners and which behaviours to reward.

To build a training experience connected with the real needs and learning characteristics of future learners, the analysis of the target individuals will be fundamental to understand in detail the characteristics of the students, their needs, learning styles, timing and possibility of frequency, connection capacity, e.g., (bandwidth, type of device) and digital skills (ability to use virtual platforms and environments), in order to create a type of personalised path that is in line with their basic expectations and needs.

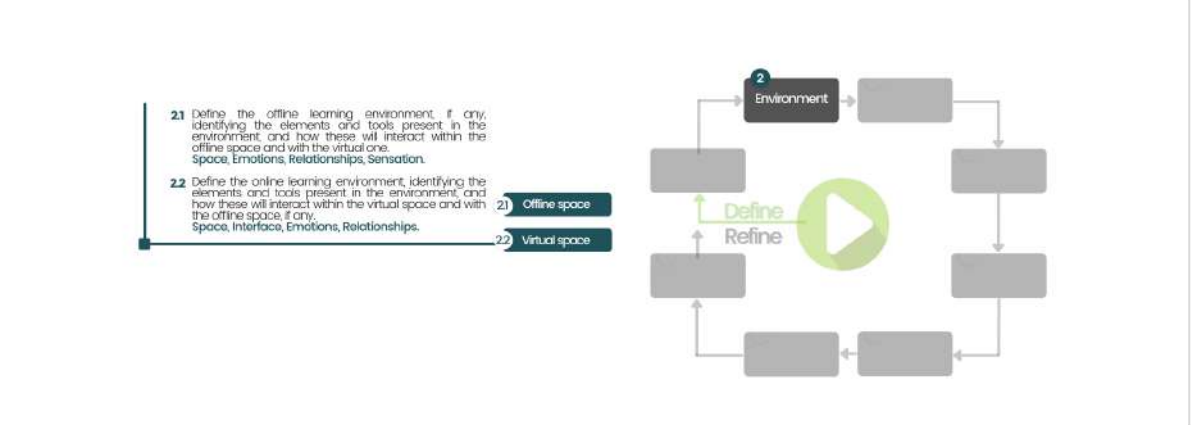
We define which technical, basic and transversal skills and which certifications the learners will acquire at the end of the path. What are the fundamental skills that we aim to strengthen, and how will we structure the development of complex skills (we define how many and which basic skills make up them) that will be the subject of the activities to be implemented.

We, therefore, define how we will evaluate the performance of the learners, which KPIs we will use and, above all, what type of metric we will define to measure their performance, the skills achieved and to be achieved, the effort and the level of engagement concerning the path and to experience in general.

Let us start by designing the entire structure of the program. We proceed to dividing the program by the various levels: program, courses, chapters/milestones, modules, activities, Levels, and then proceed in detail of the single lesson, the sources, the method of conducting the lesson, the verification system, the minimum duration which we consider valid for the completion of the same.

It is crucial, already in this phase of planning the path, to insert dynamics, mechanics and elements, starting from the basic ones such as the definition of the points to be assigned to each activity, bonus-malus to be attributed to the quality of the outputs, the effort and the commitment of the student, to virtuous and non-virtuous behaviours, extra bonuses to be assigned randomly or as an incentive to keep motivation high, reward particular performances, establish prizes and awards associated with the completion of milestones, elements such as badges and rankings.

2. Environment

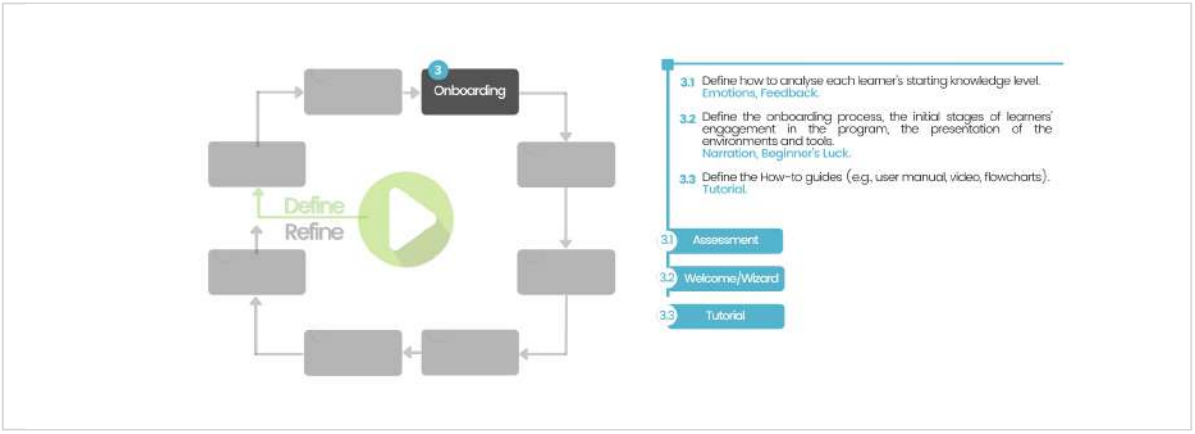


In this phase, we will define the learning environments, the elements and tools that characterise them and make them consistent in order to **make the learning experience fluid regardless of the space used**. What platform will we use? How will the learning space be organised? We will then proceed to define:

- what the types of interaction on the platform will be (e.g., which areas, how to access, which tools can be used);
- if and how we will use virtual environments using VR;
- if and how we will use third-party platforms and how we will integrate them within our spaces.

We need to design the context of the use of the lessons, where the activities will develop, to be able to define the possibilities of interaction between learners and the tools they will use, as well as the desired results and behaviours.

3. Onboarding

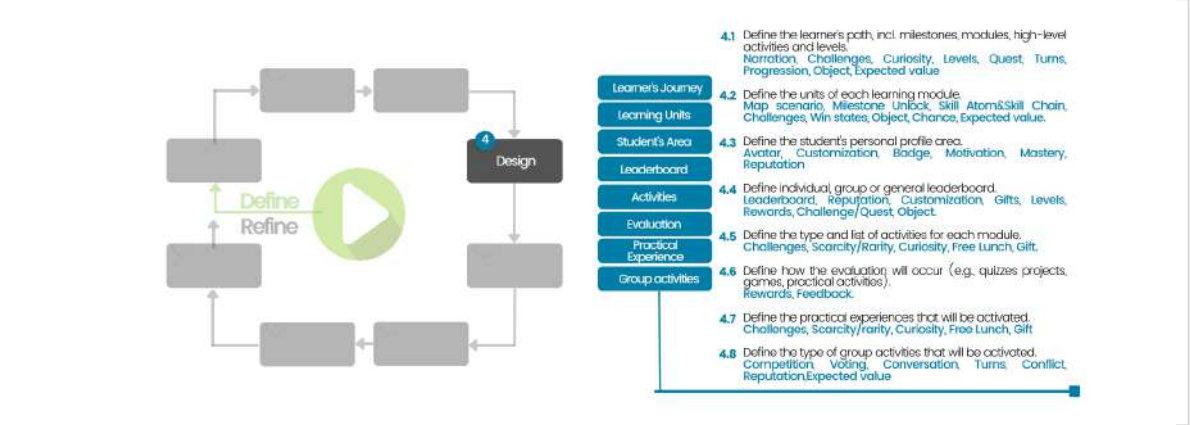


In this third phase, we will define how to best structure the onboard phase of the training path. First of all, it will be necessary to plan an assessment phase for the students. We can use quizzes or other tools to understand better and make an initial assessment of the initial level of the learners concerning the skills we want to monitor. This activity will allow us to create a personalised path aligned with the learner's abilities and learning style.

Subsequently, we will define the activities and steps that make up the initial path within the platform we will use. The onboarding phase is critical in the training path because it represents an orientation phase in which the learner's emotions must be well managed, the fear of novelty and the perception that the task is about to be undertaken is complex must be countered. It will be essential to create a familiar environment by designing a series of activities to offer a general overview of the entire experience and its path and clarify the objectives and tools. It may be helpful to insert a series of guides, small manuals and/or video tutorials, flow charts that help orientate and serve as a compass for the student who is about to start the journey.

4. Design

Resuming the draft of the course program, we can deepen the use of our game toolbox, taking a



cue from Game design and Gamification that help us make the training experience more engaging and exciting. To do this, we begin to structure the activities by defining: the challenges, levels, extra bonuses, route map, scores, rewards and everything that helps us to define a sense of progressive advancement in the path and in the acquisition of new skills, which is very important to achieve Flow and increase intrinsic motivation. In addition, it is essential to create a narrative frame through Storytelling techniques to make the training experience consistent. To do this, we can use scenarios, settings and storyboards consistent with the contents and spaces we have designed for our training experience.

We can create a map representation of all the activities that represent the basic units of our path and the challenges (for the milestones with several activities) and challenges (for each activity) to be faced (e.g., completing the first level with a minimum score of No.); the paths that the various learners will have to carry out, the basic skills on which we want to build the learning cycles and above all what are the objects that represent the elements of the game (e.g., a learner who obtains a badge for the highest score or is the first in the leaderboard wins an award).

The personalization of the avatar is essential because it allows learners to identify the player's characteristics and identify with their digital identity. Therefore, it will be important to define, in order to make the level of progress and development more visible, the growth within the game/training experience to foresee the possible combinations of personalization of the avatar with a series of elements that represent the goals, the skills completed, bonuses achieved, new skins and other elements that represent a recognition of the level achieved within the game context.

It is important to define and choose how to view the relative and general rankings or score, which will allow comparison between everyone (or within individual teams) concerning the levels achieved, quality of outputs, performance, and other activities.

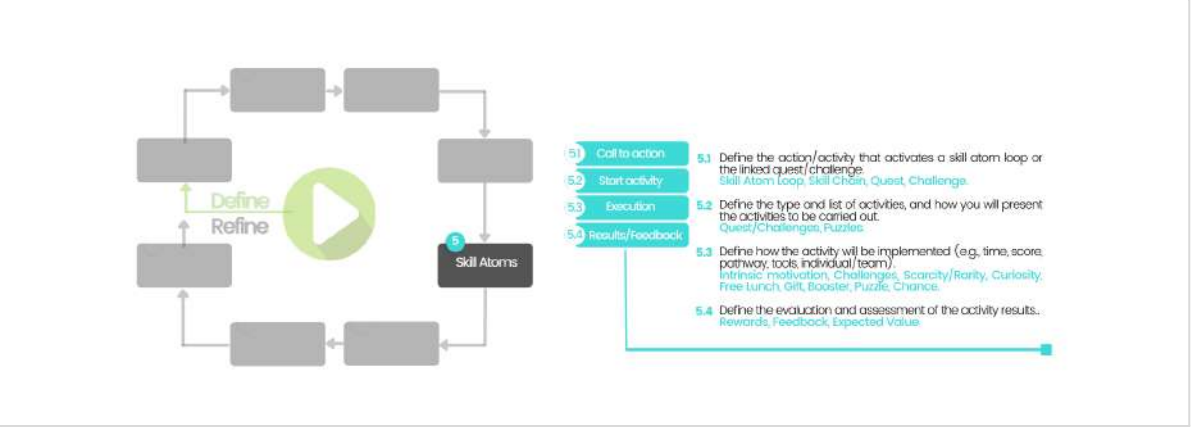
It is advisable to check and provide for balancing actions in all phases of the game and, above all, not to make the players' performances misaligned. The primary objective of the experience is to be inclusive and let as many learners as possible complete the path. Therefore, we can use some game elements as tools to improve the engagement of those who are obtaining lower performance and results (e.g., prizes, bonuses in quizzes, special rewards) or increase in difficulty for the best, in order to keep the level of the challenge high.

As a next step, let's proceed to define in detail the activities that make up each block, each module of the path, and the tools and instruments to be used. It is also essential to define how the activities carried out will be verified (e.g., quizzes, practical projects, group activities, production of documents) if there are activities and outputs in which a discussion with the learner is envisaged or projects to be completed in teams or with more students.

Therefore, we will define the evaluation criteria to allow each learner to understand how their performance, activities, and expected outputs will be judged and measured, and above all to foresee or not the possibility for students to take corrective actions. In order to consolidate the knowledge acquired, structuring practical activities is vital so that students can solidify the knowledge and skills acquired in concrete projects.

In the same way, it is necessary to foresee group activities, such as activities in teams or individual activities involving relationship/communication/sharing of tasks between several players. It is essential within the game system to define how each learner's individual contributions will be evaluated, as well as how we will assess the behaviours, the relationships and success factors we seek to achieve.

5. Skill Atoms

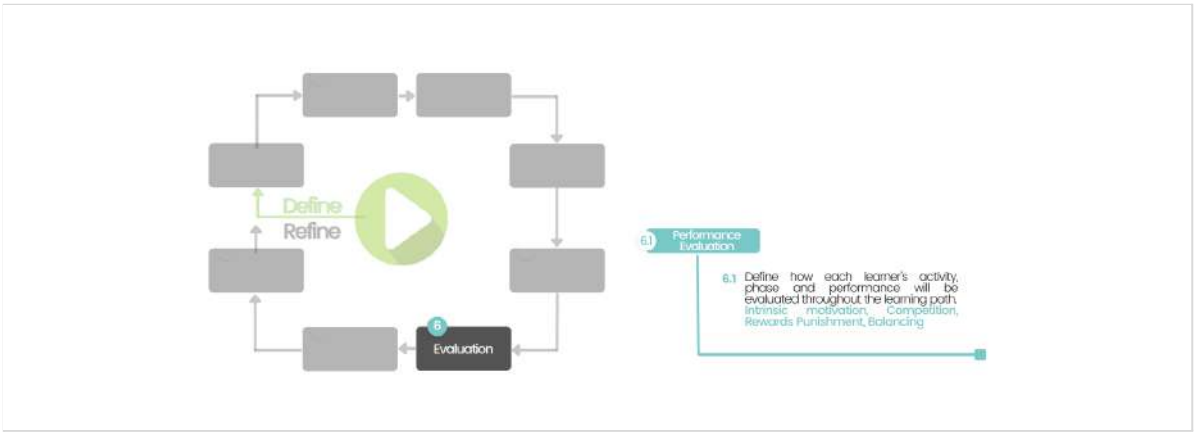


We have laid the foundations for planning the stages of the journey. We have defined levels and modules to be completed to reach the completion of a particular skill. In this phase, however, it is essential to define in detail every single activity of the path from which atom skills it is composed and how this will impact the achievement of the macro-skills we want to achieve.

We can define the Skill Atoms as the essential elements of the path. In games, they describe how the player acquires a new skill. The same concept is applied to our path: Skill Atoms represent the skills, knowledge and fundamental competencies that the student must acquire and which are activated in the path in the form of cycles (loops) in which one is called to carry out an activity (or more activities in case of more complex atom skills). Each skill is composed of a series of tasks/activities to be completed with a fixed or customizable path, a time limit, a score, the related KPIs, any people to be involved, methods of execution. They can be activities of various kinds of in-depth study or practical experimentation such as a case study, mini-project, quiz, text, video, an exercise, exploration activity. Based on the performance of the student and the quality of the results, the system must provide some form of feedback (e.g., positive/negative, reward, badge, benefit, progress, limitation, a new challenge, avatar personalization element) to let them know how his actions were valued. This feedback can be displayed and represented using basic game elements such as scores, prizes and badges, or if the game experience is complex even with visual, tactile, auditory stimuli.

Once the feedback has been analysed, the student updates their mental models concerning the activity carried out and the knowledge acquired. Also crucial in this phase is the feedback, to excite the student by celebrating the success/goal/level achieved or the new skill acquired, with, for example, a badge, a special prize, an avatar skin, an exclusive reward.

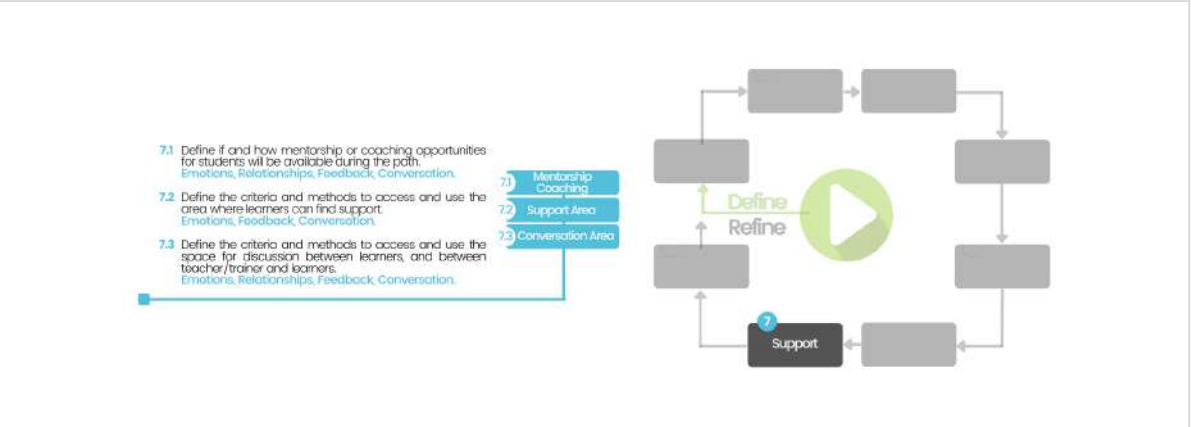
6. Evaluation



This phase aims to **define a clear and consistent monitoring action** to review and make a coherent evaluation of the whole learning path and student performance. We expand, edit or improve the game elements and feedback systems designed so far. We design new ones to improve the quality of relevant information concerning the commitment and results achieved by each learner and the impact obtained within the training experience. The achievable results, the value of prizes, rewards and dynamics of interaction and cooperation between the actors should always be well defined and coherent at every stage of the process. We should make explicit and let every learner understand the value of each action and progressive improvements, supporting them to give meaning to each activity to the entire training process in order to increase the perceived value; understand and improve one's

ability to relate, verify one's skills and knowledge acquired compared to those required, verify the costs/benefits of each activity.

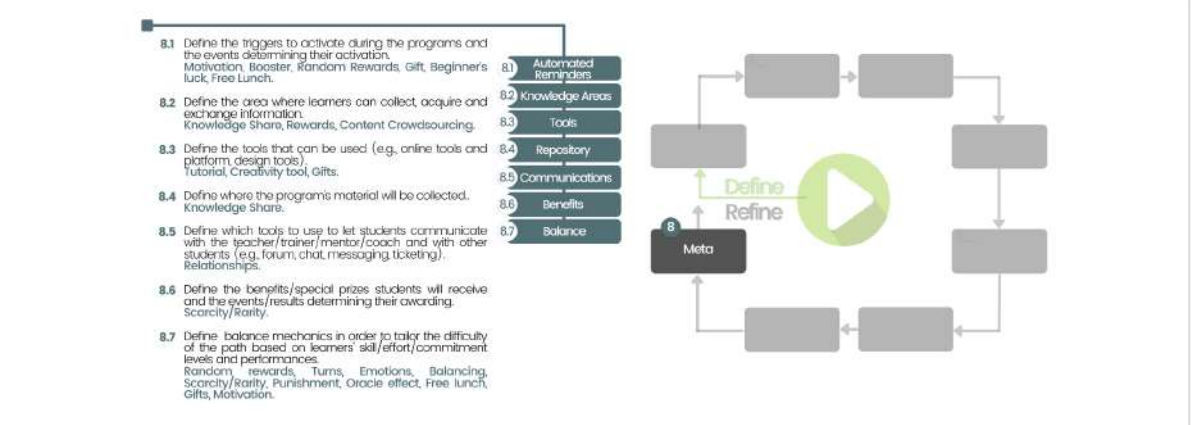
7. Support



In all phases of the path, from the initial phase to the final phase, up to the completion of the activities of a specific module, teachers may need support and confrontation activities. It is important, in this phase, to designate what the modalities of interaction can be and to foresee the moments in which support/discussion is expected. We can define if there will be the support of a mentor or a coach, if there will be repositories with information areas, documents, FAQs and supplementary materials. We define whether there will be dedicated areas and spaces such as forums, conversation areas, messaging tools, where learners can interact with their colleagues and have all the information to complete a single activity. If we use platforms, we need to define how the relationship dynamics will be structured through internal messaging and third-party applications, group chats or video calls or interactions in virtual environments. It will be essential to evaluate and define through scores and other elements the coherence and impact of these actions within the path and the primary game system, to define feedback mechanisms of the various interactions, integrating them into the system of points, prizes, and evaluation of the entire path.

It is necessary to promote a type of communication that is omnichannel, online and offline, favouring inclusive relationships and a constant and constructive dialogue between users, respecting their technological, technical and social capacity and adapting it to the different stages of the process.

8. Meta



The last area of knowledge is a meta conceptual area that represents the scaffolding of the entire structure. The balancing of all blocks is a fundamental property of the path and of all the elements defined so far, so that students can maintain a high level of engagement, effort and commitment concerning the learning path. At this stage, we aim to review, make coherent, and balance the training path based on all the activities we have put in place, on each student's learning styles and characteristics, their interests, and the results put in place, carefully calibrating the parameters of the system so that no resource, no action, no interaction is stronger or weaker in comparison to other similar elements, even if each element maintains its distinctive characteristics.

Designing activities and dynamics that do not give rise to repetitive behavioural patterns or bad habits is essential. Let's review the selected elements, mechanics and dynamics, all the actions and activities over which the player has control, the difficulty of quests and challenges, the level of difficulty and commitment in achieving the various objectives. We set up all the automation and triggers that favour interactions between students and the desired behaviours.

Contributors

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Bibliography

- Ambrose, S.A., Bridges, M.W., DiPietro, M., Lovett, M.C., and Norman, M.K. (2010). *How learning works: Seven research-based principles for smart teaching.* San Francisco, CA: Jossey-Bass, p 3, 69, 170.
- Angotti, R.; (2019). *Vocational education and training in Europe: Italy*. Cedefop ReferNet VET in Europe reports 2018. Available at http://libserver.cedefop.europa.eu/vetelib/2019/Vocational_Education_Training_Europe_Italy_2018_Cedefop_ReferNet.pdf
- Athanasouli, A., Georgiadis, N., Karnemidou, A., Mavris, D. (2016). *Vocational education and training in Europe – Greece*. Cedefop ReferNet VET in Europe reports. Available at http://libserver.cedefop.europa.eu/vetelib/2016/2016_CR_GR.pdf
- Benassi, V. A., Overson, C. E., & Hakala, C. M. (2014). *Applying science of learning in education: Infusing psychological science into the curriculum*. Retrieved from the Society for the Teaching of Psychology.
- Bransford, J., Brown A., and Cocking, R. (2000). *How people learn: Brain, mind, experience, and school.* Washington, D.C.: National Academy Press.
- Biggs, J., & Collis, K. (1982). *Evaluating the Quality of Learning: the SOLO taxonomy.* New York: Academic Press.
- Cedefop (2019). *Vocational education and training in Romania: short description.* Luxembourg: Publications Office. http://data.europa.eu/doi/10.2801/256780
- Cedefop (2019). *Spain - Vocational Education and Training System*. Available at https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/spain-2019.
- Cedefop (2019). *Poland - Vocational Education and Training System*. Available at https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/poland-2019.
- Cedefop; Directorate-General of Employment and Industrial Relations (2019). *Vocational education and training in Europe: Portugal.* From Cedefop; ReferNet. Vocational education and training in Europe database. Available at https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/portugal
- Entwistle, N. J. (1998). *Approaches to learning and forms of understanding. Teaching and learning in higher education*, p 72, 98.
- Faust, J. L., & Paulson, D. R. (1998). *Active learning in the college classroom. Journal on Excellence in College Teaching*, p 9 (2), 3-24.
- Gaskell, A. (2019). Editorial— *How can we Maximise the Potential of New Technologies to meet the Sustainable Development Goals (SDGs)?* Journal of Learning for Development, 6(2), p 91 – 94.

- Ramsden, P. (1992) *Learning to Teach in Higher Education.* London, Routledge.
- Sancha, I.; Gutiérrez,S. (2019). *Vocational education and training in Europe: Spain*. Cedefop ReferNet VET in Europe reports 2018. Available at http://libserver.cedefop.europa.eu/vetelib/2019/Vocational_Education_Training_Europe_Spain_2018_Cedefop_ReferNet.pdf
- Svinicki, M.D. (1999). *New directions in learning and motivation*. In M. Svinicki (Ed.), New Directions for Teaching and Learning, p 80, 5-27.
- Svinicki, M.D. (2004). *Learning and motivation in the postsecondary classroom*. Bolton, MA: Anker Publishing, p 24.
- Svinicki, M.D. (2005). *Student goal orientation, motivation, and learning*. Center for Enhancement of Learning and Teaching: Idea Papers, p 41.
- Tanner, K. D. (2012). *Promoting student metacognition*. CBE Life Sciences Education, 11(2), p 113-120.
- Salmon, G. (2013). *E-tivities: The Key to Active Online Learning*.
- *Instructional Challenges Survey.* Centre for Teaching Excellence, University of Waterloo.