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"FOSTERING SOCIALLY DISTANCED AND INCLUSIVE ON CAMPUS EDUCATION IN ARMENIAN HEIS"

UNIVERSIDADE DE LISBOA (ULISBOA)

DIGITAL COMPETENCE FRAMEWORK BEST PRACTICE REPORT

COUNTRY CASE – PORTUGAL

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DIGITAL COMPETENCE FRAMEWORK (DCF) IN HIGHER EDUCATION

(Analysis of Digital Competences in Higher Education in Portugal)

Prepared by: Rui Mendes, Director of International Affairs of Instituto Superior Técnico, Universidade de Lisboa (ULISBOA)

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Introduction

This document has been prepared in the context of Work Package 1 (WP1) of the eCAMPUS project. It offers a detailed overview and critical assessment of the current landscape of digital competences in higher education across Portugal. Its purpose is to deliver a data-driven national insight that complements similar analyses conducted by project partners in Spain (UAM), Sweden (KTH), and Italy (UNIGE). Collectively, these national studies will feed into the creation of a comprehensive Best Practice Report and provide the groundwork for a broader evaluation of digital competences in higher education. Ultimately, the goal is to support the development of a Digital Competence Framework for higher education in Armenia, aligned with national needs and inspired by European best practices.

Portugal has committed to advancing digital competence across all sectors of society. Higher education institutions are seen not only as knowledge producers, but as key players in the development of digital literacy, transformation of professional profiles, and national innovation systems. To align with European strategies such as the Digital Decade and the European Strategy for Universities, Portugal launched several strategic plans: the Plano de Ação para a Transição Digital (2020), the national initiative INCoDe.2030 (since 2017), and the AI Portugal 2030 strategy.

The Quadro Dinâmico de Referência de Competência Digital para Portugal (QDRCD), based on the European DigComp 2.1 framework, was established in 2019 as a national model to guide digital skills development. It applies to all education levels, but its integration into higher education is still evolving. This document explores how Portugal is adapting the DCF to the higher education context and how this aligns with international standards and national policy frameworks.

Section 1: Frameworks and Initiatives

1.1. The QDRCD: A National Reference for Digital Competence

The Quadro Dinâmico de Referência de Competência Digital para Portugal (QDRCD | Dynamic Framework of Reference for Digital Competence in Portugal) represents a fundamental pillar in Portugal's strategy to ensure that citizens are equipped with the necessary digital skills for the 21st century. Developed as part of the national INCoDe.2030

programme and approved in 2019, the QDRCD is grounded in the European Commission's DigComp 2.1 model but adapted to the national context.

It serves a triple function: informing public policy, supporting educational and training curricula, and guiding certification processes and skill assessment across various sectors of society.

At its core, the QDRCD outlines five core areas of digital competence:

Digital and Information Literacy

Involves the ability to search, evaluate, store, and retrieve information in digital environments. For instance, users are expected to distinguish between credible and non-credible sources and understand how to manage data across platforms.

Communication and Collaboration

Encompasses the use of digital technologies for interaction, collaboration, and participation in digital communities. It includes managing digital identity and understanding appropriate netiquette in professional and academic contexts.

Digital Content Creation

Covers the ability to create, edit, and integrate digital content, as well as understanding copyright and licensing rules. It also addresses the skills needed to develop new digital resources and adapt existing materials to different purposes.

Safety and Privacy

Focuses on protecting personal data, securing digital devices, and understanding online risks. It also includes digital wellbeing and awareness of responsible online behavior.

Problem Solving

Includes identifying needs, developing digital solutions, and applying technological tools to specific tasks or challenges. This area is key to fostering innovation and adaptability in a rapidly changing digital landscape.

In recent years, additional areas have been introduced to reflect technological advances and emerging societal needs:

Computational Thinking and Algorithmic Reasoning

Promotes logical problem-solving, data structuring, and step-by-step processing, which are essential in digital and AI-related professions.

Programming and Scripting Skills

Refers to basic knowledge of programming languages and the ability to interact with software environments, essential for STEM careers.

Use of Intelligent Systems (AI)

Includes familiarity with artificial intelligence tools and systems, understanding their ethical implications, and integrating them into everyday work or study.

The QDRCD presents these areas in a structured framework of four proficiency levels, allowing individuals and institutions to assess and track development over time. This

model also supports modular learning paths and micro-credentials, enabling flexible and targeted upskilling efforts.

Níveis no DigComp 2.1	Complexidade das tarefas	Autonomia	Domínio Cognitivo
1	Tarefas Simples	Com orientação	Lembrar
2		Com autonomia e orientação onde necessário	
3	Tarefas bem definidas e rotineiras, e problemas simples	Sozinho(a)	Compreender
4	Tarefas e problemas bem definidos não rotineiros e problemas simples	De modo independente e de acordo com as próprias necessidades	
5	Tarefas e problemas diferentes	Orientando os outros	Aplicar
6	Tarefas mais apropriadas	Adaptando-se a outros num contexto complexo	Avaliar
7	Problemas complexos com definição limitada	Integrando para contribuir para a prática profissional e orientar outros	Criar
8	Problemas complexos, com muitos fatores que interagem entre si	Propondo novas ideias e processos para a área	

Adaptado de Lucas, M. & Moreira, A. (2017). DigComp 2.1: Quadro Europeu para a Competência Digital para Cidadãos: com oito níveis de proficiência e exemplos de uso. Aveiro: UA

DigComp 2.1 Levels	Task Complexity	Autonomy	Cognitive Domain
1	Simple tasks	With guidance	Remember
2	Simple tasks	With autonomy and guidance where needed	
3	Well-defined and routine tasks, and simple problems	Alone	Understand
4	Well-defined non-routine tasks and simple problems	Independently and according to personal needs	
5	Different tasks and problems	Guiding others	Apply
6	More appropriate tasks	Adapting to others in a complex context	Evaluate
7	Complex problems with limited definition	Integrating to contribute to professional practice and guide others	Create
8	Complex problems with many interacting factors	Proposing new ideas and processes in the field	

Crucially, the QDRCD integrates cognitive, ethical, and creative dimensions, ensuring that digital competence is not merely technical but also promotes critical thinking, social responsibility, and innovation. As digital tools become more embedded in educational, economic, and civic life, this holistic view is vital to preparing citizens not only to use technology but also to shape it ethically and effectively.

1.2. Policy Anchors: Strategic Alignment with National and EU Agendas

Portugal's commitment to enhancing digital competence is not an isolated initiative but rather part of a cohesive and multilayered strategy, supported by major national and European policy frameworks. These strategic anchors ensure that digital capacity-building is sustained, inclusive, and aligned with broader economic and social transformation goals.

INCoDe.2030: Portugal's Flagship Digital Competence Initiative

Launched in 2017, the Iniciativa Nacional Competências Digitais e.2030 (INCoDe.2030[1]) is Portugal's overarching strategy to promote digital skills across all dimensions of society.

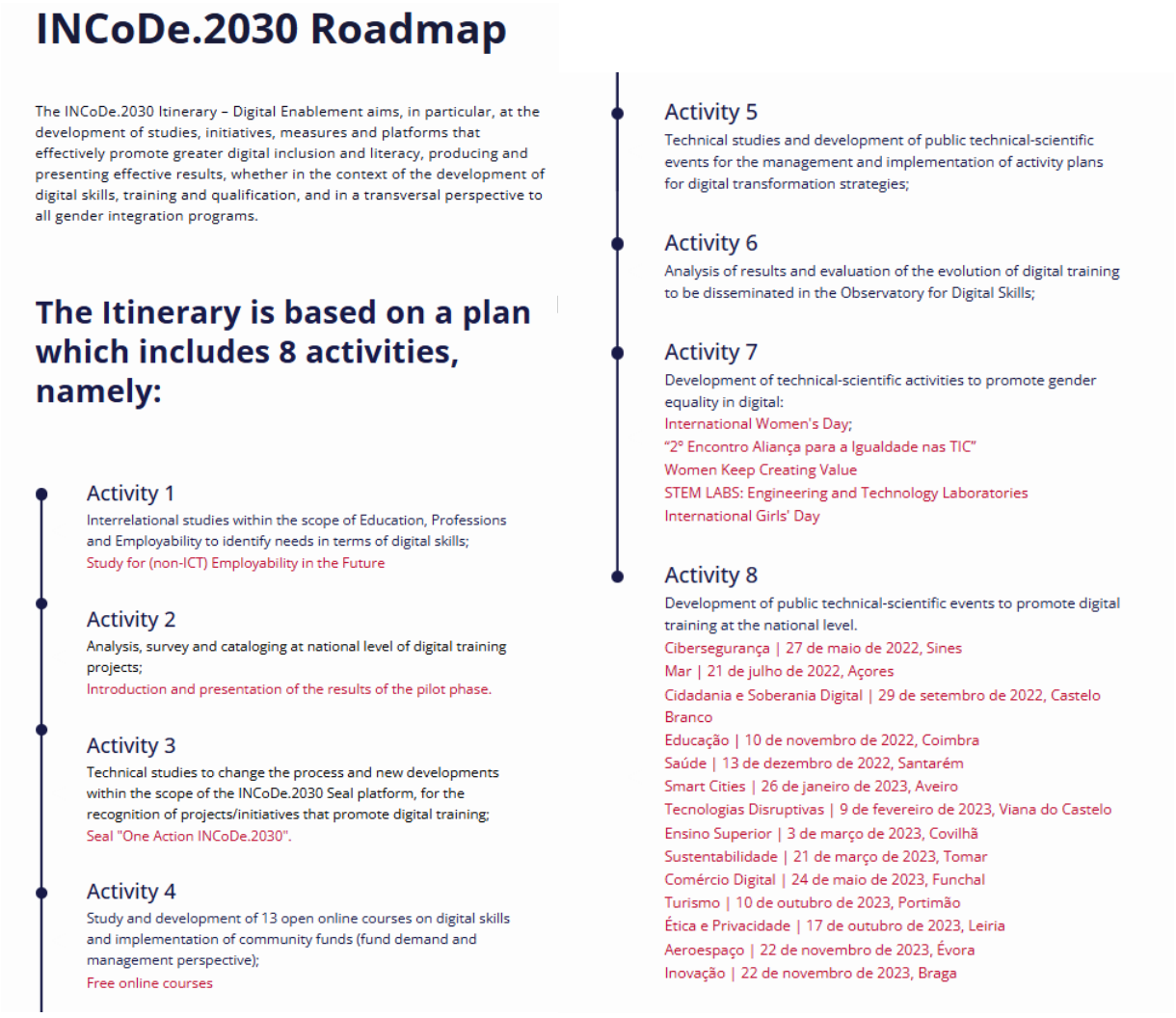
It encompasses five lines of action:

[1] https://www.incode2030.gov.pt/en/incode-2030-en/

- *Inclusion:* Targeting digital literacy for all citizens, with special focus on vulnerable groups.
- *Education:* Integrating digital skills into the national curriculum and teacher training.
- *Qualification for Employment:* Promoting reskilling and upskilling aligned with labor market needs.
- *Specialisation:* Supporting higher education and advanced training in areas such as AI, cybersecurity, and data science.
- *Research:* Encouraging R&D in digital fields and reinforcing Portugal's role in European and global innovation ecosystems.

INCoDe.2030 has driven the development of national tools like the QDRCD and supported initiatives such as AI Portugal 2030, a coordinated effort to position Portugal at the forefront of AI adoption and education

Notably, Portugal was one of the early signatories of the European AI Declaration and has implemented multiple rounds of public funding to support AI integration into public administration and academia.



INCoDe.2030 Roadmap

The INCoDe.2030 Itinerary – Digital Enablement aims, in particular, at the development of studies, initiatives, measures and platforms that effectively promote greater digital inclusion and literacy, producing and presenting effective results, whether in the context of the development of digital skills, training and qualification, and in a transversal perspective to all gender integration programs.

The Itinerary is based on a plan which includes 8 activities, namely:

Activity 1
Interrelational studies within the scope of Education, Professions and Employability to identify needs in terms of digital skills;
Study for (non-ICT) Employability in the Future

Activity 2
Analysis, survey and cataloging at national level of digital training projects;
Introduction and presentation of the results of the pilot phase.

Activity 3
Technical studies to change the process and new developments within the scope of the INCoDe.2030 Seal platform, for the recognition of projects/initiatives that promote digital training;
Seal "One Action INCoDe.2030".

Activity 4
Study and development of 13 open online courses on digital skills and implementation of community funds (fund demand and management perspective);
Free online courses

Activity 5
Technical studies and development of public technical-scientific events for the management and implementation of activity plans for digital transformation strategies;

Activity 6
Analysis of results and evaluation of the evolution of digital training to be disseminated in the Observatory for Digital Skills;

Activity 7
Development of technical-scientific activities to promote gender equality in digital:
International Women's Day;
"2º Encontro Aliança para a Igualdade nas TIC"
Women Keep Creating Value
STEM LABS: Engineering and Technology Laboratories
International Girls' Day

Activity 8
Development of public technical-scientific events to promote digital training at the national level.
Cibersegurança | 27 de maio de 2022, Sines
Mar | 21 de julho de 2022, Açores
Cidadania e Soberania Digital | 29 de setembro de 2022, Castelo Branco
Educação | 10 de novembro de 2022, Coimbra
Saúde | 13 de dezembro de 2022, Santarém
Smart Cities | 26 de janeiro de 2023, Aveiro
Tecnologias Disruptivas | 9 de fevereiro de 2023, Viana do Castelo
Ensino Superior | 3 de março de 2023, Covilhã
Sustentabilidade | 21 de março de 2023, Tomar
Comércio Digital | 24 de maio de 2023, Funchal
Turismo | 10 de outubro de 2023, Portimão
Ética e Privacidade | 17 de outubro de 2023, Leiria
Aeroespaço | 22 de novembro de 2023, Évora
Inovação | 22 de novembro de 2023, Braga

Plano de Ação para a Transição Digital

In 2020, the government introduced the Plano de Ação para a Transição Digital[2], which consolidated digitalisation as a central vector for national development

Structured around three pillars - digital inclusion of citizens, digital transformation of businesses, and digital modernisation of the state - the plan articulates ambitious goals to accelerate digital maturity across sectors.

Key elements of the plan include:

- ➔ Creating a more digitally inclusive society, ensuring all citizens can benefit from the digital economy.
- ➔ Promoting entrepreneurship and SME digitalisation, especially in traditional sectors.
- ➔ Investing in e-government and interoperable digital public services, fostering transparency and efficiency.

This plan also emphasizes monitoring and governance, assigning coordination responsibilities to the Estrutura de Missão Portugal Digital[3] (Portugal Digital Mission's Structure) and aligning national efforts with the European Union's Digital Compass[4].

Monitoring Progress: Portugal in the EU Digital Decade

Portugal's progress is systematically monitored through its participation in the EU's Digital Decade framework, which sets clear targets for 2030 in four cardinal areas: digital skills, digital infrastructures, digitalisation of businesses, and digital public services.

Highlights from the 2024 Digital Decade Country Report[5] include:

Connectivity:

Portugal has achieved near-universal coverage, with 94.2% of households connected to Very High-Capacity Networks (VHCN) and 98.1% 5G coverage in 2024. This places Portugal well ahead of most EU peers in infrastructure readiness.

Digital Skills:

Only 56% of the population possess at least basic digital skills, slightly above the EU average of 55.6%, but still far from the 2030 target of 80%. ICT specialists represent only 4.5% of the workforce, and only 20% are women—a figure that has not improved since 2021.

SMEs and Digital Intensity:

[2] https://www.portugal.gov.pt/gc22/portugal-digital/plano-de-acao-para-a-transicao-digital-pdf.aspx
[3] https://portugaldigital.gov.pt/en/
[4] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0118
[5] 2024 Digital Decade Country Report

53.6% of SMEs demonstrate a basic level of digital intensity, while the adoption of advanced technologies like cloud, AI, and data analytics remains low (AI usage at 7.9% vs. 75% target).

These figures highlight a clear gap between infrastructure and human capital, reinforcing the importance of educational and training systems in driving meaningful digital transformation. To this end, the Digital Decade report recommends that Portugal intensify evaluation of existing measures, address gender disparities in ICT professions, and strengthen collaboration between academia, industry, and government.

A Systemic and Inclusive Approach

Together, the QDRCD, INCoDe.2030, the Plano de Ação para a Transição Digital, and the EU Digital Decade Reports form a robust ecosystem of policy tools and monitoring mechanisms. They reflect a systemic, inclusive, and forward-looking approach to digital competence development.

This comprehensive strategy supports not only employability and economic transformation but also educational equity and digital citizenship. By aligning national initiatives with European benchmarks, Portugal positions itself as a key player in the digital future - provided it continues to invest in the digital skills of all its citizens, particularly in higher education where innovation, research, and workforce preparation converge.

Section 2: Target Audience and Domains

The successful implementation of a national digital competence framework hinges on its capacity to engage a broad range of actors across the education ecosystem and beyond. In Portugal, the Quadro Dinâmico de Referência de Competência Digital (QDRCD) plays a pivotal role in fostering digital literacy and advanced skills across multiple layers of society. This section outlines two of the most critical domains—higher education professionals and students/lifelong learners—highlighting the strategies, tools, and initiatives that aim to support these groups in becoming digitally empowered.

2.1. Higher Education Professionals

Faculty members and researchers in Higher Education Institutions (HEIs) are among the most influential agents in Portugal's digital education transformation. The national strategy explicitly recognizes the importance of equipping educators with digital competences, both as a means of enhancing pedagogical quality and as a multiplier effect for student learning.

Several HEIs, notably Universidade de Lisboa Rectorate/Institute of Education (ULisboa), Universidade de Lisboa/Instituto Superior Técnico (IST), and Universidade do Porto (U.Porto), have launched structured initiatives to promote digital skill development among their academic staff. These initiatives often include micro-credentials, intensive courses, or workshops aligned with the QDRCD proficiency levels. ULisboa, for example, launched a set of online courses focused on digital pedagogical innovation, offering modules on e-learning design, assessment using digital tools, and ethics in AI integration.

Key Focus Areas for Training:

Use of Digital Pedagogical Tools

Tools like Moodle, Microsoft Teams, and Panopto are widely promoted for lesson planning, flipped classrooms, and digital assessment. The use of learning analytics dashboards is also increasing, allowing educators to monitor student engagement and personalize interventions.

Assessment of Digital Content

Faculty are being trained to assess the validity, accessibility, and adaptability of digital content. This includes content curation for diverse learning needs and ensuring compliance with copyright, open licensing, and data protection regulations (e.g., GDPR).

Integration of AI in the Classroom

Emerging initiatives explore the use of AI tools such as adaptive quizzes, automated feedback systems, and generative AI in writing and coding support. Some pilot programs at Instituto Superior Técnico and Universidade NOVA de Lisboa are also exploring AI-assisted grading and conversational agents in student support services.[6]

Collaborative Learning Platforms

The use of online collaboration environments - like Miro, Padlet, and shared Git repositories - has been encouraged to foster active learning, problem-solving, and student co-creation. Educators are supported in designing group-based activities and peer assessment methods via digital platforms.

Despite these developments, the Digital Decade Country Report (2024) stresses that the professional development of educators in Portugal must become more systemic and widespread. The QDRCD enables this by offering a structured roadmap and self-assessment tools for higher education professionals to benchmark their progress and plan their learning trajectories.

2.2. Students and Lifelong Learners

Students, particularly at the tertiary level, are expected to graduate with robust digital skills not only for academic success but also to meet the demands of the evolving labor market. However, data from the DESI 2024 report reveal that **only 56% of the Portuguese population possess basic digital skills**, with even lower levels of advanced competencies such as coding or data analytics.

Addressing this challenge requires investment not only in formal education pathways but also in lifelong learning ecosystems.

To this end, MOOCs and digital learning platforms play a crucial role in broadening access to digital upskilling. The **NAU platform**, coordinated by FCCN (the National

[6] https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3d%3dBAAAAB%2bLCAAAAAAABACzMDQxAQC3h%2byrBAAAAA%3d%3d

Scientific Computing Foundation), offers free online courses co-developed by public universities and governmental agencies. These courses target both enrolled students and non-traditional learners, including:

- ➔ *Non-ICT students* in fields such as the humanities and social sciences who require foundational digital tools (e.g., data visualization, online collaboration).
- ➔ *Adult learners and job seekers,* many of whom are retraining for new careers in digital economy sectors.
- ➔ *Public administration professionals,* supported through platforms such as INA (Instituto Nacional de Administração/National Institute of Public Administration), which develops courses in e-government, cybersecurity, and digital ethics.

Institutions like Instituto Superior Técnico, IP Leiria, and Universidade do Algarve have also created their own learning hubs, combining in-person and online formats to build capacity among diverse student populations. These hubs use the QDRCD as a guideline to structure course offerings according to proficiency levels, allowing learners to progress from basic digital literacy to more complex problem-solving and innovation domains.

Digital Literacy as a Lifelong Right

The QDRCD promotes a citizen-centric approach to digital inclusion. By embedding competence development into non-formal learning platforms and aligning with lifelong learning principles, the framework ensures that digital skills are no longer the privilege of those in formal education but a lifelong right and responsibility for all.

This approach also aligns with the European Digital Education Action Plan (2021–2027)[7], which calls on Member States to support accessible digital learning at all stages of life. In Portugal, the National Plan for Digital Transition explicitly supports this with funding mechanisms under the Recovery and Resilience Plan, which dedicates EUR 4.5 billion to digital transformation—much of which is earmarked for education and training.

Moreover, the use of national self-assessment tools based on the QDRCD - similar to DigCompSAT[8] or TET-SAT - helps students and adult learners identify their digital gaps and choose tailored learning paths, fostering autonomy and motivation.

DigCompSAT Project Overview

[7] https://education.ec.europa.eu/focus-topics/digital-education/action-plan
[8] https://all-digital.org/wp-content/uploads/2021/01/digcompsat_2020.pdf

Section 3: Competency Domains and Proficiency Levels

Portugal adopts a structured and progressive approach to digital competence development, grounded in the Quadro Dinâmico de Referência de Competência Digital (QDRCD). This national reference framework is inspired by the European DigComp 2.1 model and contextualized to address the specific social, educational, and technological landscape of the country.

Five Core Competency Domains

The QDRCD identifies five interrelated domains of digital competence, which serve as the foundation for curriculum design, training programmes, and assessment tools:

Digital and Information Literacy

- ➔ Skills related to searching, evaluating, managing, and interpreting digital information and data.

Communication and Collaboration

- ➔ Competence in digital interaction, sharing, participation in digital communities, and managing digital identity.

Digital Content Creation

- ➔ Encompasses the development and adaptation of digital content, including awareness of copyright, licenses, and coding.

Safety and Privacy

- ➔ Focuses on protecting personal data and digital devices, ensuring cybersecurity, and promoting digital well-being.

Problem Solving

- ➔ The ability to identify needs, select appropriate digital tools, and apply them to innovative and efficient solutions.

Each domain is complemented by sub-competences, making the framework both comprehensive and adaptable to various educational levels and professional sectors.

Proficiency Levels and Cognitive Taxonomy

To ensure developmental alignment, the QDRCD integrates eight proficiency levels, closely mapped to the Bloom's Taxonomy and the European Qualifications Framework (EQF). These levels are structured along three dimensions:

Complexity of Tasks: Ranges from simple and routine (Levels 1–2) to complex and open-ended (Levels 7–8).

Autonomy: From task execution with guidance (Level 1) to full autonomy and leadership in digital innovation (Level 8).

Cognitive Domain: Based on Bloom's taxonomy, levels progress from remembering and understanding, to applying, evaluating, and ultimately creating.

For example, a Level 2 user may be able to perform basic searches and evaluate sources with support, whereas a Level 6 user is capable of critically assessing data sets, applying advanced tools, and adapting solutions to new contexts. Level 8 reflects the capacity to propose novel digital strategies, foster innovation, and lead systemic change in professional or academic settings.

Alignment with European and Sectoral Frameworks

The QDRCD does not operate in isolation. It is fully aligned with DigComp, the e-CF (European e-Competence Framework[9]) for ICT professionals, and national qualification frameworks such as Catálogo Nacional de Qualificações[10] (CNQ). This cross-mapping ensures interoperability and recognition of competences across formal education, vocational training, and lifelong learning.

Moreover, by integrating a taxonomy-driven structure, the QDRCD allows for the design of modular learning pathways, micro-credentials, and self-assessment tools, contributing to the personalization and scalability of digital competence development in Portugal.

Section 4: Assessment & Certification

Assessing digital competence is a cornerstone of Portugal's strategy to equip its citizens, educators, and learners with the necessary skills to thrive in a digital society. In line with the European Commission's DigComp and DigCompEdu frameworks, Portugal has adopted a multi-layered and evolving approach to assessment, combining self-evaluation tools, formal certification pathways, and the emerging ecosystem of microcredentials. While a nationally unified certification framework for higher education professionals is still in development, bottom-up and institution-led initiatives are demonstrating innovative and scalable models of digital skills recognition.

4.1. Self-Assessment Tools and Formative Evaluation

Portugal has promoted the use of self-assessment tools as a foundational step in digital competence development. These tools are aligned with the European DigCompEdu framework, which is designed specifically for educators. One of the most notable implementations is through FCCN, the digital infrastructure branch of the Fundação para a Ciência e a Tecnologia (FCT). FCCN provides platforms that support teachers and researchers in evaluating their own digital teaching readiness.

These tools allow users to:

- Reflect on their use of digital technologies in learning environments;
- Identify gaps across DigCompEdu dimensions (e.g. Digital Resources, Teaching & Learning, Assessment, Empowering Learners);
- Receive personalized recommendations and learning pathways;
- Track progress over time through dashboards and reports.

[9] https://esco.ec.europa.eu/en/about-esco/escopedia/escopedia/european-e-competence-framework-e-cf
[10] https://catalogo.anqep.gov.pt/

Several HEIs have adopted these tools institutionally, integrating them into Continuing Professional Development (CPD) programmes and internal quality assurance mechanisms.

In schools, this model is mirrored by teacher-specific self-assessment tools (e.g. TET-SAT) which have been encouraged across the EU. The Digital Education at School in Europe report (Eurydice, 2019) confirms Portugal as one of the systems promoting self-evaluation frameworks, contributing to both personal reflection and institutional benchmarking.

4.2. Formal Certification and MOOCs

Portugal is also leveraging MOOCs and institutional online learning platforms to formalize the certification of digital skills. The NAU platform, managed by FCCN, plays a central role in democratizing access to digital learning opportunities. It offers free and certified courses, developed in collaboration with public universities and government agencies. Popular topics include:

- Data protection and privacy (aligned with GDPR),
- AI fundamentals and ethics,
- Digital collaboration and cloud-based tools,
- Introduction to programming and computational thinking.

Learners who complete MOOCs can receive formal digital certificates, which are recognized by employers and public bodies, although they are not yet formally integrated into the national qualifications catalogue. This model has proven particularly effective in upskilling adult learners, public administration professionals, and job seekers.

Moreover, institutions like Universidade de Lisboa/Rectorate/Instituto de Educação, Universidade de Lisboa/Instituto Superior Técnico, and Universidade NOVA de Lisboa have begun offering blended or online CPD programs specifically designed for higher education staff. These include formal evaluations, peer assessments, and portfolio-based validation of competencies, which align with the QDRCD and European frameworks.

4.3. Microcredentials and Open Badges

One of the most innovative assessment trends in Portugal is the development of microcredentials, particularly through collaborations between HEIs and national digital agencies. While there is not yet a legally binding, standardized national certification system for digital competence in higher education, pilot projects are leading the way.

Notably, Universidade de Lisboa Lisboa and FCCN have initiated Open Badge systems - digital credentials that verify specific competences and can be shared across platforms like LinkedIn, Europass, or personal portfolios. These badges:

- Represent discrete, verifiable units of competence (e.g., "Digital Collaboration", "Creating Digital Content");
- Can be stacked to build a more comprehensive digital skills profile;
- Are aligned with the QDRCD proficiency levels and DigCompEdu descriptors;
- Promote transparency and portability of learning achievements.

The use of microcredentials supports flexible, personalized learning paths and has strong potential for integration into lifelong learning and recognition of prior learning (RPL) systems.

This approach is consistent with the European Commission's push for a European framework for microcredentials, ensuring cross-border comparability and recognition. Portugal is actively contributing to the development of this agenda through participation in relevant Erasmus+ and Horizon projects, and via the integration of digital credentials into institutional strategies.

4.4. Towards a National Certification Strategy

Despite strong progress in tools and institutional initiatives, Portugal does not yet have a national, unified certification standard for digital competences, especially for higher education professionals. However, the groundwork is being laid through bottom-up initiatives and strategic coordination.

Key future goals for certification include:

- Ensuring national and European recognition through interoperability with DigComp and EQF standards;
- Supporting career development by linking digital competence certification to professional evaluation, promotion, and CPD credits;
- Providing stackable credentials that allow learners to progressively build a recognized digital portfolio throughout their careers;
- Embedding assessment in broader educational innovation, quality assurance, and human resource development policies.

The Digital Decade Country Report for Portugal (2024) highlights the importance of increasing the number of ICT specialists and improving digital skills in the general population - an area where structured certification pathways will be critical.

4.5. Challenges and Opportunities

Several challenges remain in scaling up certification:

- Harmonizing recognition across institutions and public bodies;
- Ensuring that certifications are meaningful for employers and professional bodies;
- Integrating assessment practices into ongoing curriculum reform at HEIs.

Nonetheless, Portugal's assessment strategies are innovative, inclusive, and aligned with EU best practices. The QDRCD provides a solid framework, and the widespread use of self-assessment, microcredentials, and institutional certifications positions the country to formalize a national standard in the near future.

Section 5: Alignment with International Standards

Portugal has taken a strategic approach to ensure its national efforts in digital competence development are aligned with international and, in particular, European

frameworks. The Portuguese Digital Competence Framework (QDRCD), developed in 2019 under the INCoDe.2030 initiative, is deeply inspired by the European DigComp 2.1 and DigCompEdu frameworks. It represents a national adaptation that retains the structure and principles of these European models while responding to the specific educational and societal contexts in Portugal.

At the higher education level, institutions such as the University of Lisbon (ULisboa) and Instituto Superior Técnico (Técnico Lisboa) have been instrumental in ensuring this alignment is more than theoretical. Through institutional strategies and targeted training offers, these universities have incorporated the language and structure of DigCompEdu into continuing professional development (CPD) programs for academic staff. For example, ULisboa has offered structured online courses for university teachers that follow DigCompEdu areas such as "Digital Resources," "Teaching and Learning," and "Empowering Learners." Each module concludes with an evaluation aligned with DigComp proficiency levels.

In parallel, Técnico Lisboa developed a digital skills self-assessment tool for teaching staff, modeled on DigCompEdu, which allows educators to benchmark their digital competence and identify areas for growth. The results are used internally to design personalized learning pathways and promote peer mentoring. In these efforts, the universities also consider the European Qualifications Framework (EQF), explicitly referencing task complexity, autonomy, and cognitive domain to enable cross-border recognition of digital skills certifications.

The commitment to the Open Badge standard (IMS 2.0) further strengthens Portugal's position. ULisboa and FCCN (through the NAU platform) issue badges that encapsulate metadata about the learning outcomes, assessment criteria, and issuing body, ensuring that credentials can be verified across Europe. These badges are stackable and have begun to be incorporated into Europass portfolios.

This deliberate strategy of mapping national tools to EU-recognized standards is critical not only for ensuring consistency and transparency but also for enhancing the international mobility of students and educators. Portuguese institutions have recognized that alignment with frameworks like DigComp and DigCompEdu is essential for guaranteeing that the digital competences acquired are visible, portable, and useful beyond national borders. The result is a growing ecosystem in Portugal where international standards are not merely adopted but embedded into the everyday practices of higher education institutions.

Section 6: Examples of Implementation Strategies

The implementation of digital competence frameworks in Portuguese higher education institutions has followed diverse, yet complementary, strategies. These strategies include structured training programs, curricular integration, technological experimentation, and governance mechanisms. While leading institutions such as Técnico Lisboa and Universidade de Lisboa have played pioneering roles, other universities and polytechnics have also contributed valuable practices that reflect regional innovation, inclusivity, and scalability.

6.1. Examples of Institutional Implementation Strategies

Técnico Lisboa (Universidade de Lisboa) | Launched the Digital Learning@Técnico initiative, which includes:

- Faculty development workshops on digital pedagogy and AI in education;
- Integration of DigCompEdu in internal teacher self-assessment and CPD;
- Use of tools like GitHub Copilot in master's courses for software engineering;
- Development of open templates for course digitization aligned with QDRCD.

Reitoria da Universidade de Lisboa (ULisboa) | Created a centralized online CPD program for faculty through the Institute of Education:

- Courses aligned with DigCompEdu covering digital resources, assessment, and inclusion;
- Use of peer-feedback and project-based learning for certification;
- Issuance of Open Badges for verified competences;
- Recognition of participation in internal performance evaluations.

Universidade do Porto (U.Porto) | Implemented the UP Digital Academy, a transversal training hub for students and staff:

- Offers self-paced online courses on digital literacy, AI, and cloud services;
- Uses learning analytics to monitor engagement and adapt offerings;
- Includes a microcredential system using blockchain-backed certification.

Instituto Politécnico de Leiria (IPLeiria) | Developed the Le@d Hub to enhance digital learning environments:

- Provides pedagogical support to teachers integrating Moodle and video tools;
- Organizes digital bootcamps for students on data handling and cybersecurity;
- Developed an internal platform for self-assessment based on QDRCD levels.

Universidade do Minho | Coordinated the eU Campus Virtual Project, focused on digital capacity building:

- Supported by European funds, with DigComp and DigCompEdu as core frameworks;
- Promoted the use of virtual classrooms and collaborative teaching tools;
- Piloted a cross-departmental AI literacy curriculum for non-STEM programs.

Instituto Politécnico de Setúbal (IPS) | Established a Digital Skills and Innovation Office:

- Offers personalized mentoring and digital coaching to faculty and administrative staff;
- Facilitates design thinking labs to co-create teaching solutions;
- Partnered with local industries to create problem-based learning modules using digital platforms.

6.2. Key Enablers across Institutions

- Modular CPD programs aligned with QDRCD and DigCompEdu allow for personalized learning trajectories and flexible recognition of digital skills.
- Microcredentials and open badges are becoming the standard mechanism for certifying and stacking learning outcomes.
- Co-governance models (e.g., internal task forces, working groups) ensure strategic alignment between pedagogical services, IT departments, and academic leadership.
- Pilot courses using AI and immersive technologies (e.g., XR, chatbots) help institutions evaluate the pedagogical value and ethical implications of emerging tools before broad implementation.

6.3. Common Characteristics of Effective Implementation

- Scalability: Institutions adopt modular and self-paced models to reach large and diverse groups.
- Inclusivity: Programs are open to students, faculty, and technical staff, often addressing specific gaps (e.g., first-year digital onboarding).
- Alignment: Frameworks like DigComp, DigCompEdu, and EQF are used to ensure coherence and international recognition.
- Sustainability: Many initiatives are now transitioning from project-based funding to long-term institutional strategies embedded in internal quality assurance systems.

Section 7: Challenges & Barriers

While significant progress has been made in advancing digital competence in Portuguese higher education, multiple challenges persist. These barriers, both systemic and operational, affect institutions' ability to scale digital transformation efforts and to ensure inclusiveness, quality, and sustainability. The following outlines the most pressing obstacles faced by universities and polytechnics across the country.

1. Lack of a National Mandate for Digital Competence Certification

Unlike in primary and secondary education, there is no mandatory national policy requiring higher education institutions to assess or certify digital competences among faculty. This leads to heterogeneity in adoption, with some institutions like Técnico Lisboa and Universidade do Minho advancing rapidly, while others lag behind. As a result, good practices are fragmented and not always shared or scaled nationally.

2. Institutional Autonomy and Uneven Engagement

The autonomy of HEIs, while valuable, sometimes leads to uneven prioritization of digital skills development across faculties within the same institution. For instance, at Universidade do Porto, some faculties have fully embraced digital learning platforms, while others continue to rely predominantly on traditional methods.

3. Resistance to Change among Faculty

Many faculty members, especially those with long academic careers, show reluctance to adopt new tools and methods, citing:

- Lack of time;
- Unfamiliarity with digital platforms;
- Perceived threats to academic autonomy or pedagogical identity.

At Instituto Politécnico de Setúbal, mentoring programs had to be introduced to overcome this barrier, using peer-led support rather than top-down training.

4. Inequitable Access to Technology

Digital divide among students is still a concern:

- Some students lack access to reliable devices or internet at home.
- At ULisboa and Universidade de Évora, equipment lending programs were implemented to mitigate this issue, but these are not yet universal.

Accessibility of digital content (e.g., for students with disabilities) also remains inconsistent.

5. Fast-Paced Technological Change

The emergence of AI, XR, and blockchain technologies creates pressure on curricula, requiring frequent updates and staff retraining. For example, Técnico Lisboa's pilot courses on generative AI highlighted gaps in staff readiness and the lack of institutional guidelines on ethical AI use. Institutions struggle to balance innovation with regulation and risk management.

6. Limited Human and Financial Resources

Smaller institutions, particularly polytechnics in interior regions (e.g., IP Portalegre, IP Bragança), often lack:

- Dedicated instructional designers or digital pedagogy units;
- Long-term funding to maintain and update platforms;
- Incentive systems to recognize and reward digital innovation.

7. Fragmented Support Systems

Many HEIs still separate IT services, pedagogy units, and academic departments, making coordination difficult. Cross-functional teams, such as those established at Universidade do Minho and IP Leiria, are proving more effective but are not yet the norm.

8. Gaps in Monitoring and Evaluation

Although some institutions have implemented self-assessment tools (e.g., DigCompEdu-based diagnostics), few conduct systematic evaluations of:

- The impact of digital training on teaching practices;
- Student outcomes related to digital skills development;
- Institutional return on investment in digital transformation.

Section 8: Lessons Learned Relevant to eCampus Project

Portugal's experience in developing and implementing digital competence frameworks in higher education offers several practical lessons for the eCAMPUS project. These lessons stem not only from national policy design, such as INCoDe.2030 and the QDRCD, but also from institutional practices that illustrate how alignment, flexibility, and inclusiveness can drive meaningful digital transformation.

1. Strategic Alignment with European Frameworks is Essential

a) The successful integration of DigComp and DigCompEdu into Portuguese initiatives highlights the value of building national and institutional frameworks that are interoperable with European standards.

b) At ULisboa and Técnico Lisboa, training programs and microcredentials are explicitly mapped to DigCompEdu descriptors, facilitating recognition across borders and enabling integration into European tools like Europass.

c) This alignment ensures comparability, transparency, and mobility for learners and educators alike.

2. Microcredentials Foster Flexible and Personalized Learning

a) Microcredential systems, such as ULisboa's Open Badge platform and Técnico's Digital Skills Track, allow for:

- Modular learning paths;
- Stackable certifications;
- Targeted upskilling that aligns with individual or institutional needs.

b) These formats are ideal for lifelong learners, adjunct faculty, and non-traditional learners who may not follow standard academic pathways.

3. Institutional Incentives Drive Participation

a) Recognition of digital training in staff performance evaluations and promotion criteria, as seen at ULisboa, helps embed digital competence into the culture of continuous improvement.

b) Institutions that link digital literacy with quality assurance processes see greater faculty engagement and commitment.

4. Peer Learning and Communities of Practice Strengthen Engagement

a) At institutions like ULisboa and Universidade do Minho, Communities of Practice (CoPs) foster collaborative learning and peer support.

b) CoPs enable the sharing of resources, co-creation of digital materials, and reflection on pedagogical strategies.

c) They also provide a safe environment for experimentation and learning, especially for hesitant staff.

d) These grassroots efforts promote sustainable cultural change, beyond one-off training sessions.

5. Emerging Technologies Must be Contextualized and Piloted

a) The integration of generative AI (e.g., ChatGPT, GitHub Copilot) into pilot courses at Técnico Lisboa has demonstrated:
    - The importance of controlled experimentation;
    - The value of faculty training in critical AI literacy;
    - The need for institutional guidelines on ethical AI use in learning environments.

b) Such pilots provide feedback loops that help refine digital competence frameworks to include emerging domains like AI ethics, prompt engineering, and data stewardship.

6. Equity Must Be Embedded in Digital Strategies

a) Several institutions (e.g., ULisboa, Universidade de Évora, IP Leiria) have developed equipment lending schemes, onboarding courses, and support services to ensure students are not left behind.

b) These inclusive strategies highlight the importance of planning for digital access, diversity, and usability, particularly for underrepresented groups.

7. Coordination and Sustainability Require Cross-Functional Leadership

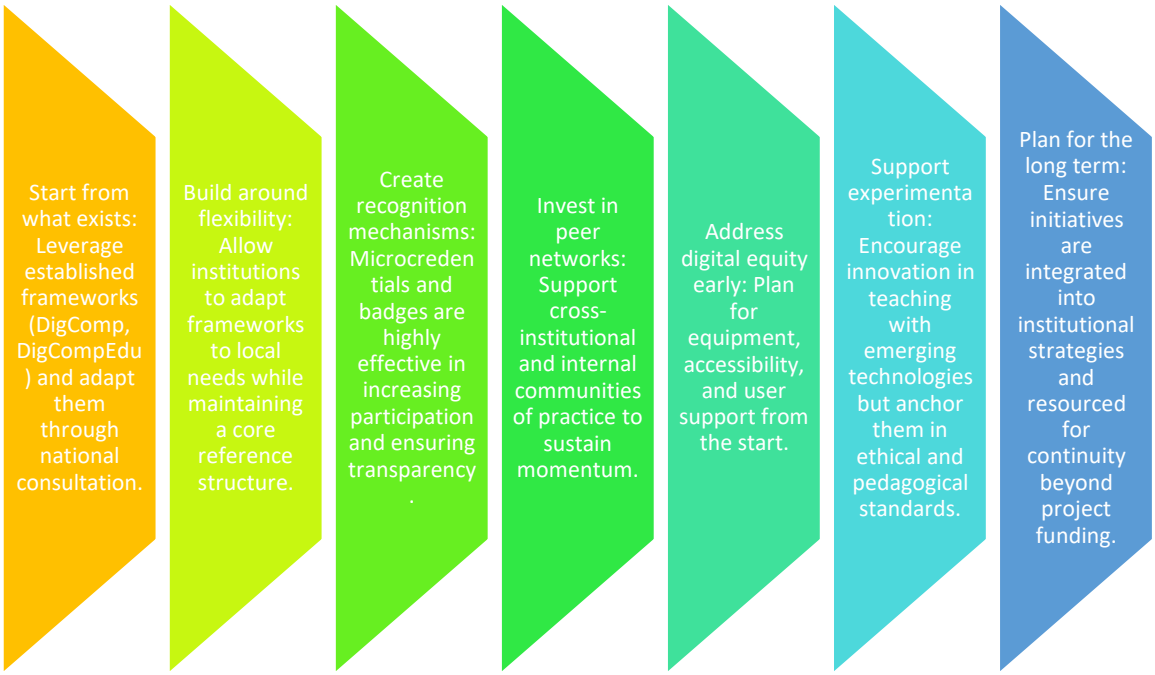
a) Institutions with successful digital transformation efforts have created interdisciplinary task forces or digital innovation offices (e.g., IPS – Instituto Politécnico de Setúbal).

b) These units combine IT, pedagogy, governance, and research, promoting:
    - Strategic coherence;
    - Efficient resource use;
    - Scalable implementation models.

c) They also play a key role in ensuring that digital innovation is embedded in long-term institutional planning, not just isolated projects.

8. Key Takeaways for eCAMPUS

For the eCAMPUS project, the Portuguese case provides several transferable insights:



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