Co-funded by
the European Union

ERASMUS+ CBHE PROJECT # 101177299-ECAMPUS-EDU-2024-CBHE

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

UNIVERSITA DEGLI STUDI DI GENOVA (UNIGE)

DIGITAL COMPETENCE FRAMEWORK BEST PRACTICE REPORT

COUNTRY CASE – ITALY

Co-funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or European Education and Culture Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

GENOA 2025

Contents

DIGITAL COMPETENCE FRAMEWORK (DCF) IN HIGHER EDUCATION

(Analysis of Digital Competences in Higher Education in Italy)

Prepared by: Giovanni Adorni, Professor at Department of Computer Science, Bioengineering, Robotics & Systems Engineering, University of Genoa (UNIGE)

Date: 20 June 2025

Section 1: Objectives of the Document within WP1

This document has been developed within the framework of Work Package 1 (WP1) of the eCAMPUS project. It provides an overview and critical analysis of the current state of digital competences in higher education in Italy. The objective is to present an evidence-based national perspective that complements similar reviews prepared by project partners from Spain (UAM), Sweden (KTH), and Portugal (ULISBOA). Together, these country-level analyses will contribute to the definition of a comprehensive Best Practice Report and serve as a foundation for the general review of the current situation in the field of digital competences in higher education. The ultimate aim is to support the implementation of a Digital Competence Framework for higher education in Armenia, tailored to national priorities yet informed by European best practices.

In this report there are some references to documents and websites created for the public administration and Italian citizens and unfortunately only available in Italian language. However, content in other languages is easily accessible thanks to modern translation systems.

Section 2: Frameworks and Initiatives

Several frameworks and initiatives are in place in Italy to develop digital competences, for teachers, for university students and citizens, for ICT professionals and for public administration (PA). A list, although not intended to be exhaustive, is as reported in the following.

- ✓ **European Digital Competence Framework for Citizens – DigComp 2.2** - Although not created in Italy, DigComp (Digital Competence Framework for Citizens) is adopted as a key reference at the national level. The latest version 2.2 (2022) has been translated into Italian by the Department for Digital Transformation and serves as a conceptual basis for many initiatives (https://repubblicadigitale.gov.it/portale/-/da-oggi-il-digcomp-2.2-parla-italiano). DigComp defines 21 essential digital competences for citizens, organized into 5 areas (data and information literacy, communication and collaboration, digital content creation, safety, problem-solving). A new version of the framework, DigComp 3.0, is currently under development at the European level. Italy is closely following this evolution and has already begun to incorporate some of its emerging transversal priorities, such as AI literacy, sustainability, and digital well-being, into national initiatives (see Section 8).

- ✓ **European Digital Competence Framework for Educators – DigCompEdu** - The EU framework DigCompEdu, specific to the digital competences of educators, is also used as a reference in Italy. It articulates competences into 6 areas (professional engagement, digital resources, teaching practices, assessment, student empowerment, development of students' digital competences) and is employed to align teacher training initiatives with international standards. Although there is no official Italian localization of DigCompEdu, the principles of this framework are incorporated into programs like EPICT (see later) and new syllabi, to connect the pedagogical dimension to the use of technologies (see, for example, the Conversational AI syllabus later on).
- ✓ **EPICT (European Pedagogical ICT Licence)** - A European framework born from an EU project (2003-2005) in which the University of Genoa participated (https://epict.unige.it/); EPICT is now aligned with the frameworks DigComp 2.2, DigCompEdu, UNESCO's ICT Competency Framework for Teachers (https://www.unesco.org/en/digital-competencies-skills/ict-cft), and provides a set of competence syllabi on the pedagogical use of digital technologies, a training model for teachers and a certification system for acquired competences (https://epict.unige.it/certificazioni). In Italy, EPICT has established itself as a reference for the digital training of teachers, with university courses and in collaboration with training organizations, and related certifications issued by the University of Genoa (https://app.myopenbadge.com > Organizations > Genova > Certificazioni EPICT).
- ✓ **Informatics for Digital Citizenship and Digital Humanities (Living Syllabus)** - A "living" syllabus proposed by the University of Genoa to guide the design of training courses on basic and advanced digital competences. It covers the five competence areas of the European DigComp 2.2 framework and targets three types of users (citizens, school teachers, and university students in non-ICT fields) with different expected proficiency levels. It is defined as "living" because it is developed and updated with a collaborative approach through an online portal, to adapt to technological evolution. The syllabus is released under an open license (Creative Commons) for wide dissemination (https://gup.unige.it/sites/gup.unige.it/files/2024-10/ITADINFO_2024_ebook.pdf).
- ✓ **Conversational AI** - A new initiative by the University of Genoa (available by June 2025) that defines a syllabus to train and certify teachers on the pedagogical use of conversational Artificial Intelligence (chatbots, generative models) in the classroom. The "Conversational AI" syllabus is aligned with the DigComp 2.2 frameworks and aims to prepare teachers to effectively integrate generative AI tools into daily teaching. This innovative framework is divided into progressive certification levels (Integrator, Expert, Leader) and is designed to modernize teaching professionalism in the face of the challenges and opportunities of AI (https://library.iated.org/view/ADORNI2024BUI).
- ✓ **e-CF (European e-Competence Framework)**: European standard implemented in Italy that identifies 41 competences for ICT professionals (https://www.consorzio-cini.it/index.php/en/labcfc-home/labcfc-areas-of-research/cfc-digital-competences/cfc-the-european-e-competence-framework, and https://www.aicanet.it/professionisti-ict/soluzioni-e-cf-plus/e-cf-competenze);

- ✓ **Digital Competences for PA -** The Italian Department of Public Administration has developed a reference model for digital competences specifically for civil servants. This model aims to enhance the digital skills of public administration employees, ensuring they are equipped to handle modern digital tools and processes effectively (https://cdn.syllabus.gov.it/portale/ documents/20121/44682/28feb22_Syllabus-competenze-digitali-pa_v2.pdf).

Among the main national initiatives:

- ✓ **Repubblica Digitale** - National initiative that coordinates digital policies by promoting digital inclusion and the development of competences (https://repubblicadigitale.gov.it/portale/).
- ✓ **National Strategy for Digital Skills -** Operational plan with four areas of intervention: education, workforce, ICT specialist skills, and citizens (https://docs.italia.it/italia/mid/strategia-nazionale-competenze-digitali-docs/it/1.0/quadro-generale/visione-e-obiettivi.html).
- ✓ **National Digital School Plan (PNSD) -** Guideline document to promote digital innovation in the school system (https://www.mim.gov.it/scuola-digitale).
- ✓ **ITS Academy** - Higher Technical Institutes also focused on advanced digital training (https://www.mim.gov.it/tematica-its).
- ✓ **National Competence Certification System -** Includes digital competences (https://www.lavoro.gov.it/notizie/pagine/sistema-nazionale-di-certificazione-delle-competenze -pubblicato-il-decreto-in-gazzetta-ufficiale).
- ✓ **Agency for Digital Italy** (**AGID)** - Promotes the dissemination of e-skills among citizens, businesses, and public administrations through ad hoc training courses, projects, events, and awareness and communication initiatives. It also works with other public bodies to define national e-skills strategies and provides operational materials and tools (https://www.agid.gov.it/en/agency/digital-skills).
- ✓ **National Recovery and Resilience Plan** (**PNRR) -** Is the instrument which using Next Generation Europe funds will make Italy more equitable, sustainable and inclusive. The plan will help build a new Italy, leaving behind the pandemic's economic and social impact (https://www.italiadomani.gov.it/content/sogei-ng/it/en/home.html). PNRR includes a section dedicated to Education and Research (https://www.italiadomani.gov.it/content/sogei-ng/it/en/il-piano/missioni-pnrr/istruzione-e-ricerca.html).
- ✓ **Digital Education Hub –** Establishment of 3 Digital Education Hubs in Italy by the Ministry of University and Research (MUR) (https://ict.crui.it/forum-pa-2024/digital-education-hub-linnovazione-digitale-per-il-sistema-universitario-italiano/). These hubs bring together almost all public universities with the aim of improving the capacity of the higher education system to offer digital education to all university students, facilitating those who need temporal and logistical flexibility, aiming for greater inclusion and an increase in graduates in Italy. The University of Genoa is part of one of these hubs, called EDUNEXT - Next Education Italy (https://edunext.eu/).

Section 3: Year of Establishment

In the following, I will consider the evolution of Italian initiatives on digital competences with particular reference to higher education, spanning the last two decades.

- **2003–2005 -** Launch of the European EPICT project, with the University of Genoa as the Italian partner. During these years, the EPICT model of training and certification for teachers was developed. From 2005 onwards, EPICT has been implemented in Italy through university courses and master's programs dedicated to teachers (https://moe.unige.it/).
- **2010s -** Spread of EPICT and other general ICT certifications (e.g., ECDL/ICDL) as requirements or training activities in universities. In 2015, the National Digital School Plan brought attention to digital competences in schools, but for the university sector, most initiatives remained voluntary.
- **2017 -** Publication of DigCompEdu at the European level (translated into Italian in the following years in the academic field), providing a new reference for the digital training of university and school teachers.
- **2020–2021 -** The COVID-19 pandemic accelerates the need for digital competences in the education sector. Many university teachers are forced to quickly develop e-learning skills. This context fosters awareness and propensity towards structured frameworks of digital competences.
- **2022 -** Release of version 2.2 of DigComp by the European Commission, with updates on emerging topics (e.g., data, AI, accessibility). Italy immediately adopts this framework: in 2023, the official Italian translation of DigComp 2.2 is published as part of the Repubblica Digitale initiative, signaling the intention to disseminate a common reference in the country.
- **2023 -** Development in Italy of the Informatics syllabus (Living Syllabus) for digital citizenship and Digital Humanities. In the academic year 2023/2024, the syllabus is tested in university courses and programs for teachers, demonstrating its effectiveness. In parallel, thanks to PNRR funds, the C-KIDD project aimed at schools starts, using the syllabus to train a community of experts and produce innovative resources (coding, augmented/virtual reality) for teaching (https://scuolafutura.pubblica.istruzione.it/polo-didattica-digitale-castelfranco-veneto-tvpc_02000b/-/pnsd/archivio-corsi and https://www.facebook.com/p/C-Kidd-CommunityKit-61557085311916/?locale=ne_NP&_rdr).
- **2024 -** Launch of the collaborative "living" development process of the syllabus: an online portal is opened to the contribution of the community of teachers and experts to continuously update and enrich the document. Additionally, at the beginning of the year, EPICT definitively adopts the system of micro-certifications through open badges.
- **2024 –** Launch of Digital Education Hub: EDUNEXT - Next Education Italia.
- **2025** - The official launch of the "Conversational AI" certification for educators is scheduled for June, with the related syllabus and pilot training course at the University of Genoa .

- **Near future -** The release of DigComp 3.0 at the European level is expected (currently in the final consultation phase), with updates to competence levels and descriptors to reflect new digital needs. This will guide future adaptations of Italian frameworks. An increase in specialized certifications (e.g., on AI, cybersecurity, etc.) and further integration of digital competences in university curricula and professional development programs for teachers is also expected.

Section 4: Target Audience

Italian initiatives cover a wide range of recipients, demonstrating an inclusive approach to digital competences, as illustrated below.

School teachers - The primary target of many historical programs. EPICT, for example, was created to train teachers (K-18) in the pedagogical use of ICT. Even if today it is not only limited to compulsory school teachers but is also of interest to university teachers, most EPICT certifications are still aimed at school teachers of all levels who wish to certify their digital teaching competence. The DigCompEdu framework also applies to school educators, and initiatives such as the ministerial project "Scuola Futura" (PNRR) offer courses for teachers based on these competences (https://pnrr.istruzione.it/).

Teacher trainers and digital experts - Programmes such as the PNRR C-KIDD mentioned above aim to create a community of certified experts who, in turn, train teachers in digital education. This group includes trainers, digital animators, and other professionals who act as multipliers in the territory. In the university context, some teachers act as early adopters or mentors for their colleagues in the use of digital tools.

University faculty (HEI faculty) - Although not mandatory, more and more university professors and researchers are becoming a target for digital competence programs. For example, the University of Genoa involves its faculty in workshops on the use of AI in teaching (https://arxiv.org/abs/2503.16307)). The upcoming "Conversational AI" certification is open to educators at any level, including academic faculty, to update their skills on generative AI in the classroom. In general, university faculty are recognized as a strategic audience for spreading innovative digital teaching methodologies, although participation has so far been voluntary. The University of Genoa is also part of one of the HUB EDUNEXT - Next Education Italy.

University students (especially non-ICT fields) - An emerging target is students in humanities and social sciences, who in the past had few formal opportunities to develop advanced digital competences. The syllabus "Informatics for Digital Citizenship and Diital Humanities" is designed specifically for non-ICT university students, such as those enrolled in Digital Humanities or related degree programs. These courses provide students with a more advanced perspective on informatics and transversal digital competences, preparing them as "digital communicators" capable of applying technologies in their field. These students, future professionals in various fields, benefit from an enriched curriculum with competences increasingly demanded by the digital labor market.

Lifelong learners: Basic digital competences concern the entire population. Italy, through programs like Repubblica Digitale, addresses citizens of all ages to promote digital inclusion. The syllabus developed in Genoa includes the profile of "digital citizen," individuals who want to actively exercise digital citizenship. This target includes students

outside the STEM academic context, adults in continuous education, workers needing reskilling, unemployed individuals improving their employability, etc. Initiatives for this audience aim at essential competences for daily life, civic participation, and work. Currently, there are specific courses (including online) and dedicated certification systems will be activated (for example, a future DigComp certification for citizens is under development at UNIGE (https://app.myopenbadge.com > Organizations > Genova > Competenze Digitali).

Section 5: Competence Domains

The frameworks mainly used at the Italian level on digital competences cover a plurality of competence domains, in line with European taxonomies, embracing both technical-instrumental skills and pedagogical and cognitive dimensions.

- **DigComp 2.2 –** The majority of the Italian initiatives are linked to the five key areas defined by the European DigComp framework. The UNIGE syllabus precisely covers these areas, detailing the knowledge and skills required for each and adapting them for different target audiences. This ensures comprehensive coverage of fundamental digital competences
- **DigCompEdu -** The European DigCompEdu framework identifies six competence areas for digital didactics; Italian syllabuses for teachers, such as EPICT and the AI certification, cover all these areas transversally, with particular emphasis on the use of digital resources and effective pedagogical integration. For instance, the 'Conversational AI' syllabus includes technical skills on the use of chatbots and language models, but also pedagogical and ethical skills on how to guide students in such activities.
- **ICT Pedagogical and Didactic Competences -** The original EPICT model divided the teacher's digital competences into a series of concrete application areas. In particular, EPICT provides syllabi and certifications related to: the pedagogical use of tools for multimedia content production, the use of STEM applications (simulations, virtual labs, coding, robotics) in the classroom, the use of technologies for innovative teaching methodologies (e.g., flipped classroom, online collaborative learning), and the integration of digital tools in school organization (school-family communication, virtual classroom management, documentation). These areas reflect all facets of digital teaching, ensuring that the teacher's competence is not limited to technical aspects but includes design, communication, and organizational aspects.
- **Emerging Competences (AI, data, etc.)** - Traditional domains are progressively being extended to include new emerging competences. For example, the competence of "prompting" (knowing how to effectively interact with conversational AI systems through targeted prompts) is not explicitly mentioned in DigComp 2.2 but is addressed in the Conversational AI syllabus. Similarly, the ability to use augmented and virtual reality tools in educational contexts, or to analyze data (learning analytics) to improve teaching, are competences that some projects (such as C-KIDD for coding and AR/VR) are introducing in training. It is expected that DigComp 3.0 and future updates will expand the competence domains to fully encompass these new areas (generative AI, advanced data literacy, etc.), but Italian experiences are already trying to anticipate trends by including such elements in

experimental curricula. These directions are coherent with the forthcoming DigComp 3.0 framework, which places increasing emphasis on transversal digital citizenship competences including AI literacy, sustainability, and critical media awareness. Italian initiatives have begun to address these emerging domains proactively, ensuring early alignment with future EU standards (see Section 8).

Section 6: Proficiency Levels

Each framework adopts a structure of levels of mastery or proficiency to describe the progression of digital literacy from novice to expert. Below is how the levels are organised in the different frameworks.

- **DigComp 2.2** defines eight proficiency levels organized into four progression stages (foundation, intermediate, advanced, and highly specialised), consistent with the Europass and EQF descriptors. These levels are used as reference points in academic programs and teacher training initiatives. For example, the UNIGE syllabus sets a target of level 4 (corresponding to a high intermediate level) for digital citizens across the five areas, while aiming at higher levels for more specialised educational goals.
- **DigCompEdu** defines six levels of mastery, from A1 (Newcomer) and A2 (Explorer) for digital beginners, to C1 (Leader) and C2 (Pioneer) for advanced digital innovators, with B1 (Integrator) and B2 (Expert) as intermediate stages. These levels are increasingly used in the design of Italian certification pathways, particularly in relation to digital pedagogy. Recent training programmes aim to support teachers in progressing from beginner or intermediate levels (A1–B1) to B2 and beyond. The new 'Conversational AI' certification explicitly adopts this structure, with three levels—Integrator (B1), Expert (B2), and Leader (C1)—mapped to DigCompEdu. A possible extension to C2 (Pioneer) could include advanced leadership in AI-enhanced education.
- The **Living Syllabus** framework adopts a differentiated approach, assigning target levels based on user profiles rather than defining internal progression scales. It sets EQF level 4 for digital citizens and EQF level 6 for university teachers and students in non-ICT fields. Level 6 implies the ability to perform complex tasks, adapt to new contexts, and critically evaluate solutions—appropriate for university-level responsibilities. Level descriptors are defined by integrating Bloom's taxonomy and EQF criteria of autonomy and complexity, ensuring consistency with European standards, as outlined in the Europass description of EQF levels (https://europass.europa.eu/en/description-eight-eqf-levels).
- **EPICT** originally used a certification model based on cumulative thresholds (Bronze, Silver, Gold), reflecting the number of completed modules. Since 2024, these milestones are recognized through open badges. While not strictly structured as hierarchical competence levels, they support continuous professional development through progressive achievement.
- In recent years, Italian institutions have widely adopted **Open Badges** to certify competence in specific areas. These badges are aligned with DigComp and DigCompEdu indicators and include metadata describing learning outcomes and

evidence. This micro-credentialing approach supports flexible, modular growth of digital profiles for both educators and students.

- **Emerging certifications**—e.g., in AI literacy, accessibility, and data ethics—are also being developed following these frameworks, ensuring alignment with European standards and facilitating cross-border recognition.

This combination of structured European frameworks and flexible, modular certification pathways supports both formal qualifications and lifelong learning strategies. It may serve as a valuable reference for Armenia in the design of its national Digital Competence Framework in higher education.

Section 7: Assessment & Certification

Assessment and certification are crucial elements in giving formal value to the competences acquired. In Italy, these features can be observed in different programmes.

Evidence-based model - The EPICT system favours authentic assessment, focusing on evidence of what the teacher knows how to do with digital in their teaching. Historically, at the end of EPICT courses, teachers underwent a certification interview in which they presented project work and reflections on the pedagogical use of ICT. Today, the process has been streamlined: the teacher can compare his or her activities with the EPICT curricula and present evidence (teaching materials, completed projects, documented experiences) in order to obtain recognition of competences by means of a badge. This "evidence-based" system valorises the practices already carried out and formalises them in an official university certification. Each specific competence is certified by an Open Badge issued by the University of Genoa on the myOpenBadge platform (https://app.myopenbadge.com > Organizations > Genova). The badges comply with the European standard for micro-credentials, which ensures transparency of criteria and metadata (tagged skills, EQF level, etc.). EPICT certifications are also valid for 5 years to encourage continuous updating in the face of rapid technological change.

Examinations and academic credits - At university level, digital literacy is assessed through examinations and practical tests included in curricular courses. For example, in the university course 'Technologies and Languages for the Digital Humanities' at UNIGE, students took a final exam that included both theoretical and practical tests of DigComp skills. Passing the exam resulted not only in training credits, but also in the issuance of an additional certification in the form of an open badge: the 'Digital Citizenship Certification - DigComp 2.2' badge. Created on an ad hoc basis, this badge certifies in a portable way that the student has digital competences in line with the European framework. This is an example of integration between traditional academic assessment and external certification: the student is assessed by the university and at the same time receives a title that is recognised outside (e.g. in the world of work) (https://app.myopenbadge.com > Organizations > Genova > Competenze Digitali).

Open badges and micro-credentials - The use of open badges has become common across the different initiatives. In addition to EPICT and the UNIGE syllabus, future courses such as the Conversational AI certification are likely to issue badges for each level achieved. Open badges make it possible to accumulate different micro-credentials

(e.g. a teacher can have a badge for 'multimedia content', one for 'STEM tools', etc.), thus creating a personalised portfolio of competences. In Italy, care is taken to ensure that these tools are in line with the European approach to micro-credentials, in order to promote their usability. For example, the EU Recommendation of 16/06/2022 on microcredentials is explicitly mentioned as a reference in the implementation of the UNIGE badges.

Specialised certifications - We are beginning to see certifications that focus on specific areas of digital literacy. The 'Conversational AI' certification for teachers is a case in point: it includes a dedicated training course (face-to-face or blended, with modules on generative AI, conversational tools, digital ethics) and a structured assessment by level (likely through project work and a practice test with simulated teaching scenarios). The framework is designed to issue a certificate for each of the three levels (B1, B2, C1), aligned with DigCompEdu as described above. During certification, teachers will have to demonstrate operational skills (e.g. designing a teaching activity integrating a chatbot and documenting its impact) and critical skills (e.g. discussing the ethical implications of using AI). The result will be a new qualification recognised by the university and included in the EPICT system.

Lack of compulsory and self-assessment - In the Italian university context, it should be noted that there is currently no compulsory certification system of digital competences for teachers (unlike in some countries where certification is linked to career progression). This means that many assessments are voluntary or internal to projects. Self-diagnosis tools such as online questionnaires have been proposed (e.g. the SELFIE for Teachers tool at European level, also adapted in Italian) to allow teachers to assess their own level and decide whether to undertake training/certification. This modality complements formal assessments and promotes individual awareness.

Section 8: Alignment with International Standards

The Italian experience actively seeks to align with international standards, particularly European ones, to ensure consistency, quality and recognisability of the digital competences acquired.

Alignment with DigComp and DigCompEdu - Almost all the initiatives mentioned are based on existing European frameworks. The UNIGE syllabus fully adopts DigComp 2.2 as a reference framework, ensuring that the competences covered are those recognised as essential at EU level. Similarly, the 'Conversational AI' certification was mapped to both DigComp 2.2 and DigCompEdu: a correspondence matrix with the competences of both frameworks was created during the design phase. An internal analysis highlighted the coverage of the syllabus against all areas of DigCompEdu and DigComp to ensure that nothing fundamental was overlooked. This double mapping is considered crucial for several reasons: firstly, to achieve international recognition and mobility - a certified teacher knows that his or her competences are readable anywhere in Europe - and secondly, to integrate both the technological and pedagogical dimensions of digital competence. For example, one of the outcomes of the alignment is to ensure training in the ethical and responsible use of AI: joining DigCompEdu means training teachers not only in the technical use of tools, but also in the ethical implications (privacy, bias, well-being) of such tools.

Reference to the EQF (European Qualification Framework) - Competence levels in Italian frameworks are often explicitly linked to European EQF levels. The UNIGE syllabus, for instance, adopts the EQF language to describe task complexity, autonomy and cognitive domain required at each level. This facilitates the comparability of certifications: a badge certifying competences at 'EQF Level 6' carries the shared meaning of that level (equivalent to a Bachelor's degree in terms of learning outcomes). Aligning with the EQF also helps microcredentials to be included in the learner's Europass portfolio and to be recognised in employment or other educational systems.

Microcredentials and the Open Badge standard - As mentioned above, Italian certifications adopt the international Open Badge 2.0 (IMS) standard to issue digital credentials. Each badge contains standardised metadata (description of skills, criteria, evidence, issuing body) that allow it to be verified anywhere. Furthermore, Italy supports the European line on micro-credentials: the use of open badges by the University of Genoa is in line with the EU Recommendation 2022 on micro-credentials (https://eur-lex.europa.eu/legal-content /EN/LSU/?uri=oj%3AJOC_2022_243_R_0002). This means that aspects such as interoperability, transparency and quality of credentials are guaranteed according to shared European parameters.

European frameworks and action plans - Italian initiatives are often contextualised within broader European programmes. For example, the eCAMPUS project itself (to which this comparative study contributes) is situated within the EU Digital Education Action Plan 2021-2027, which promotes the development of digital literacy among teachers and the digital transformation of higher education. Similarly, the PNRR funds that funded the C-KIDD project mentioned above come from NextGenerationEU, which has digitisation as one of its priorities. There is therefore a strong awareness of aligning national targets with European ones: for example, contributing to the Digital Compass 2030 (which sets percentage targets for digital literacy of the population and teachers - https://eufordigital.eu/library/2030-digital-compass-the-european-way-for-the-digital-decade/) or implementing the UNESCO/OECD guidelines on AI in education (https://www.oecd.org/en/ publications/ai-and-the-future-of-skills-volume-1_5ee71f34-en.html).

International cooperation and EU projects - Finally, alignment also manifests itself through participation in European networks and projects for the exchange of good practice. EPICT itself started as a European consortium and has links with partners in several countries. Italian universities involved in Erasmus+ projects (such as eCAMPUS) bring national experience, but also adopt elements from other contexts. This two-way flow ensures that the Italian framework evolves in line with the international landscape and, conversely, that the Italian experience contributes to global references.

Emerging Priorities in DigComp 3.0 - In preparation for the evolution of the European Digital Competence Framework towards DigComp 3.0, Italy has already begun to incorporate its five emerging transversal priority areas: *AI literacy*, *digital well-being*, *security*, *sustainability*, and *misinformation*. These elements are increasingly present across multiple national initiatives, reflecting a proactive alignment with EU and global recommendations.

- **AI literacy** is addressed through the national syllabus "*Conversational AI for Teachers*", developed by the University of Genoa. This framework trains educators to use generative AI tools critically and pedagogically, with a strong emphasis on

ethics, transparency, and responsible prompting practices. The syllabus is aligned with both DigComp 2.2 and DigCompEdu, and contributes directly to raising awareness of how algorithmic systems shape learning, communication, and assessment.

- **Digital well-being** is promoted in the *EPICT* training programmes and in the *Living Syllabus*, which include modules on balanced digital habits, cognitive overload prevention, and time management in digital environments. These components are consistent with international guidelines, such as those of UNESCO and the OECD, and aim to cultivate healthier relationships with technology in both teaching and learning.
- **Security** remains a foundational aspect of digital competence initiatives in Italy. The national syllabus for civil servants (PA) covers data protection, device security, and risk awareness in digital operations. In parallel, teacher training frameworks such as EPICT also include structured content on safe digital practices. Moreover, the *Conversational AI* syllabus explicitly integrates secure prompting techniques and bias mitigation strategies, especially relevant when using AI-powered tools in education.
- **Sustainability**, although not yet a fully autonomous domain in Italian frameworks, is progressively addressed in the Living Syllabus, which includes awareness-raising on the environmental impact of digital practices. Topics such as energy consumption, device lifecycle, and cloud infrastructure are discussed, with a view to promoting more sustainable digital habits among educators and students.
- **Misinformation and disinformation** are critical topics in both national digital citizenship programmes and teacher training schemes. Italy has a strong tradition in media literacy education, as evidenced by the "Competenze Digitali per la Cittadinanza" project. In the *Conversational AI* syllabus, specific sections are dedicated to the analysis of AI-generated content, helping teachers and students distinguish between facts and opinions, and to critically assess synthetic vs. original content. This aligns with DigComp 3.0's call to empower citizens to navigate complex and sometimes manipulated information environments.

These developments show Italy's commitment to a forward-looking interpretation of digital competence, informed by ethical awareness, critical literacy and inclusive design. They also position Italian initiatives as promising models for the Armenian higher education system within the eCAMPUS project framework.

Section 9: Implementation Strategies

In Italy, the implementation of e-skills frameworks in the academic environment takes place through diversified strategies combining training, co-creation, curricular integration and collaborative policies.

Dedicated university courses and master's degrees - One of the main ways has been to activate academic training courses aimed at developing digital skills. The University of Genoa, for example, has been offering EPICT-based postgraduate and masters courses since the early 2000s to train teachers in the use of ICT in schools and university. These courses, often blended or online, have reached hundreds of teachers across Italy, who at the end certify their skills through exams and practical tests. Other universities have

also included digital literacy modules in their Masters courses for teachers (especially since the pandemic). Within degree courses, some institutions have included specific digital skills training for non-computer students (e.g. 'Digital skills for XX' in humanities degree courses). The case of UNIGE, with its 'Technologies and Languages for Digital Humanities' course, is emblematic of how a university can incorporate the framework into an official course, ensuring that all students in that course leave with a certain level of digital literacy.

Continuing education and national platforms - To reach teachers, especially school teachers, the Ministry has launched platforms such as Scuola Futura. These offer free training courses funded by the PNRR. The University of Genoa, under C-KIDD, contributes by creating innovative teaching kits (e.g. coding materials, AR/VR) and courses on such platforms. This strategy allows any Italian teacher to register for and take courses on digital skills, often recognised with ministerial badges. The collaboration between universities (which design the content) and the Ministry (which conveys it) ensures both academic quality and wide dissemination.

Collaborative "living syllabus" portal - One of the most innovative strategies is the participatory process of building the living syllabus. Through an open web portal (accessible with SPID/CIE public digital identity to ensure trustworthiness - Italian implementation of the European Single Digital Gateway - EU Regulation 2018/1724, which aims to provide single, secure access to digital public services across all EU member states), the educational community is invited to actively contribute to updating the framework. The process is structured in phases: (1) Initial Consultation, where through dedicated forums and chats for each DigComp competence area users can comment on the proposed syllabus, suggest changes and additions. (2) Integration and discussion, where experts analyze the contributions received and hold online meetings open to the most active participants to discuss the proposals. (3) Release of a beta version, which is further refined collectively. (4) Final vote and official release of the updated syllabus, with CC BY-SA license and mention of contributors. This method, borrowed from open-source development practices, ensures that the framework implementation is not dropped from the top but built with users, fostering ownership and relevance. Once released, the portal remains open for continuous suggestions and periodic revisions, making the syllabus effectively "alive" and evolving. This strategy could serve as a model for other countries or contexts that want to keep their frameworks up-to-date by involving the community.

Collaborations with training institutions - The University of Genoa, in conjunction with other universities, has established collaborative agreements with external entities, such as training centres and educational institutions, with the objective of localising digital skills courses. For instance, trainers who have undergone training at UNIGE are able to facilitate EPICT courses within school networks, whilst ensuring that the university maintains oversight and adherence to the European model. This approach is designed to facilitate the implementation of the programme on a national scale without placing an undue burden on universities. It utilises existing training facilities while providing a uniform framework (syllabus) and a standardised certification process (exams administered by UNIGE committees, among others). The utilisation of this network model has been instrumental in the successful dissemination of EPICT beyond the Ligurian region, as evidenced by its implementation in regional projects that have received financial support from both European and ministerial funds.

Integration of emerging technologies in pilot courses - New technologies are experimented with in real teaching contexts, and then reflected in the framework. For example, the "Software Architecture for Embedded Systems" course at the University of Genoa integrated generative AI tools (ChatGPT, GitHub Copilot) as design assistants during the students' final project. Students learned how to interact with AI through effective prompts and leverage it to prototype solutions, document code, and accelerate development. The results were positive in terms of enhanced problem-solving and reduced time-to-project. This strategy of implementing AI in teaching and evaluating its impact provides concrete use cases that can then be included in syllabuses (e.g., the competence of "prompt-based learning" can be added in teacher guidelines). It also serves to identify critical issues in advance (e.g., privacy issues or AI reliability) to be addressed in the framework. Implementation also comes through innovative teaching labs within universities, serving as "pathfinders" before wider adoption.

Communication and dissemination - A key strategy for successful implementation is to share best practices. Conferences, workshops, publications and seminars raise awareness among the academic community and decision makers. Presenting the results of the pilot project on AI at international conferences, for example, gives visibility to the Italian experience and allows international feedback to be gathered to improve local implementation. Guidelines and manuals are also critical so that frameworks are understood and used by stakeholders.

Section 10: Best Practices

Within the Italian higher education sector, there have been a number of notable best practices that have emerged in relation to digital competences. These can be used as exemplars.

Curricular integration with micro-certifications - As previously referenced, the experience of the undergraduate course in Digital Humanities at the University of Genoa is regarded as a best practice example of curricular integration of digital skills. In this particular instance, the DigComp 2.2 curriculum was integrated into the existing academic programme, resulting in the students acquiring both an externally recognised badge and course credits. This elevated the perceived relevance of the course, thus motivating students to engage with digital skills not only for the grade but also for the purpose of additional certification. The initiative was met with enthusiasm: all enrolled students successfully obtained a "Digital Citizenship" badge, signifying a commendable level of proficiency in digital tools and concepts. This best practice demonstrates the possibility of combining disciplinary academic goals (e.g. digital communication in the humanities) with cross-disciplinary frameworks such as DigComp, to mutual benefit. It is recommended that analogous initiatives be expanded to encompass other degree programmes, such as economics and social sciences, with a view to disseminating digital competences universally amongst all graduates, and not solely amongst those specialising in ICT.

Training trainers and creating resources - The C-KIDD project has established a best practice in teacher training within the school context, whilst also maintaining strong university ties. The project has done this by training trainers and creating resources. In

accordance with the Digital Skills Framework (advanced level for teachers), a core group of certified experts was selected and trained, and they were subsequently networked as a professional community. These experts have collaboratively developed a series of innovative teaching kits, which are ready-to-use learning units on digital citizenship topics. These include coding, computational thinking, and the use of augmented and virtual reality in teaching various subjects. The kits are published on the ministerial platform and made available to all teachers (knowledge transfer). Concurrently, the subject experts have obtained certification, which serves as a validation of their advanced proficiency in the domain of digital pedagogy. This dual approach, involving the training of trainers and the creation of educational resources, establishes a dynamic feedback loop, thereby ensuring the sustained dissemination of the training programme and the generation of quality materials, which in turn serve to reduce the barriers to entry for those wishing to innovate within the classroom environment. This approach can be replicated in the context of higher education, for example, by establishing a group of digital champions within each university (i.e. faculty members who are passionate about digital education). These digital champions would then be responsible for guiding their colleagues and sharing digital lesson plans for a variety of courses.

Learning supported by generative AI - A pioneering best practice is the experience conducted in the course "Software Architecture for Embedded Systems" (Master's degree in Mechatronics Engineering) at the University of Genoa. Here, ChatGPT and GitHub Copilot were integrated as tools to support students during design activities. After learning the fundamentals of embedded systems design, students tackled a complex project (e.g. SLAM robotics applications). In the development phase, they interacted with AI tools to generate code, documentation and UML diagrams on demand. Teachers guided students in proper prompting and evaluating AI outputs. The benefits observed were faster prototyping and more complex final projects. Importantly, AI did not replace human work, but expanded it, allowing students to focus on architectural decisions and creative problem solving, while repetitive tasks were delegated to the generator. This shows how AI can be used in an advanced learning context, offering insights for other disciplines too. In the humanities, ChatGPT could be used for textual analysis or assisted translation, stimulating critical thinking; in the social sciences, it could generate case studies or synthetic datasets for exercises. The Genoa experience has been documented and the results shared with the community, helping to set up guidelines on "prompt-based learning" (https://arxiv.org/abs/2503.16307). This shows a good way to try out new ideas in the classroom, evaluate them scientifically, and then add related skills (e.g. knowing how to use AI assistants in one's subject) to updated digital competence frameworks.

Collaborative platforms - Another good practice for the eCAMPUS project could be the active involvement of the teaching community in developing the living syllabus. The Moodle portal dedicated to this initiative has seen academics, school teachers, ICT experts and recent graduates come together to discuss and improve the syllabus. This co-creation practice is a best practice, generating a sense of community and shared goals. Contributors discuss and vote on proposals in thematic chats, and become both users and builders of the framework. Early feedback shows the process increases the quality of the outcome (proposals for data science skills and innovative teaching tools have emerged) and creates a core of ambassadors ready to promote the syllabus. This

also alleviates resistance to change, with faculty seeing the framework as something of their own rather than an external imposition. This best practice might inspire the future definition of the National Digital Competence Framework for university teachers, should the MIUR or CRUI wish to develop it. A participatory path could lead to shared guidelines. This model, supported by an open and accessible platform like Moodle, could be effectively transferred to the Armenian context, where inclusiveness and stakeholder engagement are key to sustainable implementation.

Section 11: Challenges & Barriers

Although progress has been made, considerable challenges and obstacles persist in the way of the comprehensive development of digital competences in Italian higher education.

Absence of mandatory and fragmentation - Universities in Italy lack a sense of obligation and are fragmented. In contrast to the school sector, where the Ministry of Education has initiated national programmes and some regions have made digital competence certification mandatory for teachers, universities have autonomy. Each university has freedom over faculty training and requirements, and there is currently no national policy imposing digital competence standards on academic staff. This results in uneven adoption, with some universities investing a lot in digital teaching and others very little. This fragmentation is a barrier because it makes it difficult to coordinate efforts and share resources. Without formal obligations or incentives, many university faculty may not feel motivated to commit to developing their digital skills.

Resistance to change - A cross-cutting problem is that some teaching staff (in schools and universities) are reluctant to embrace new digital methodologies and tools. Some faculty are worried that new digital skills frameworks could be seen as a check on their professionalism, which could make them afraid or put them off. Many Italian lecturers are getting close to retirement and so may not see the benefit of updating themselves digitally. Young researchers and professors are often focused on research and so may not have the time to update themselves technologically. In general, it is therefore hard to get faculty to engage with continuing education. We need to show the benefits, such as how digital teaching can reduce workloads or improve outcomes, and perhaps offer recognition and rewards to those who upgrade.

Widespread diffusion of skills and inclusiveness - While there are excellences and vanguards, there is a risk of creating a gap between those with digital skills and those without. For example, many college students outside the specific pilot courses receive no digital training and are left with skills limited to informal use of social or basic office automation tools. Similarly, some highly trained faculty coexist with colleagues who ignore even the basics (e.g., managing a virtual classroom, using open repositories for teaching materials). This heterogeneity is a barrier because a common minimum level is needed to innovate on a large scale. The challenge is therefore to engage the laggards and also to reach out to those who have so far remained on the margins. In education, for example, Italian regions such as Lombardy still have low percentages of digitally certified teachers compared to others (territorial gap). In academia, there is no official data, but presumably some faculties or universities are far ahead of others. Including everyone requires targeted strategies: offer free and easy basic training to get started

(also peer tutoring: young people helping seniors), and make sure initiatives are accessible. Access to resources is also a factor: a faculty member may not have equipped classrooms or stable connections and thus may not be able to put certain skills into practice. On the student front, not all have adequate devices or prior skills: it is necessary to bridge these gaps to avoid further widening the digital divide

Speed of technological innovation – Digital technologies are evolving rapidly, rendering competences and frameworks obsolete if not updated. For example, generative AI was not on anyone's radar a few years ago, but now it is essential. Static frameworks risk lagging behind. Curricula must be constantly updated – hence the idea of the living syllabus. Without an agile update mechanism, there is a continuous misalignment between what is taught/certified and what is actually needed in the current digital world. Keeping up is logistically difficult for educational institutions: it means frequently revising study programmes and training trainers on new developments. All this is made more difficult by bureaucratic contexts where changes to regulations or programmes take time. The living syllabus aims to reduce this gap by making the document flexible and open to continuous revisions. The operational challenge remains to quickly implement changes. For example, if a new competence emerges in DigComp 3.0, how to ensure that all relevant courses in various universities include it promptly?

Limited resources and sustainability – Large-scale training and certification plans require significant resources. Many Italian initiatives have been made possible thanks to funding (e.g. EU funds, PNRR, Erasmus+ projects). The challenge will be to make them sustainable when the funding runs out. For example, maintaining the living syllabus portal, managing certification exams, and updating training materials will require continuous commitment. Currently, much of this work falls on a small number of academic experts/volunteers. To scale, it will be necessary to institutionalise some processes (e.g. including a certain number of hours dedicated to digital training of colleagues in the contracts of academic staff, or allocating annual ministerial budgets for these activities). Without stable resources, there is a risk that excellent initiatives will remain episodic or lose momentum.

Ethical, normative and quality dimensions - The use of advanced digital tools (cloud, AI, big data) brings ethical and regulatory challenges. One example is the use of generative artificial intelligence systems in the classroom, which poses privacy (GDPR), algorithmic bias, and data security issues. Using ChatGPT can result in violations of guidelines, as well as incorrect or distorted content. Therefore, navigating these dilemmas is part of advanced digital competence. However, ethical awareness and formal regulation often come after technological adoption, leaving teachers unprotected. A barrier is the lack of clear policies on the use of certain tools: some institutions prohibit, others encourage, creating confusion. The challenge is to integrate aspects of critical digital citizenship (e.g., digital identity management, cybersecurity) into frameworks as both concepts and practices. For example, the living syllabus portal requires SPID precisely to ensure security and verified identity in contributions.

Toward a Stronger Systemic Model - While the Italian experience showcases methodological robustness, innovation, and strong alignment with European frameworks, further progress is needed for it to stand as a fully consolidated best practice at EU level. In particular, the following structural dimensions require continued attention and development:

- **Systemic sustainability:** Many promising initiatives still depend on short-term project funding without long-term institutional embedding.
- **Territorial consistency**: Regional disparities in implementation and uptake create fragmentation that limits equity and scalability.
- **Regulatory integration**: Despite existing certification pathways, there is no national mandate to link digital competence with career advancement or professional requirements.
- **Comparative positioning**: A more explicit benchmarking against other EU partners would offer insights into relative strengths and areas for improvement.

These aspects do not diminish the strengths of the Italian model, but rather highlight opportunities to reinforce its strategic value and long-term impact — both within Italy and as a reference for other education systems.

Section 12: Lessons Learned Relevant to eCampus Project

The following set of recommendations (R) draws on key lessons learned from Italy's experience in the development and implementation of digital competence frameworks in higher education. Each point is presented with the intention of supporting the design and contextualization of a national Digital Competence Framework in Armenia within the scope of the eCAMPUS project. While based on the Italian model, these lessons are intended to be adaptable to Armenia's specific educational, institutional, and socio-cultural context.

R1. Define a National Framework for Higher Education aligned with European Standards

Italy's success in teacher training is strongly tied to alignment with European frameworks such as DigComp 2.2 and DigCompEdu. eCampus Project could adopt or adapt these as the foundation for a national DCF in higher education, ensuring compatibility with the European education space and digital credentials.

R2. Foster a Participatory and Flexible Framework Development Process

The "Living Syllabus" developed in Italy illustrates the effectiveness of a participatory, community-driven approach to framework co-creation. eCampus Project could establish a collaborative online platform to involve university educators, experts, and students in defining and periodically updating national digital competence guidelines.

R3. Leverage Micro-Credentials and Open Badges for Scalable Recognition

Using open badge technology for modular and evidence-based certification has helped Italy scale and personalize recognition. eCampus Project could adopt this strategy to motivate participation and provide transparent, verifiable credentials that support employability and further learning.

R4. Create Pilot Courses and Experimental Labs to integrate Emerging Technologies

Italian universities, including UNIGE, have used pilot courses to explore generative AI and digital pedagogy. Similar experimentation in Armenian HEIs could allow low-risk testing of innovations (like ChatGPT in teaching) and feed back into national framework development.

R5. Promote the Training of Trainers and establish Professional Learning Communities

A successful model in Italy is the creation of regional communities of certified trainers who cascade knowledge. eCampus Project could replicate this with a core team of university-based digital education champions who support peers and act as national multipliers.

R6. Integrate Certification and Digital Competence in Quality Assurance and Career Progression

The Italian context still lacks mandatory digital competence requirements for academic staff. For Armenia, linking digital certification with academic promotion or performance evaluation could accelerate adoption.

R7. Design for Inclusion and Sustainability from the Outset

Italy's experience shows the importance of addressing the digital divide and planning long-term sustainability. Armenia should ensure equitable access to digital tools and training, establishing dedicated institutional support structures. A relevant European example is Finland, which successfully institutionalized digital competence training through permanent university-based units, ensuring sustainable support beyond initial project funding.

R8. Develop New Competence Areas Beyond the Basics

Italy is experimenting with AI literacy, data literacy, and accessibility/inclusion certifications. eCampus Project could innovate by embedding these emerging domains into its national framework and university curricula from the beginning.

R9. Encourage Research, Monitoring, and Feedback Loops

Ongoing research and evaluation have been essential for Italy to adjust its strategies. eCampus Project should embed mechanisms to collect evidence on impact and to revise training and certification systems accordingly.

R10. Prioritize Communication and Visibility

Conferences, workshops, and public platforms have helped disseminate best practices in Italy. Armenia should adopt similar practices to foster a sense of ownership among educators and share successes at national and international levels.

The Italian experience in promoting digital competences in higher education includes long-standing teacher training frameworks and recent innovations in generative AI and collaborative syllabus development. While challenges remain, especially regarding implementation and equity, the accumulated expertise offers practical insights. This analysis, part of WP1 of eCAMPUS, aims to inform Armenia's strategic development. Lessons learned from Italy may help avoid pitfalls and foster a robust, inclusive framework aligned with European standards.

REFERENCES

1. Adorni, G., & Bellini, E. (2025). *Towards a Manifesto for Cyber Humanities: Paradigms, Ethics, and Prospects*. IEEE Conference on Cyber Humanities, Florence, 8-10 september (in press).
2. Adorni, G., Torre, I., Vercelli, G. & Zolezzi, D. (2025). *Prompting the Future: Prompt-Based Learning as a Core Digital Competence in AI-Enhanced Education*, *ITAL-IA 2025, V Convegno Nazionale CINI sull'Intelligenza Artificiale, June 23–24, Trieste, Italy*.
3. Adorni, G. (2024). Building a *Conversational AI Syllabus Educator Certification: A Framework for Integrating AI in Educational Practice*. In INTED2024 Proceedings, Seville, Spain 11-13 November. https://library.iated.org/view/ADORNI2024BUI
4. European Commission. (2017). *European Framework for the Digital Competence of Educators – DigCompEdu*. Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC107466
5. European Commission. (2021). *Digital Education Action Plan 2021–2027*. https://education.ec.europa.eu/focus-topics/digital-education/action-plan
6. European Commission. (2022). *The European Digital Competence Framework for Citizens – DigComp 2.2*. Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC128415.
7. European Commission. (2022). *Council Recommendation on Micro-credentials for lifelong learning and employability*. https://education.ec.europa.eu/education-levels/higher-education/micro-credentials.
8. European Commission, DigComp HUB. (2024). On the Road to *DigComp 3.0*. https://www.digcomphub.eu/on-the-road-to-digcomp-3-0/.
9. EPICT Italia. (2024). *EPICT Syllabi and Certifications*. https://epict.unige.it.
10. OECD. (2025). *Teaching Compass: Reimagining Teachers as Agents of Curriculum Change*. OECD Education Policy Perspectives, No. 123. https://www.oecd.org/en/publications/oecd-teaching-compass_8297a24a-en.html.
11. UNESCO. (2025). *Artificial Intelligence in Education*. https://www.unesco.org/en/digital-education/artificial-intelligence.
12. Università di Genova. (2024). *Living Syllabus – Informatica per la Cittadinanza Digitale e le Digital Humanities*. Genova University Press. https://gup.unige.it/sites/gup.unige.it/files/2024-10/ITADINFO_2024_ebook.pdf.

Co-funded by the European Union

Co-funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union or European Education and Culture Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.