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"Fostering Socially Distanced and Inclusive on Campus Education in Armenian HEIs"

BEST PRACTICE REPORT

Digital Competence Frameworks for Educators in Higher Education

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Contents

1. Executive Summary

This report presents a comprehensive analysis and synthesis of best practices derived from eight international digital competence frameworks, with a focus on their application within higher education institutions (HEIs). The frameworks analyzed include those developed by the European Union (DigCompEdu), the United Kingdom (DTPF), Ireland (All Aboard), Lebanon (LBPSF), Spain (CDCFT), Greece (DiCAF), Australia (DL Skills Framework), and the United States (TETCs), as well as information on the state of the art in 4 European countries based on information provided by eCAMPUS project member European universities. Commonalities and divergences among these frameworks are explored to provide a robust foundation for developing or refining institutional strategies to enhance digital teaching and learning capabilities.

2. Introduction

Digital transformation has fundamentally reshaped educational landscapes, making digital competence a crucial component of the professional profile of modern educators. As HEIs strive to adapt to rapid technological advancements and evolving learner expectations, digital competence frameworks serve as essential guides. This report addresses the increasing demand for integrated, policy-aligned, and pedagogically grounded approaches to developing digital skills among educators.

3. State of the art in Armenia

As digitization advances in industries, higher education institutions should respond adequately to these changes and equip their students with the skills that will drive the current workforce and make them competitive in both local and international labor markets.

Strengthening digital competence is a priority for the EU and its member states, and it has become a key aspect of skills development within the scope of Erasmus+ projects, aiming to widen its impact not only on the programme but also on partner countries.

In Armenia, employers with a deep understanding of business needs and opportunities will be well-positioned to foster the country's economic development.

Armenia strives to position itself as a hub for technology and innovation, and in this respect, digital literacy has become the cornerstone for success. Besides, it supports the key principles of the Global Digital Impact, which were adopted in September 2024 at the Summit of the Future.

Education - 2030 is the key policy document in the area of education, and it identifies the need to build strong linkages with employers and to ensure there is an urgent need to focus on the professional development of teachers, with the key importance of their digital skills

However, this is not an easy task, as the technologies evolve very quickly, making it hard to keep up with the latest challenges.

Recent studies have shown that there is always a mismatch between the skills students possess and those required in the market. Thus, digital skills are not static; they require ongoing learning, which can be very challenging in a busy work environment.

Addressing these challenges has become a policy priority, and it requires strategic changes on the national and local levels, which will ensure sustainable support to the institutions and individuals to

The growing importance of digital skills has become increasingly vital, especially since the COVID-19 pandemic began, as it has significantly impacted the mode of teaching and learning at higher education institutions.

Digital competencies have gained significant prominence in higher education institutions nowadays, both for teachers and students. Making effective use of the technologies in teaching, learning, and assessment is crucial. The teacher plays a key role in integrating and implementing technologies in the classroom, utilizing them pedagogically to achieve learning outcomes efficiently. They should use various digital tools in their professional practice, encompassing a broad range of tools (technological, informational, multimedia, communicative, collaborative, and ethical). This integration should be holistic, situated, systemic, and, in addition, highly susceptible to incorporating the skills, attitudes, and knowledge required to support the learning of their students as active participants in the digital world.

4. Background and Rationale

Digital competence extends beyond technical proficiency to encompass pedagogical integration, professional engagement, and the ability to foster students' digital skills. The global shift toward hybrid and online learning, accelerated by the COVID-19 pandemic, has underscored the need for structured development pathways. Despite numerous existing models, inconsistencies persist in application and understanding. This report identifies high-impact practices across leading frameworks and recommends an adaptable model for HEIs.

The proliferation of digital technologies has driven a paradigm shift in higher education, prompting the need for structured frameworks that articulate digital competencies for educators. A robust body of literature now exists globally, offering insights into the design, implementation, and outcomes of digital competence frameworks. This literature review draws from national and regional frameworks, evaluating their theoretical foundations, implementation strategies, and practical implications for higher education.

The European Commission's *DigCompEdu* framework (Redecker, 2017) is widely acknowledged as a foundational and transformative model that systematically outlines digital competencies explicitly tailored for educators. Conceived and developed by the Joint Research Centre (JRC) of the European Commission, DigCompEdu builds upon the broader DigComp framework for citizens, extending its principles to address the multifaceted demands of modern teaching. This extension ensures a pedagogical

orientation, aligning educators' use of technology not just with operational skills but with deeper instructional strategies that foster meaningful, inclusive, and effective learning environments. Its comprehensive scope and emphasis on educator-specific applications make it one of the most cited and adopted frameworks in the domain of digital education reform.

DigCompEdu articulates six clearly defined competence areas:

1. Professional Engagement – covers communication, collaboration, and professional development using digital technologies.
2. Digital Resources – includes selecting, creating, and responsibly sharing digital content.
3. Teaching and Learning – emphasizes the strategic integration of technology into instructional design and delivery.
4. Assessment – focuses on leveraging digital tools to monitor, assess, and support learner progress.
5. Empowering Learners – prioritizes personalization, accessibility, and learner autonomy.
6. Facilitating Learners' Digital Competence – supports students in developing their own digital skills.

Each competence is broken down into specific descriptors and contextualized with practical examples, offering clarity and applicability. A distinctive feature of DigCompEdu is its progression model across six levels of proficiency:

- A1 (Newcomer)
- A2 (Explorer)
- B1 (Integrator)
- B2 (Expert)
- C1 (Leader)
- C2 (Pioneer)

This laddered structure promotes lifelong learning and personalized professional development. It enables educators to identify their current level of competence and plan actionable steps for advancement. This is especially effective when used in conjunction with self-assessment tools, such as the *DigCompEdu Check-In*, which provides a customized feedback report and development recommendations.

DigCompEdu also emphasizes contextual adaptability—it is designed to be relevant across various education sectors (primary, secondary, higher, vocational, and adult education) and diverse cultural environments. As a result, it has been adopted by several national education systems, including Spain, Greece, and Estonia. It serves as the foundation for complementary models, such as the UK's DTPF and Spain's CDCFT.

Furthermore, the framework is embedded within EU-level policy strategies, such as the Digital Education Action Plan (2021–2027), underscoring its role in capacity building, quality assurance, and digital transformation in education. DigCompEdu's impact extends beyond policy; it shapes professional development programs, curriculum design, and institutional benchmarking tools, and is frequently cited in educational research as a reference for digital pedagogy and educator readiness.

Critically, DigCompEdu's evidence-based structure and alignment with pedagogical best practices distinguish it from frameworks focused solely on technical or ICT skills. Its holistic view positions digital competence as a dynamic integration of technical know-how, instructional design, and reflective teaching practices that empower both educators and learners in a digital society.

In addition to its pedagogical emphasis, DigCompEdu stands out for its user-centered approach. It recognizes that educators have diverse levels of digital fluency and varying access to technological resources. Therefore, the framework is designed not only to promote excellence among digital pioneers but also to provide a clear, supportive pathway for those at the beginning of their digital journey. This inclusivity makes it particularly valuable in higher education institutions where digital skills may vary widely across faculties.

Moreover, DigCompEdu encourages a culture of continuous professional development through self-reflection, peer learning, and feedback. Its compatibility with self-assessment tools, such as the Check-In, enables institutions to generate aggregate data that informs institutional strategies, targets training interventions, and guides resource allocation. This capacity for evidence-based planning aligns the framework with institutional quality assurance and strategic development goals.

Its influence is also evident in its integration into various European-funded projects and digital education networks. For example, DigCompEdu has been adopted as a foundation for the SELFIE tool (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies), which supports schools and HEIs in assessing their overall digital capacity.

In summary, DigCompEdu is not only a theoretical model but a practical instrument for transformation. Its clear structure, pedagogical orientation, alignment with policy, and adaptability make it a cornerstone in the landscape of educator digital competence development.

The UK's Digital Teaching Professional Framework (DTPF) builds upon DigCompEdu while tailoring its approach to the further education and vocational training context. Developed by the Education and Training Foundation (ETF) and Jisc, DTPF emphasizes not only teaching and learning with technology but also includes areas such as accessibility, employability skills, digital wellbeing, and leadership. The framework consists of three stages of progression (Exploring, Adopting, Leading) and integrates micro-credentials and bite-sized professional development. The DTPF has been praised for its pragmatic approach, support tools, and comprehensive mapping to other national standards, including ETF's professional teacher standards and Jisc's Digital Capabilities Framework. DTPF represents a thorough and pragmatic approach to supporting educators in the further education (FE) and vocational training sectors as they adopt and lead digital pedagogies. Developed by the Education and Training Foundation (ETF) in collaboration with Jisc, the DTPF aims to articulate what effective digital teaching looks like, while offering clear pathways for professional growth and recognition.

Structured across three performance stages—Exploring, Adopting, and Leading—the DTPF aligns digital teaching competencies with practical applications in educational settings. Each stage corresponds to increasing levels of digital fluency and pedagogical integration, allowing educators to map their progress over time. Unlike traditional frameworks focused heavily on ICT use, the DTPF grounds digital skills in teaching practices, emphasizing pedagogy, employability, accessibility, and wellbeing.

The DTPF is organized into seven domains:

1. Planning Your Teaching – Incorporating Digital Strategies into Lesson Design.
2. Approaches to Teaching – integrating digital tools across face-to-face, blended, online, and hybrid contexts.
3. Supporting Learners to Develop Employability Skills – focusing on digital skills aligned with workplace readiness.
4. Subject-Specific and Industry-Specific Teaching – Contextualizing Technology for Professional Relevance.
5. Assessment – applying digital tools to formative and summative assessment.
6. Accessibility and Inclusion – Ensuring Equitable Access and Participation.
7. Self-Development – promoting reflective practice, CPD, and digital wellbeing.

A distinctive feature of the DTPF is its cross-referencing to several established standards, including the EU DigCompEdu framework, the ETF's Professional Standards for Teachers and Trainers, and Jisc's Digital Capabilities Framework. This makes the DTPF both context-specific and internationally compatible.

The framework is complemented by an extensive suite of online training modules, micro-credentials, and bite-sized CPD opportunities, allowing educators to upskill in a flexible, modular fashion. The DTPF also places significant emphasis on self-assessment and progression, enabling teachers and trainers to identify gaps, set goals, and build digital capacity in an evidence-informed manner.

Notably, the DTPF explicitly incorporates elements often overlooked in digital competence models, such as teacher and learner wellbeing, identity management, and inclusivity. These areas underscore a more holistic view of digital teaching, rooted not just in technical proficiency but in ethical, empathetic, and responsive practice.

Overall, the UK's DTPF provides a robust and actionable model that strikes a balance between pedagogical integrity and technological innovation. Its strategic design, practical relevance, and strong policy alignment make it a leading example of a digital competence framework tailored for the complex realities of today's educators.

Ireland's All Aboard initiative offers an innovative and inclusive approach to building digital capacity in higher education. Launched in 2015 and developed collaboratively by institutions such as NUI Galway, University of Limerick, and University College Dublin, the initiative responds to the identified need for a coherent, national digital skills framework that spans both academic staff and students. Funded under Ireland's Teaching and Learning Enhancement Fund, All Aboard aims to empower users to flourish in the digital age through awareness, training, and recognition of digital skills.

A distinguishing feature of All Aboard is its user-friendly and accessible presentation of digital competencies. Instead of rigid taxonomies or formal progression levels, it uses a metaphorical 'Metro Map' to visualize digital skills across thematic 'stations.' These stations include areas such as Digital Identity, Digital Tools, Teaching and Learning, Information and Data Literacy, and Staying Safe Online. This approach encourages exploration and supports individualized learning paths, recognizing the varied digital starting points of users.

The initiative emphasizes a shared digital culture among educators, learners, and support staff. Unlike many frameworks that focus solely on educators, All Aboard views digital competence as a community-wide responsibility. It promotes a whole-institution approach

by fostering interdisciplinary collaboration and integrating digital literacy into curriculum design and institutional policy.

In terms of implementation, All Aboard has been influential in guiding digital skills audits, professional development workshops, and the development of digital badges. Its resources include toolkits, training modules, and self-assessment tools that support reflective practice and continuous improvement. It also aligns with Ireland's broader educational strategy, particularly the National Forum for the Enhancement of Teaching and Learning's Digital Roadmap.

Critically, All Aboard draws upon a range of international models, including DigComp, Jisc's Digital Capabilities Framework, and UNESCO's digital literacy initiatives, while thoughtfully tailoring them to the Irish higher education context. This blend ensures that global best practices are filtered through a culturally relevant and context-sensitive lens. The initiative stands out by emphasizing not just the 'how' of using digital tools, such as technical skills and tool selection, but more profoundly the 'why' — fostering digital responsibility, critical engagement with technology, and ethical considerations in a digital age. This orientation encourages educators and learners alike to approach digital transformation as a reflective, values-driven process rather than a purely technical challenge.

In conclusion, the All Aboard initiative offers a flexible, collaborative, and values-based approach to digital competence development. Its adaptability, visual accessibility, and focus on community participation make it an exemplary approach for institutions seeking to foster inclusive digital transformation in higher education.

The Lebanese Professional Standards Framework (LBPSF) represents a context-sensitive adaptation of globally recognized teaching standards, carefully tailored to address the complex and evolving educational, cultural, and socio-political realities of Lebanon. Initiated under the EU-funded Erasmus+ E-Taleb project, LBPSF reflects a national strategy to enhance academic quality and professionalize teaching in higher education through a nuanced and inclusive framework. Its design recognizes the multifaceted challenges Lebanese educators face, such as infrastructural disparities, regional instability, and diverse student needs, while promoting pedagogical excellence, innovation, and professional ethics.

LBPSF is structured into three interdependent components:

1. Fields of Practice – These define the core areas of academic work, including planning and designing instruction, teaching and supporting learning, assessing student learning, fostering inclusive environments, and engaging in professional development.
2. Core Knowledge – These are the theoretical and practical foundations that educators must possess, including subject matter expertise, awareness of digital technologies, pedagogical methods, and an understanding of how students learn.
3. Attitudes and Professional Values – These include commitment to equity, continuous learning, respect for diversity, ethical practice, collaboration, and innovation in teaching.

This tripartite design ensures a comprehensive view of educational professionalism, emphasizing not only the competencies required to perform academic duties but also the beliefs and values that sustain high-quality and ethical practice.

A distinguishing feature of LBPSF is its strong emphasis on evidence-based teaching and the centrality of students in the learning process. The framework encourages educators to integrate subject-specific research into their teaching, use inclusive and active learning approaches, and develop students' soft skills, curiosity, and lifelong learning abilities. It also explicitly advocates for the use of digital technologies to enhance teaching and learning, aligning it with global digital transformation trends.

Unlike many Western frameworks, LBPSF is acutely responsive to the Lebanese context, recognizing the challenges posed by environmental instability, resource limitations, and diverse learner demographics. As such, it promotes adaptable and resilient teaching practices that are sensitive to changing societal needs.

LBPSF supports institutional and individual development through mechanisms such as:

- Encouraging reflective practice and peer collaboration
- Recognizing teaching excellence and innovation
- Aligning with national quality assurance processes

The framework is intended not only for educators but also for institutions and policymakers. Institutions can use it to guide recruitment, appraisal, and professional development, while policymakers can leverage it to inform accreditation and strategic planning.

In summary, LBPSF is a culturally relevant, pedagogically rich, and practically grounded framework. It offers Lebanese higher education a pathway to raise teaching standards, embrace digital transformation, and nurture an inclusive and innovative academic culture.

Spain's Common Digital Competence Framework for Teachers (CDCFT) is a nationally recognized model that provides a detailed structure for assessing and developing the digital competence of educators. Developed by the Spanish Ministry of Education, Culture and Sport through the National Institute of Educational Technologies and Teacher Training (INTEF), the CDCFT is grounded in the European DigComp and DigCompEdu frameworks and offers a localized yet comprehensive reference for professional digital growth in Spain's educational system.

The CDCFT is composed of five core competence areas:

1. Information and data literacy
2. Communication and collaboration
3. Digital content creation
4. Safety
5. Problem solving

Each area encompasses specific digital competencies (21 in total), which are clearly defined and accompanied by six proficiency levels: A1, A2 (Foundation), B1, B2 (Intermediate), C1, and C2 (Advanced). These levels follow a progression model similar to the Common European Framework of Reference for Languages (CEFR), allowing for structured professional development and continuous assessment.

A significant strength of the CDCFT is its three-dimensional evaluation model. For each competency, educators are assessed along three axes: knowledge, skills, and attitudes. This tripartite structure not only captures the technical capabilities of educators but also

evaluates their critical understanding and professional disposition toward using digital tools effectively and ethically.

The framework supports self-assessment and personalized professional development through the *Digital Competence Portfolio for Teachers* (Portfolio de la Competencia Digital Docente), a dynamic and interactive online platform. This tool allows educators to assess their current digital competencies, track their progression across the six proficiency levels, access a wide array of curated learning resources, and receive tailored improvement plans. The platform also facilitates documentation of achievements and reflective practice, making it an effective vehicle for continuous professional growth. Its widespread institutional adoption across Spain's autonomous communities highlights its value not only as a self-evaluation tool but also as an instrument for systemic capacity-building and national-level coordination of digital education policy.

Moreover, the CDCFT has informed training programs, teacher certification criteria, and national strategies for digital education. Its strong alignment with broader EU policies ensures that Spanish educators are equipped with competencies that are internationally recognized and transferable.

In summary, the CDCFT offers a robust, scalable, and pedagogically sound model for educator digital competence. Its emphasis on progression, holistic evaluation, and institutional integration makes it a cornerstone of Spain's national strategy for educational innovation and digital transformation.

Australia's Digital Literacy Skills Framework, developed as part of the Commonwealth-funded Foundation Skills for Your Future program, presents a practical and workplace-aligned approach to building digital competence among adult learners and educators. It extends the Australian Core Skills Framework (ACSF) by explicitly incorporating digital literacy as a sixth core skill alongside reading, writing, oral communication, learning, and numeracy (LLND).

This framework defines digital literacy as the ability to navigate, communicate, create, think critically, and act safely in the context of digital technologies. It is structured around performance indicators across multiple levels of complexity, with application across personal, community, workplace, and educational contexts. It distinguishes itself by focusing on the contextual relevance of digital skills, ensuring that competence is not viewed as purely technical but as integrated into daily tasks and professional responsibilities.

A key feature of the framework is its support for both accredited and non-accredited training, offering flexibility for use in diverse learning environments, including vocational education and training (VET), community education, and workplace upskilling. It also offers a performance features grid, which provides educators with concrete descriptors and sample activities to assess learners' capabilities across digital domains.

In addition, the framework emphasizes inclusivity by addressing accessibility, equity, and the varying levels of digital readiness among adult learners. This broad applicability has made it a foundational tool for enhancing national digital literacy, particularly in preparing learners for employment in increasingly digitalized sectors.

The Teacher Educator Technology Competencies framework (TETCs), developed in the United States, addresses a distinct but critical niche in the landscape of digital education frameworks, focusing specifically on teacher educators rather than classroom teachers or general staff. Developed through a collaborative, multi-institutional research effort

involving crowdsourced literature reviews and the Delphi methodology, the TETCs comprise 12 research-informed competencies designed to ensure that teacher educators are well-prepared to prepare pre-service teachers for technology-rich teaching environments.

The TETCs emphasize the integration of educational technology across teacher education programs, advocating for a systemic and program-wide model rather than isolated course-level interventions. Key competencies include modeling effective use of technology, designing technology-enhanced learning experiences, assessing digital learning, supporting digital citizenship, and engaging in professional learning networks.

What sets the TETCs apart is their strong alignment with teacher preparation and accreditation requirements. They emphasize that technology integration must be embedded within all subject-specific methods courses and practicum experiences, rather than being confined to standalone courses. The framework encourages institutions to adopt a culture where all faculty—not just educational technology specialists—are expected to integrate digital pedagogy.

TETCs are closely aligned with the National Educational Technology Plan (U.S. Department of Education), which provides a strategic vision for integrating technology into education at all levels. This alignment reinforces the TETCs' significance in informing national policy, shaping institutional strategies, and guiding accreditation bodies. Each of the 12 competencies is accompanied by detailed examples of observable educator behaviors and expected outcomes, enabling teacher educators to engage in both formative assessments and reflective practices that drive continuous improvement and accountability.

In summary, the TETCs offer a critical model for institutions seeking to build digital capacity within teacher education programs. Their research foundation, policy alignment, and systemic approach make them a valuable tool for ensuring that future teachers enter the profession equipped with the competencies necessary to thrive in digitally enhanced learning environments.

Greece's Digital Competence Actions Framework (DiCAF) offers an action-based approach to digital competence. Rather than organizing skills by thematic areas, DiCAF categorizes competencies by actions—what educators can do with digital technologies. It draws from DigComp but localizes content for the Greek context, addressing digital resource use, collaboration, ethical practices, and technology integration. The framework aims to support continuous professional development and reduce digital skills gaps.

Comparatively, all frameworks share foundational elements such as:

- Progressive skill development models (e.g., A1–C2, Exploring – Leading)
- Emphasis on pedagogical application of technology
- Recognition of digital ethics, citizenship, and identity
- Support for self-assessment and reflective practice
- Linkage to national education strategies and professional standards

However, each framework also presents unique features informed by local priorities. For instance, the UK framework's inclusion of wellbeing and employability, Ireland's visual and exploratory learning model, and Lebanon's integration of professional values highlight the importance of contextualization.

In conclusion, the literature reveals a dynamic and evolving field marked by shared principles and innovative adaptations. Effective frameworks are those that not only define competencies but also support their development through accessible tools, institutional alignment, and cultural responsiveness. These insights serve as the foundation for identifying and implementing best practices in digital competence frameworks for higher education.

5. Methodology

The frameworks were selected based on geographical diversity, influence on policy, comprehensiveness, and focus on higher education. Content analysis was performed on each framework, focusing on structure, scope, implementation strategy, and integration mechanisms. Key themes and competencies were coded and compared to identify overlaps and gaps.

6. Description of Identified Best Practices

Best Practice #1: Structured Competency Domains with Progression Levels

Frameworks such as DigCompEdu, CDCFT (Spain), and the UK's DTPF employ a tiered structure, often aligning with the Common European Framework of Reference (CEFR) model. These include:

- Competency areas such as digital resource management, pedagogic integration, assessment, and professional collaboration.
- Proficiency levels ranging from novice (A1) to expert (C2), allowing for differentiated training and evaluation.

Effectiveness: Enables personalized learning pathways and facilitates targeted professional development.

Outcomes: Empowers educators to self-assess, set learning goals, and track progress over time.

Best Practice #2: Integration with Institutional and National Policy

Frameworks like All Aboard (Ireland) and the Australian DL Skills Framework align closely with national education and skills development strategies.

Effectiveness: Enhances legitimacy, funding opportunities, and alignment with employability goals.

Outcomes: Improved policy coherence, increased institutional buy-in, and measurable impact on national digital literacy targets.

Best Practice #3: Pedagogical Emphasis and Learner-Centric Design

Frameworks from Lebanon and the UK prioritize pedagogical application over purely technical skills.

Effectiveness: Ensures that digital tools are used to enhance student learning, engagement, and outcomes.

Outcomes: More meaningful digital integration, increased student satisfaction, and improved teaching quality.

Best Practice #4: Continuous Professional Development Pathways

Most frameworks incorporate mechanisms for ongoing professional growth. Examples include:

- Self-assessment tools (DigCompEdu, CDCFT)
- Reflective practices (TETCs, DTPF)
- Micro-credentialing (DTPF, All Aboard)

Effectiveness: Encourages reflective practice and professional ownership of learning.

Outcomes: Sustained digital competence development and greater adaptability.

Best Practice #5: Inclusion of Digital Citizenship and Ethics

Many frameworks integrate components related to ethical use of technology, data privacy, and digital identity management (Spain, Greece, UK).

Effectiveness: Prepares educators and students for safe and responsible digital participation.

Outcomes: Promotes inclusive, respectful, and legally compliant use of digital tools.

Best Practice #6: Collaborative Framework Development and Stakeholder Engagement

Frameworks such as the Lebanese LBPSF and Ireland's All Aboard emphasize co-creation with educators, students, policymakers, and support staff.

Effectiveness: Builds ownership, ensures relevance, and increases adoption.

Outcomes: More contextualized and accepted frameworks that reflect institutional and cultural nuances.

Best Practice #7: Use of Competency-Based Micro-Credentials

The UK's DTPF and Spain's CDCFT support modular certification and recognition of digital teaching competencies through badges and credentials.

Effectiveness: Motivates continuous engagement and provides tangible rewards for progress.

Outcomes: Enhances professional portfolios and supports career advancement.

Best Practice #8: Integration with Learning Management Systems (LMS)

Frameworks from Australia and RMIT University incorporate LMS integration into their digital teaching strategies.

Effectiveness: Ensures practical applicability and simplifies adoption by embedding competencies into platforms educators use daily.

Outcomes: Improved usability and seamless tracking of digital teaching activities.

Best Practice #9: Tailored Frameworks for Different Educator Roles

Frameworks like the TETCs (USA) focus on teacher educators, while DigCompEdu includes early childhood through higher education professionals.

Effectiveness: Meets diverse role-based needs across the education ecosystem.

Outcomes: More effective and relevant training paths for different educator categories.

Best Practice #10: Emphasis on Wellbeing and Work-Life Balance

The UK's DTPF uniquely includes wellbeing for practitioners and learners.

Effectiveness: Recognizes and addresses digital fatigue, ensuring sustainable practices.

Outcomes: Supports holistic professional development and promotes healthier learning environments.

7. Comparative Analysis of Frameworks

This matrix summarizes the key components and distinctive features of the major digital competence frameworks analyzed in this report, providing a comparative overview to guide adaptation or integration by higher education institutions.

Framework	Origin: Country/Region	Key Features: Structure & Domains	Proficiency Levels	Unique Features	Contextual Focus
DigCompEdu	EU	6 areas, 22 competencies	A1–C2	Comprehensive pedagogical integration, learner empowerment	Broad EU, adaptable globally
DTPF	United Kingdom	7 domains, CPD modules	3 Stages: Exploring - Leading	EdTech strategy alignment, CPD-aligned	FE/TVET sector
All Aboard	Ireland	Skills-based, user-focused	None specified	Visual, exploratory, student & staff joint development	National HE strategy
LBPSF	Lebanon	3 components: core knowledge + practice + values	Descriptive	Values-based, inclusive, adaptable for Arab contexts	Lebanese HE institutions
CDCFT	Spain	5 areas/domains, 21 competencies	A1–C2	Digital portfolio, rigorous evaluation structure	National teacher training
DiCAF	Greece	Action-oriented	Descriptive	Task-focused	National

		(digital tasks/actions)		digital actions	digital literacy strategy
Digital Literacy Skills Framework	Australia	Core skills + LLND alignment, based on ACSF	Descriptive (5 levels)	Aligned to VET, employability, foundational LLND skills	Workforce and vocational education
TETCs	United States	12 competencies focused on teacher educators	Descriptive	Focus on teacher training	Teacher education institutions

8. Analysis of DCFs in Italy, Portugal, Spain and Sweden based on information provided by partner countries[1]

The review of digital competence frameworks across the four countries involved in the Erasmus+ eCAMPUS project, where the partner universities are based, provides valuable insights for Armenia. By analyzing their models, successes, and challenges, Armenian higher education institutions can better understand how to design a national framework that aligns with European standards while being adapted to the local context. This perspective will help anticipate potential barriers, identify proven solutions, and guide the development of a sustainable and inclusive digital transition strategy for Armenia's higher education system.

Digital Competence Framework in Higher Education in Italy

Several frameworks and initiatives are in place in Italy to develop digital competences for teachers, students, and society, for ICT professionals, and for public administration IT involves: European Digital Competence Framework for Citizens - DigComp 2.2. This framework was not created in Italy; instead, it was adopted at the national level. The latest version of this document (2022) has been translated into Italian and serves now as a conceptual basis for many initiatives. DigComp defines 21 essential digital competences for citizens, organized into five areas.

The European Digital Competence Framework for Educators (DigCompEdu), a specific document for educators, is also used in Italy. It embraces six areas: professional development, digital resources, teaching practices, assessment, and students' digital competencies. This framework is used to align teacher training initiatives with international standards. The principles of this framework are incorporated into the EPICT programme and the new syllabus to connect the pedagogical dimension to the use of technologies.

EPICT (European Pedagogical ICT license) is a European framework developed in collaboration with the University of Genova, and it is now aligned with other frameworks. It

[1] Original papers developed by the EU partner universities are provided in separate reports.

also includes a training model for teachers and a certification system for acquired competences in informatics for Digital Citizenship and Digital Humanities (living syllabus), a framework with a 'living' syllabus proposed by the University of Genoa to guide and design training courses based on advanced digital competences.

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. It targets three types of users (citizens, school teachers, and university students in non-ICT fields) with different expected proficiency levels.

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 their daily teaching practices.

E-CF (European e-Competence Framework): European standard implemented in Italy that identifies 41 competences for ICT professionals.

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.

The frameworks primarily used at the Italian level for digital competences encompass a range of competence domains, aligning with European taxonomies, and encompass both technical-instrumental skills and pedagogical and cognitive dimensions.

Among the main national initiatives:

- Repubblica Digitale - National initiative that coordinates digital policies by promoting digital inclusion and the development of competences.
- National Strategy for Digital Skills - Operational plan with four areas of intervention: education, workforce, ICT specialist skills, and citizens.
- National Digital School Plan (PNSD) - Guideline document to promote digital innovation in the school system.
- ITS Academy - Higher Technical Institutes also focused on advanced digital training.
- National Competence Certification System (Sistema Nazionale di Certificazione delle Competenze) in Italy is a government-established framework aimed at recognizing, validating, and certifying skills and competences acquired through formal, non-formal, and informal learning. It is part of a broader strategy aimed at promoting lifelong learning and enhancing employability.

Year of Establishment

Italy's journey in developing digital competence initiatives in higher education spans over two decades, beginning with the EPICT project (2003–2005), which laid the foundation for teacher training in digital pedagogy. The 2010s saw a rise in the use of ICT certifications, while the 2017 release of DigCompEdu brought a structured framework for educator training. The COVID-19 pandemic (2020–2021) intensified the need for digital upskilling, catalyzing the adoption of updated frameworks, such as DigComp 2.2 (2022). Recent milestones include the launch of a national syllabus for digital citizenship and Digital Humanities (2023), the expansion of micro-certifications (2024), and the anticipated rollout of a "Conversational AI" educator certification in 2025. Italy continues to align with EU strategies, preparing for DigComp 3.0 and broadening its digital education ecosystem.

Target Audience

Italian initiatives are inclusive, targeting a diverse range of learners. School teachers remain a central focus, with frameworks such as EPICT and DigCompEdu being widely used in training programs. Additionally, the initiatives support teacher trainers, digital animators, and university faculty who serve as innovation drivers in their institutions. University students, especially those in non-ICT fields such as the humanities, are gaining access to advanced digital training through tailored syllabi. Finally, lifelong learners—from working adults to those who are digitally excluded—are addressed through programs like Repubblica Digitale, which promote digital inclusion and civic engagement. This multifaceted approach ensures that digital competence development spans all educational levels and professional backgrounds.

Assessment and Certification

In Italy, digital competence certification emphasizes authentic, evidence-based assessment. The EPICT system enables teachers to demonstrate their digital teaching skills by submitting materials or documenting experiences, which are certified through Open Badges issued by the University of Genoa. These badges align with European micro-credential standards and are valid for five years, encouraging ongoing upskilling.

At the university level, digital skills are often assessed through formal exams and practical tests embedded in courses like "Technologies and Languages for the Digital Humanities." Successful completion can result in both academic credits and certifications (e.g., DigComp 2.2 badge), bridging university recognition and employability.

Microcredentials and specialized certifications are expanding. New programs, such as the upcoming "Conversational AI" accreditation for teachers, integrate training, ethical reflection, and task-based evaluation. Each level (B1–C1) leads to a separate certificate aligned with DigCompEdu.

Although certification is not mandatory for university faculty, self-assessment tools (e.g., SELFIE for Teachers) are encouraged to support voluntary participation and personalized development paths. This flexible yet formalized approach enhances transparency and professional mobility across Italy and the EU.

Alignment with International Standards

Italy closely aligns its digital competence initiatives with European frameworks to ensure quality, recognisability, and mobility of qualifications.

- DigComp & DigCompEdu Alignment: Italian programs, such as the UNIGE syllabus and the "Conversational AI" certification, fully integrate DigComp 2.2 and DigCompEdu. This ensures that both technological and pedagogical competencies are covered, including the ethical use of AI (privacy, bias, and well-being).
- European Qualifications Framework (EQF): Competence levels are mapped to EQF levels (e.g., EQF level 6 corresponds to a Bachelor's level), facilitating transparency and cross-border recognition in education and employment.
- Microcredentials & Open Badges: Italian badges adhere to the Open Badge 2.0 standard, which includes metadata for EU-wide verifiability. This supports the EU 2022 micro-credential recommendation, ensuring interoperability and quality.
- EU Action Plans & Funding: Initiatives like C-KIDD and eCAMPUS are funded through EU programs, such as NextGenerationEU, and align with broader strategies, including the EU Digital Education Action Plan (2021–2027) and Digital Compass 2030 targets.
- International Collaboration: Italy participates in Erasmus+ and other EU projects, fostering mutual exchange and integration of best practices across European digital education ecosystems.

Italy ensures high-quality and internationally recognized digital competence certifications by aligning with key European frameworks:

- Frameworks Used: Initiatives such as the UNIGE syllabus and the "Conversational AI" certification adopt DigComp 2.2 and DigCompEdu, covering both technical and pedagogical skills, including the ethical use of AI.
- Qualification Levels: Competence levels are linked to EQF (e.g., EQF 6 = Bachelor's level), supporting transparency and recognition across borders.
- Microcredentials: Certifications utilize Open Badge 2.0, which complies with EU standards on metadata and micro-credential quality.
- EU Integration: Projects such as eCAMPUS and C-KIDD are EU-funded and align with EU strategies, including the EU Digital Education Action Plan and Digital Compass 2030.
- Global Exchange: Italy's participation in Erasmus+ and EU networks supports two-way integration of digital education best practices.

Best Practices in Digital Competence Integration in Italian Higher Education

- Curricular Integration with Microcertifications: The University of Genoa's Digital Humanities course successfully integrated DigComp 2.2 into its curriculum. Students earned both academic credits and a "Digital Citizenship" open badge, which boosts motivation and enhances employability. This model aligns disciplinary content with cross-cutting digital frameworks and can be scaled to other fields, such as economics and the social sciences.

- Training Trainers and Creating Resources: The C-KIDD project trained a network of certified digital education experts who developed ready-to-use teaching kits (e.g. coding, AR/VR) published on a national platform. This dual model of empowering trainers and generating resources creates a feedback loop for sustainability and can be replicated in universities by forming "digital champions" among faculty.
- AI-Supported Learning: In a master 's-level engineering course, tools like ChatGPT and GitHub Copilot were used to support design tasks, enhancing prototyping and student creativity. AI handled repetitive coding tasks, allowing students to focus on complex problems. This demonstrates how generative AI can enrich learning in diverse fields such as the humanities and social sciences.
- Collaborative Syllabus Development: A Moodle-based portal engaged educators, experts, and students in co-developing a "living syllabus." Participants voted on proposals and collaboratively shaped the framework. This participatory model increased ownership, quality, and community buy-in-serving as a potential model for national digital competence frameworks and scalable to contexts like Armenia.

Challenges & Barriers in Italy's Higher Education Digital Transition

- Italy's higher education system faces key barriers in advancing digital competencies:
- Lack of mandatory policies & fragmentation: Unlike schools, Italian universities operate autonomously, leading to inconsistent implementation of digital skill training across institutions.
- Resistance to change: older faculty may resist digital updates, fearing a challenge to their professionalism, while younger staff prioritize research. Without incentives, engagement in digital upskilling remains low.
- Inequality and limited inclusiveness: A growing gap exists between digitally competent educators and those less equipped, as well as between students. Many lack access to proper training or technology, especially in underserved regions.
- Fast technological change: Rapid innovation (e.g., AI) risks making curricula obsolete. Updating frameworks like DigComp requires agile mechanisms—hence, Italy's move to a "living syllabus."
- Sustainability & funding issues: Many initiatives rely on temporary EU funds. Long-term success depends on institutionalizing digital education and securing stable resources.
- Ethical and regulatory gaps: Tools like ChatGPT pose significant risks to privacy and bias. With unclear policies, educators face uncertainty. Digital ethics and critical citizenship need better integration into training frameworks.

Lessons for Armenia's eCAMPUS Project

Italy's experience offers strategic takeaways for Armenia:

- R1: Align Armenia's national digital competence framework (DCF) with EU standards like DigComp 2.2 and DigCompEdu for recognition and interoperability.

- R2: Use participatory methods to develop a flexible, continuously updated DCF (e.g., a "living syllabus").
- R3: Adopt open badges and micro-credentials to provide scalable, evidence-based certification.
- R4: Pilot experimental courses using emerging tech (e.g., generative AI) to inform national strategy.
- R5: Train local digital champions who can cascade knowledge across institutions.
- R6: Link digital competence with academic evaluation and career progression to drive faculty adoption.
- R7: Design for digital inclusion and long-term sustainability from the start, ensuring infrastructure and support structures are in place.
- R8: Integrate emerging areas like AI, data literacy, and accessibility into the national framework.
- R9: Embed monitoring and research to enable adaptive improvement.
- R10: Promote visibility through events and platforms to build engagement and showcase success.

Italy's blended model of long-standing frameworks and AI-driven innovation offers Armenia a roadmap to build an inclusive, sustainable, and future-ready higher education system.

Digital Competence Framework in Higher Education in Portugal

Portugal has taken significant steps in embedding digital competence in its national education system, guided by the EU policies such as the DigComp Framework and the European Digital Education Action Plan (2021–2027). The country recognizes Digital Competence as a foundational skill and lifelong learning goal reflected in policy initiatives and reforms.

The Digital Competence Framework of Portugal aligns with the country's policy priorities to promote the use of digital competences across all sectors of society. Higher Education institutions are regarded not only as knowledge providers but also as key players in the development of digital literacy, transformation of professional profiles, and the national innovation system. To align with the European agenda, it has launched several strategic plans, benefiting various stakeholders and agendas.

Frameworks and Initiatives

The QDRCD is the fundamental pillar in Portugal's strategy to ensure that citizens are equipped with the necessary skills for the 21st century. It 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 training curricula, and guiding certification processes and skill assessment across various sectors of society. It

encompasses five core areas of digital competence: digital information literacy, communication, collaboration, digital content, safety, privacy, and problem-solving. In recent years, several additional areas have been introduced, including computational thinking, algorithmic reasoning, programming and scripting skills, and the use of intelligent systems (AI). These areas are presented within a structured framework of four proficiency levels, enabling individuals and institutions to assess and track development over time. This model is flexible, enabling targeted upskilling efforts. This framework integrates cognitive, ethical, and creative dimensions, ensuring that digital competence is not merely technical but also promotes critical thinking, social responsibility, and innovation.

In CoDe2030: Portugal's Flagship Digital Competence Initiative

This framework is developed to foster digital skills across all dimensions of society. The five pillars of it are inclusion, education, qualification for employment, specialization, and research. It promotes the further development of the QDRCD and supports initiatives such as AI Portugal 2030, which aims to position Portugal at the forefront of AI use in education. It has become possible due to the experience gained over the years, as Portugal was one of the early signatories of the European AI Declaration and has invested considerable support in integrating AI into public and academic administration.

InCoDe 2030 Roadmap

The primary objective of this framework is to enhance digital skills and competencies nationwide by 2030. It was designed to improve collaboration among government, educational institutions, industry, and society in implementing digital skills policies effectively. The Roadmap is based on a place that includes eight activities:

1. Study for non-ICT employability in the future
2. Analysis and categorization of national digital training projects
3. Technical studies to ensure new developments
4. Study and development of 13 open online courses on digital skills and implementation of community funds
5. Development of public technical-scientific events for the management and implementation of activity plans for digital transformation strategies
6. Analysis of results and evaluation of digital training to be disseminated in the observatory for digital skills.
7. Development of technical-scientific events to promote gender equality
8. Development of a public-technical scientific event to promote digital training at the national level.

Plano de Ação para a Transição

Digital is the framework that consolidates digitalization as a central vector for national development, fostering the shaping of a more digitally inclusive society. This promotes entrepreneurship and SME digitalization, invests in e-government, and supports interoperable digital public services. Portugal's progress in digitalization 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 infrastructure, digitalization of businesses, and digital public services. The 2024 reports highlight considerable achievements in connectivity, digital skills, and SMEs, as well as digital inclusivity. All the frameworks form a robust ecosystem of policy tools and monitoring mechanisms. They reflect a systematic, inclusive, and forward-looking approach to development. The success of implementing a national digital competence framework depends on its ability to engage a broad range of actors across the education system and beyond. The QDRCD is the key framework to foster the advancement of digital competencies in the country.

Digital Competencies of Higher Education Professionals

Portugal recognizes the importance of equipping higher education professionals with up-to-date digital skills and competencies in several higher education institutions (HEIs), including ULISOBA, which has launched structured initiatives to promote the digital skills development of its staff. They include micro-credentials, intensive courses, and workshops aligned with QDRCD proficiency levels. ULISOBA launched a set of online courses focused on digital pedagogical innovation, offering modules on e-learning design, assessment using digital tools, and integrating AI.

Key Directions of Trainings for HE Professionals are:

Use of Digital Pedagogical tools, assessment of Digital Content integration of AI in the classroom, and collaborative learning platforms. The recent Digital Decade Country Report emphasizes that the professional development of educators needs to be more systematic and widespread.

Students and lifelong learners

The country's policy for students is to equip them with digital skills, both for academic success and to meet the evolving needs of the labor market. The report revealed that only 56% of the Portuguese population possess basic digital skills, with even lower levels of advanced competences such as coding or data analytics. Addressing this challenge requires not only investment in formal education pathways but also in a lifelong learning ecosystem. In line with this, the NAU platform offers free online courses co-developed by public universities and governmental agencies. For non-formal education, the framework ensures that digital skills are no longer the privilege of those in formal education, but a lifelong responsibility for all. This approach is in line with the European Digital Education Action Plan (2021-2027), and to support the transition, Portugal has dedicated 4.5 billion Euros to education and training.

Competency Domains and Proficiency Level

The QDRCD identifies five interrelated domains of digital competence.

1. Digital and Information Literacy
2. Communication and Collaboration
3. Digital Content Creation
4. Safety and Diversity

5. Problem Solving

Each of these domains is complemented by sub-competence, making the framework both comprehensive and adaptable to various educational levels and professional sectors.

Assessment and Certification

Portugal has promoted the use of assessment and self-assessment tools to support teachers and researchers in evaluating their digital teaching and readiness. Several higher education institutions (HEIs) have adopted these tools institutionally, integrating them into ongoing professional development programs.

Formal Certification and MOOCs

Portugal is leveraging MOOCs for certifying digital competences. The NAU platform offers free and certified courses, developed in collaboration with public universities, including data protection (aligned with GDPR), AI fundamentals and ethics, Collaboration and Cloud-based tools, and Introduction to Programming and Computational Thinking. Learners who complete MOOCs receive formal digital certificates recognized by employers and public bodies.

Microcredentials and Open Badges

Microcredentials are one of the most innovative assessment trends in Portugal. ULisboa and FCCN have initiated Open Badge Systems – digital credentials that verify specific competencies and can be shared across platforms such as LinkedIn, Europass, and personal portfolios.

National Certification Challenges and Barriers

Despite substantial progress in tools and institutional initiatives, Portugal lacks a national unified certification standard for digital competences, particularly for higher education professionals, which ensures that certificates are meaningful to employers and professional bodies.

The autonomy of HEIs, while valuable, sometimes leads to uneven prioritization of digital skills development across faculties within the same institution.

Many professors show reluctance to adopt new tools and methods.

The emergence of AI, XR, and blockchain technologies creates pressure on curricula, requiring frequent updates and staff retraining the emergence of AI, XR, and blockchain technologies creates pressure on curricula, requiring frequent updates and staff retraining to ensure that graduates possess the skills and competencies aligned with rapidly evolving industry demands and technological standards.

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. The successful integration of DigComp and DigCompEdu into Portuguese initiatives underscores the importance of developing national and institutional frameworks that are interoperable with European standards.
2. 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;
3. This alignment ensures comparability, transparency, and mobility for learners and educators alike.

Digital Competence Framework in Higher Education in Spain

The Digital Competence in higher education (HE) in Spain is guided by international frameworks, such as DigCompEdu and the UNESCO ICT Competency Framework for Teachers (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2011). Spain has adopted a Common Digital Competence Framework for Teachers (INTEF, 2017), which was subsequently modified in 2022 (INTEF, 2022). It could be used for training purposes and in evaluative and accreditive processes of teachers. It is designed to aid teachers and education stakeholders in developing their digital competence models across all levels of education at schools. However, Spain lacks a national regulatory body enforcing DCF implementation across universities. The voluntary and decentralized nature of the Spanish university system results in inconsistent adoption of digital competence policies.

Frameworks and Initiatives

The Spanish Higher Education system encompasses several core frameworks, including DigCompEdu, which serves as the primary framework for digital competence among university educators. OpenEdu (pilot framework) introduces a seventh area, emphasizing open education practices, open science, and the use of open educational resources, as well as the University Teachers' Digital Competence Framework (Castañeda, 2023), an adaptation of DigCompEdu that incorporates specific elements, such as managing digital time and utilizing generative tools. The following proficiency stages measure the level of digital competence**,** one of which follows the DigCompEdu model with six progressive levels: Foundation (A1, A2), Intermediate (B1, B2), and Advanced (C1, C2). The national framework for school-level teachers (pre-university) adopts a comparable scale, using levels from A1 to C2 to measure digital skills. Both (university and non-university) are aligned with DigCompEdu, UNESCO ICT, and EU recommendations.

Implementation and Certification

Implementation is institution-driven, with no national mandate. School-level practices, including achievement indicators, performance statements, and evidence validation, inspire assessment and Certification (still under discussion). Pilot projects, such as the one at

UAM, are exploring frameworks, but a systematic rollout is pending. Certification of training refers to the documents of INTEF (2022, pp. 23-194) and Castañeda (2023, pp. 50-129).

Key Areas of Training

Spanish higher education institutions (HEIs) are developing programs that utilize digital pedagogical tools, assess students using digital content, integrate AI, and apply open science and data principles. However, these initiatives are often fragmented and experimental. Andalusia and Catalonia are regional leaders with high rates of teacher digital competence certification. The non-university model (with INTEF as central authority) is seen as a blueprint for future university-level reform.

Recommendations for lifelong learning

It is essential to develop nationally coordinated strategies for HE digital competence, following Portugal's example of QDRCD and CoDe2030 create incentivized and structured professional development plans linked to certification, establish digital teaching and innovation units in every university, promote collaboration with EU frameworks (DigCompEdu, OpenEdu, AI in education), encourage lifelong learning and open educational practices and consider implementing a Digital Decade-style progress monitoring system. Spain has laid a solid foundation by aligning with European standards, such as DigCompEdu; however, implementation at the higher education level is inconsistent and lacks national cohesion.

Digital Competence Framework (DCF) in Higher Education in Sweden

Sweden does not have a national Digital Competence Framework (DCF) specific to higher education. However, the approach to digital competency development is decentralized, adaptable, and grounded at the institutional level. The development of digital skills and pedagogical abilities is primarily led by higher education institutions (HEIs), with guidance from national quality assurance frameworks and regulatory regulations such as the Higher Education Act and the Higher Education Ordinance. The country prioritizes quality assurance and strategic development over centralized mandates. While Sweden supports European aims such as the EU Digital Education Action Plan, it does so through institutional initiatives rather than top-down state structures.

Frameworks and Initiatives

Sweden's model favors institutional flexibility and internal quality assurance rather than a national digital competency framework. SUHF Recommendations (Association of Swedish Higher Education Institutions) provide a non-binding framework for pedagogical development in higher education, including digital tools and environments including several fundamental principles such as scientific and experiential grounding, student-centered learning, infrastructure for digital and physical learning, incentives for staff development and internal quality assurance and global knowledge exchange. Sweden's

Higher Education Authority (UKÄ) includes digital competence and pedagogical development under its institutional review criteria, prompting universities to prioritize long-term staff development and digital readiness. KTH Royal Institute of Technology offers courses such as Digital Learning in Higher Education (4.5 ECTS) and integrates digital teaching into its career development pathways. Mälardalen University piloted the EU's DigCompEdu framework in a limited scope, primarily for retraining staff post-COVID, rather than for broader policy development.

Digital Competence of HE Professionals

Swedish universities are expected to develop and implement their strategies. Professional development is integrated into career advancement, especially at leading institutions like KTH. It requires courses such as Teaching and Learning in Higher Education (7.5 ECTS credits), an advanced course, Digital Learning in Higher Education (4.5 ECTS credits), and an Institutional Learning Management System (LMS) (Canvas), which is fully deployed with mandatory training modules for staff. Staff at KTH and similar institutions undergo continuous training based on pedagogical design, utilizing digital tools, assessment, and feedback through online systems, as well as ethics and GDPR compliance in digital learning environments.

Key Training Topics are:

- E-learning design and delivery
- Assessment with digital tools
- Online collaboration platforms
- Pedagogical use of AI tools
- Ethical considerations in digital learning
- Digital Learning
- Language and Communication
- Learning in STEM
- The House of Science
- The research areas of the Department are carried out in following areas
- Research on digital learning
- HEOS – Higher education organisational studies
- Engineering education in society
- Global competence
- Learning in technology and science education

Certification and Career Integration

Professional development in digital pedagogy is tied to promotion and tenure, especially within tenure-track models.

Students and Lifelong Learners

Sweden supports lifelong learning through flexible, modular, and often online course offerings. The system encourages returning professionals to reskill via freestanding courses, use of national platforms like Ladok and SUNET for student data and connectivity, and LMS integration across all universities (e.g., Canvas at KTH). While there is no national mandate to teach digital skills to students, universities provide optional and embedded training through Massive Open Online Courses (MOOCs), online modules (e.g., programming, digital safety), study administration platforms, and digital credentials.

Digital Infrastructure and Strategic Development

Sweden has invested significantly in digital infrastructure. SUNET (Swedish University Computer Network) provides a national university network, facilitates research collaboration, and offers identity and security services. SUNET was formed in the early 1980s as a research and development project. A decade later, Sunet paved the way for the establishment of the Internet in Sweden. Today, SUNET is part of the Swedish Research Council. All universities and colleges are affiliated with SUNET through regulatory letters and instructions. The affiliated organizations primarily finance the operations, but SUNET also receives funding from the Ministry of Education via the Swedish Research Council. LMS standardization (e.g., Canvas) at leading universities. In the mid-2000s, the learning environment at KTH was to be based on a Learning Management System, and the LMS would serve as a single system for managing all course offerings and communicating with students. Initially, a nationally developed product was used. At the beginning of the 2010s, it became apparent that KTH required a more powerful product, and the university management decided to transition to a more modern Learning Management System (LMS). Finally, the product Canvas was selected and deployed at KTH. The LADOK Consortium manages digital student records across 41 higher education institutions (HEIs). Institutional autonomy enables the development of tailored strategies, supported by government funding in key areas such as digital infrastructure and e-learning research.

Assessment and Monitoring

Swedish universities conduct internal evaluations of teaching quality, report on digital pedagogical development as part of national quality assurance, and participate in UHR-funded projects to evaluate and support pedagogical innovation. In 2022, UHR's survey showed high engagement in digital pedagogy and strong leadership involvement across universities. Sweden demonstrates a decentralized but robust ecosystem for digital competence development in higher education. It compensates through substantial institutional autonomy, integrated pedagogical development, and national quality assurance mechanisms. Sweden's model reflects trust in academic institutions to innovate and self-regulate, supported by national infrastructure and funding. The absence of a national DCF does not imply a lack of digital competence, but rather a new pathway to digital transformation based on autonomy, flexibility, and research-led pedagogy.

Summary of Digital Competence Frameworks in Four Countries

- Italy has adopted a flexible, modular, and evidence-based approach, anchored in European frameworks like DigComp and DigCompEdu. Through initiatives such as the Living Syllabus, micro-credentials (Open Badges), and experimentation with AI in education, Italy emphasizes community involvement, continuous updating, and alignment with EU standards.
- Portugal implements its national strategy through the INCoDe.2030 program, focusing on broad digital inclusion, teacher training, and digital transformation across all education levels. The framework promotes universal digital literacy, with a strong foundation in public policy and coordination between the education and labor market sectors.
- Spain integrates digital competence into national education policies, with mandatory self-assessment tools (e.g., SELFIE) and the Digital Competence Framework for Educators (Marco de Referencia de la Competencia Digital Docente). Spain emphasizes structured teacher development paths, certification, and alignment with the DigCompEdu framework.
- Sweden incorporates digital competences into its education system through a decentralized, autonomy-based model, encouraging universities to define their strategies. Despite limited central regulation, Sweden maintains a high level of digital maturity through robust infrastructure, effective research integration, and strong institutional support mechanisms.

Relevance to the eCAMPUS Project Objective

- Together, these four national experiences offer a rich set of models and best practices that can directly support the primary goal of the eCAMPUS project: to develop a robust, inclusive, and European-aligned Digital Competence Framework for Armenian higher education. Specifically, they contribute:
- Strategic design models (Italy's living syllabus, Spain's structured pathways)
- Practical implementation tools (Portugal's coordinated national strategy, Sweden's institutional autonomy)
- Mechanisms for certification and recognition (Italy's micro-credentials, Spain's mandatory frameworks)
- Scalable training methods (Portugal's national programs, Italy's trainer communities)
- Inspiration for sustainable and participatory processes is critical for ensuring local ownership and long-term impact in Armenia.

These lessons will help the eCAMPUS project anticipate challenges, design inclusive policies, and build institutional capacity to foster digital transformation in teaching, learning, and assessment in Armenia.

9. Recommendations for HEIs

1. Adopt a Flexible Framework Aligned to DigCompEdu or CDCFT
    - Modular and scalable
    - Compatible with local academic cultures and policy needs
2. Integrate CPD and Reflective Practice
    - Use self-assessment tools and micro-credentials
    - Build communities of practice
3. Embed Digital Pedagogy into Curriculum Design
    - Train staff in learning design
    - Promote interdisciplinary collaboration
4. Incentivize Participation
    - Link digital competence to promotions or awards
    - Provide institutional recognition and support
5. Invest in Evaluation and Feedback Mechanisms
    - Regularly review framework effectiveness
    - Use analytics to inform decisions

10. Implementation Plan

Phase 1: Preparation (1–3 Months)

- Institutional needs assessment
- Engagement of stakeholders (faculty, admin, students)
- Development and adaptation of a framework

Phase 2: Roll-Out (3–6 Months)

- Delivery of workshops and training
- Launching of digital literacy support hubs
- Initiation of self-assessment and feedback tools

Phase 3: Evaluation and Scaling (6–12 Months)

- Analysis of data from pilot implementations
- Adjustment of framework for broader use
- Establishment of long-term CPD programs

11. Conclusion

Global digital competence frameworks share common ground in emphasizing pedagogically rooted, policy-aligned, and developmentally structured approaches. HEIs can draw from these models to create robust systems that empower educators, improve teaching quality, and foster student success in the digital era. The key to success is adaptability, institutional support, and ongoing professional development.

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