Teachers' Digital Competency Development

Marja Laurikainen • Rubens Lacerda de Sá
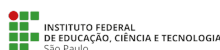
TEACHERS' DIGITAL COMPETENCY DEVELOPMENT

Guidelines

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The COVID-19 pandemic escalated the speed of the digital transformation, bringing digital education high on the political agenda globally, including in the European Union and Latin America. The latest rapid development of new technologies such as artificial intelligence and robotics has only highlighted the urgency of upgrading digital skills in all levels. (e.g. Sabzalieva et al., 2024; Staring et al., 2022; European Commission, 2020)

The *Education Modernization Brazil, Colombia, Europe - the new era of digital higher education cooperation (EMBRACE)* project is co-funded by the European Union through the Erasmus+ Capacity Building for Higher Education program. The EMBRACE project modernizes higher education in Latin America by enhancing the digital and pedagogical competency of higher education teachers to effectively plan, implement, and assess student-centered and competency-based learning processes that utilize digital tools and platforms, and blended

or online formats. Simultaneously, dialogical moments are organized with the educational leaders to foster management processes that support digitalization at an institutional level and ensure various ways of professional development of teachers and other staff in different digital tools, solutions, and platforms.

The *Guidelines for Teachers' Digital Competency Development* is produced in a collaborative process between the EMBRACE partners during August 2024 – June 2025. The document describes the frameworks that steer the digital competency development of higher education teachers, for example, the European Commission papers 2030 Digital Compass: the European way for the Digital Decade, the Digital Education Action Plan 2021-2027, and several papers on Artificial Intelligence, the UNESCO document on Transforming the digital landscape of higher education in Latin America and the Caribbean, and the national policy/legal documents, such as Política Nacional de Educação Digital in Brazil, and Estrategia Nacional Digital de Colombia 2023 – 2026 in Colombia. Further, the document presents five case examples of institutional guidelines and action plans to support teachers' digital competency development. Finally, the document draws general concluding remarks on the main aspects to consider in the institutional practices related to teachers' professional development and the use of digital pedagogy in Latin American.

Abbreviations

EACEA	The European Education and Culture Executive Agency
HAMK	Häme University of Applied Sciences
UFABC	Federal University of ABC
IFES	Federal Institute of Espírito Santo
IFSP	Federal Institute of São Paulo
UTP	Technological University of Pereira
Areandina	La Fundación Universitaria del Área Andina
IPB	Instituto Politécnico de Bragança

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INTRODUCTION

The global digital transformation was accelerated by the COVID-19 pandemic, but it also revealed how decisive role disruptive innovations can play, leading to a sense of urgency about digital education and concerns over its quality. In the post-Covid world, digital education is high on the political agendas in both the European Union and Latin America. The rapid advance of new technologies like artificial intelligence, robotics, cloud computing and blockchain make investing in developing digital skills increasingly important. (e.g. Sabzalieva et al., 2024; Staring et al., 2022; European Commission, 2020)

In both continents, Europe and Latin America, there is a common understanding of the critical component in digital education, which is of course the competencies of teachers, followed by leadership and the "digivision" of the institution, suitable digital content, and infrastructure (Sabzalieva et al., 2024; European Commission, 2020). There is still a significant gap in digital competencies among teachers,

and continuous professional development and training are essential to support digital transformation in higher education. In both Brazil and Colombia, there are national policies or strategies that emphasize digital development aspects in education, for example:

- ***Política Nacional de Educação Digital*** (2023, recently passed into a law in Brazil) that promotes the improvement of teachers' digital skills to create pedagogical innovation in the teaching and learning processes, with the reinforcement of analytical and critical skills, ethics applied to the digital environment, media literacy and citizenship in the digital age (Government of Brazil, Presidency of the Republic, 2024; Ivenicki, 2024), and

- ***Estrategia Nacional Digital de Colombia 2023 – 2026*** that aims to position Colombia as a leader in digital innovation and inclusivity, driving sustainable development and social equity through comprehensive digital transformation (Government of Colombia, 2023).

Education can benefit from opening traditional classrooms to digital spaces and learners can be empowered by new digital possibilities, tools, and environments. Research done during and after the COVID-19 pandemic shows that digital transformation can increase access to higher education, particularly in remote areas, and that universities can play a crucial role in supporting digital literacy in their communities. Access to and the use of digital technologies can help reduce the learning gap between students from high and low socioeconomic

backgrounds, and digitalization supports more flexible educational pathways and internationalization, recognizing competencies acquired outside traditional formats and promoting micro credentials. (e.g. Sabzalieva et al., 2024; Ivenicki, 2024; European Commission, 2020).

However, the COVID-19 pandemic also exposed the emergence of digital divide and underscored the need to ensure access, equity, and inclusion. The situation varied between countries and contexts, for example, according to Ivenicki (2024) in multicultural and unequal countries such as Brazil, there were multicultural and equity sensitive concerns and mixed effects related to the access to digital artefacts, as well as to the articulation of digital learning and curriculum practices. Moreover, research shows that there is an evolving need for media literacy and a wide mix of skills related to digital ethics, safety, and security, as well as privacy and data protection. (e.g. Sabzalieva et al., 2024; Ivenicki, 2024; European Commission, 2020)

Considering these, it is pivotal to discuss what meaningful and quality digital learning means in the context of higher education, and to what extent teachers are equipped with digital technologies and curricular and pedagogical strategies aimed at fostering that kind of learning. We should also find ways to harness digital transformation to improve equity and social justice within the local contexts where digital learning is developed.

DIGITAL TRANSFORMATION IN EDUCATION

In the post-pandemic world, there has been strong emphasis on further accelerating the digital transformation in education. In 2024, the UNESCO published a document "*Six pillars for the digital transformation of education*", which was co-created with multilateral agencies consisting of research, policy resources and country consultations with ministries of education and ministries of communications, intergovernmental and civil society organizations, private sector partners, and educational institutions (UNESCO, 2024). The framework aligns with global standards and international educational goals striving towards achieving the Sustainable Development Goal 4 (SDG 4) by breaking down the critical components of digital transformation in education from the systems perspective.

Digital transformation in education is a complicated process, which requires many pieces and partners that need to move forward in synchronization. This can be a challenge since some pieces can be more developed than others or stakeholder incentives are misaligned. Furthermore, the technology landscape is constantly changing, and the changes are too fast for most policymakers or educators to keep up

with. The UNESCO document describes that "*for education to embrace present and future technological transitions, approaches need to shift from rigid, piecemeal and tech-first to holistic, systems-oriented and human-centered*" (UNESCO, 2024, p. 5). Thus, the framework was created to describe the big picture beyond the purview of any single actor highlighting the close cooperation between various actors. The framework serves as a script to clarify the vision, purpose, roadmap, and required resources for all actors involved.

The framework can be used as a tool to foster cooperation across sectors and partners, to help education leaders strategize and self-assess, and for actors to adapt their contexts through the lens of technology. Figure *1* below illustrates the framework. The other layer consists of two components: education system priorities, and purpose and principles. The priorities and the vision of education should transcend technology and address human-centered, ethical, sustainable, and forward-thinking use of technology in education. In line, the purpose should be not only technology-driven but focused on the social impact of the education system, where the principles for ethical, safe, and effective use of technology are emphasized contributing to equity, inclusion, and transparency in education.
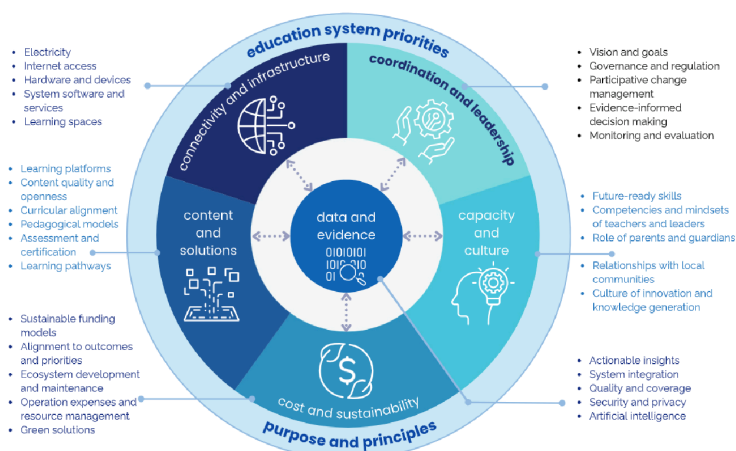
*Figure 1. Core elements of the six pillars for the digital transformation of education.
Adapted from the Digital Transformation Collaborative (2024)[1] © UNESCO*

The inner layer of the framework proposes three keys to unlock the potential of digital learning: connectivity, capacity, and content, and the broader digital ecosystem requires additional three keys to unlock digital transformation in education: coordination and leadership, cost and sustainability, and data and evidence. Table *1* below presents the components of each of these six pillars and the recommendations related to them.

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[1] Source: https://www.unesco.org/en/global-education-coalition/digital-transformation-collaborative

Pillar	Components	Recommendations
Coordination and leadership	Vision and goals	- Clear, comprehensive and adaptive digital transformation strategy with multi-stakeholder input and regular updates - Robust policies and governance structures to support and regulate digital education initiatives - Culture of data-informed decision-making, continuous improvement processes in institutions through training and integrated data systems
	Governance and regulation	
	Participative change management	
	Evidence-informed decision making	
	Monitoring and evaluation	
Connectivity and infrastructure	Electricity	- Consistent electricity and high-speed internet access to all - Low bandwidth, online/offline and/or fully offline digital learning solutions to ensure equitable accessibility - Access to necessary digital devices, services and software that enable effective engagement with digital learning materials for all students and teachers - Robust digital public infrastructure to support safe, secure and seamless tech-enabled learning environments.
	Internet access	
	Hardware and devices	
	System software and services	
	Learning spaces	
Cost and sustainability	Sustainable funding models	- Diverse, long-term funding sources and partnerships - Strategy to allocate financial resources fairly - Environmentally sustainable practices and technologies
	Alignment to outcomes and priorities	
	Ecosystem development and maintenance	
	Operation expenses and resource management	
	Green solutions	

Pillar	Components	Recommendations
Capacity and culture	Future-ready skills	- Comprehensive curricula and programs that focus on digital and information literacies, competencies and skills that empower learners to harness technology for just and equitable futures - Robust pre- and in-service training and continuous professional development opportunities to teachers and education leaders to effectively integrate technology into teaching, learning and administrative practices, fostering a culture of peer-learning, recognition and positive social impact - Enhancing digital literacy of parents and caregivers, promoting digital well-being - Strengthening partnerships with local communities to support and participate in digital learning initiatives and effective technology integration.
	Competencies and mindsets	
	Role of parents and caregivers	
	Relationships with local communities	
	Innovation and knowledge creation	
Content and solutions	Learning platforms	- User-friendly, free, accessible, and open digital learning platforms for diverse learner needs, for collaboration and interaction, aligned with national curricular standards - Integration of innovative digital and blended pedagogical approaches that cater to diverse needs and enhance engagement - Effective assessment and certification systems
	Application software quality and openness	
	Curricular alignment	
	Pedagogical models	
	Assessment and certification	

Pillar	Components	Recommendations
Data and evidence	Actionable insights	- Accurate, reliable, secure, and comprehensive data
	System integration	- Responsible and ethical AI models for education
	Quality and coverage	- Inter-operative data systems to enable data sharing and accessibility across different platforms, data protection measures and privacy laws
	Security and privacy	- Data-informed decision-making by training educators, administrators and leaders in data analysis and utilization to integrate insight to policy and practice
	Artificial intelligence	- Evidence of social impact of technologies used in education by cultivating links between researchers, developers and education decision-makers

Table 1. Components and recommendations of the digital transformation of education. Adapted from UNESCO's "Six pillars for the digital transformation of education" (UNESCO, 2024).

To be able to address and develop the digital learning in education, the first three pillars need to be ensured to provide the necessary infrastructure to educators and learners for the teaching and learning processes. The purpose of the EMBRACE project, presented in the next section, is to focus on the development of teachers' competencies to ensure quality digital learning that considers all the aspects presented in the latter three pillars of the framework in *Table 1*. The guidelines presented in this document showcase examples of institutional support mechanisms and draw conclusions for the digital competency development of teachers.

The *Education Modernization Brazil, Colombia, Europe - the new era of digital higher education cooperation (EMBRACE)* project is co-funded by the European Union through the Erasmus+ Capacity Building for Higher Education program. The EMBRACE project consortium is formed by seven higher education institutions:

- Häme University of Applied Sciences (HAMK), Finland, Coordination
- Federal University of ABC (UFABC), Brazil
- Federal Institute of Espírito Santo (IFES), Brazil
- Federal Institute of São Paulo (IFSP), Brazil
- Technological University of Pereira (UTP), Colombia
- The University Foundation of the Andean Area (Areandina), Colombia
- Instituto Politécnico de Bragança (IPB), Portugal

These partners collaborate to modernize higher education in LA by:

- developing the digital and pedagogical competencies of higher education teachers to plan, implement and evaluate student-centered and competency-based (online) education contributing to the equity and accessibility of higher education,
- supporting educational management in managing impactful pedagogical change and in organizing the innovative learning ecosystem with all relevant stakeholders, and
- building innovative collaboration between HEIs and the world of work/ society partners that result in a stronger learning ecosystem as well as economic and social development in the partner regions.

Cascading model for teachers' capacitation

Capitation of teachers
Selected 25 teachers had an intensive online training focusing on digital pedagogical themes to become Institutional Developers.

Tutor Teacher Training
From each institution, a group of Tutor Teachers were selected and trained to become mentors for other teachers.

Launching the MOOCs
Three MOOCs were launched to wider educational community in Latin America and Europe (and beyond).

Construction of MOOCs
As a part of their training, the Institutional Developers designed three MOOCs for teachers' professional development.

Piloting the MOOCs
The Tutor Teachers piloted all three MOOCs as a part of their training, and MOOCs were finalized based on their feedback.

Figure 2. Professional development of teachers in EMBRACE

As described in Figure 2 above, the project started with a cascading model of teachers' professional development where 25 teachers first went through a 3-month online training program on various digital and pedagogical themes with an aim of becoming Institutional Developers who will coordinate the educational processes improved in the EMBRACE project. In the second phase, the 25 teachers constructed three MOOCs on digital pedagogy, active methods, and collaboration

with the world of work: MOOC 1: Digipeda – Digital and Pedagogical Competences, MOOC 2: Active Pedagogies Using Digital Tools, and MOOC 3: Professional Involvement and Promoting Learners' Digital Competence. The 25 teachers also designed and facilitated a training process for another 75 teachers who also piloted the MOOCs as a part of their training; these teachers would become Tutor Teachers on (digital) pedagogy for their colleagues in their campuses/institutions. After the piloting, the MOOCs were finalized and launched to wider educational community in Latin America and Europe (and beyond). The MOOCs contribute both to the professional development of in-service teachers and as a part of education of pre-service teachers, and the MOOCs are not limited to higher education, but can be utilized in other levels of education as well.

With this publication of guidelines for teachers' digital competency development the EMBRACE project is moving on towards the establishment of professional learning communities and institutional support mechanisms, as well as the transformative leadership from the directors and managers in partner institutions.

POLICIES FOR DIGITAL DEVELOPMENT IN BRAZIL AND COLOMBIA

As mentioned above, the COVID-19 accelerated the development of digital education and post-pandemic time has brought up the quality of digital teaching and learning under microscope. Moreover, the era of *Digital Darwinism* has raised concerns in a situation where technology is evolving too fast for many individuals and organizations. When the rate of change only accelerates, people, businesses and entire countries are struggling to stay aware of the latest technological developments, let alone understand or adapt to the changes (Christie & Geary, 2024). To avoid *Digital Darwinism*, attention must be paid to diminishing digital divide, to ensuring digital inclusion and ethical dimension of digitalization, and to boosting global democracy where technology serves everyone, not just a few.

Both in Brazil and Colombia, there are national policies and strategies related to digitalization, digital education, and development of digital skills.

Política Nacional de Educação Digital (PNED) in Brazil includes:

1) Digital Inclusion to ensure equal access to technologies;

2) School Digital Education aims to ensure the insertion of digital education in educational environments in all levels and modalities, and to stimulate digital literacy and skills, e.g. in computing, robotics;

3) Digital training and specialization;

4) Research and Development seeks to develop inclusive and accessible digital technologies and digital creation and Performance of connectivity. (Government of Brazil, Presidency of the Republic, 2024; Ivenicki, 2024)

Estrategia Nacional Digital de Colombia 2023 – 2026 tackles the issue from three aspects:

1) Improvement of digital skills and talent to improve employability and productivity by promoting digital literacy, focusing on inclusive education, and enhancing access to digital technologies, particularly in rural areas;

2) Public digital transformation by implementing digital tools and platforms to support educational services and to foster innovation in educational practices;

3) Responsible adoption of AI and other emerging technologies to drive economic and social value by promoting research and innovation and by integrating AI and other technologies into educational curricula. (Government of Colombia, 2023).

Both above-described strategies steer and support the EMBRACE partners in the development of digital pedagogy in higher education as well as the digital competencies of teachers.

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FRAMEWORKS FOR DIGITAL COMPETENCY DEVELOPMENT
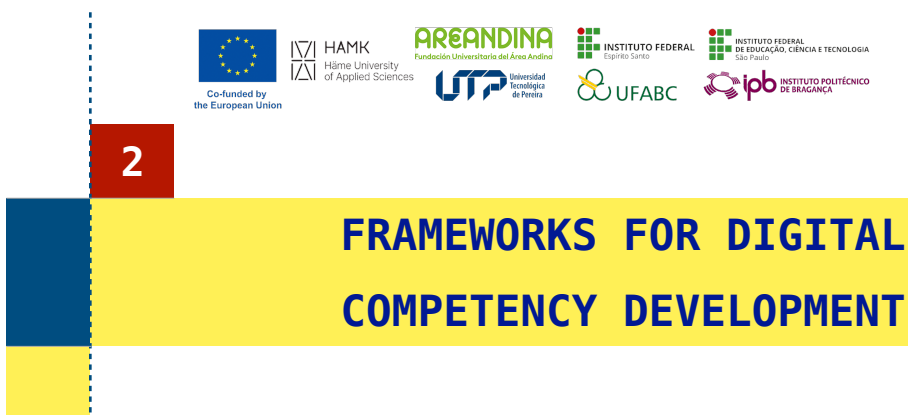
Globally, several organizations have created their own frameworks and recommendations on digital competency development. This chapter presents three selected frameworks for digital competency development targeted at educators from the European Commission (DigCompEdu), UNESCO (ICT Competency Framework for Teachers), and UNICEF (Educators' Digital Competency Framework). The DigCompEdu, an initiative of the European Commission first launched in 2017 (Redecker, 2017), has been used commonly for the competency development of teachers and in the EMBRACE project it was used as the basis for the development of the MOOCs as described in section 2.1. The UNESCO and UNICEF frameworks have similarities between them as well as with the DigCompEdu, and they are further described in sections 2.2. and 2.3. Further, section 2.4. presents implications of AI for education systems, teaching and learning processes, and needed competencies of educators.

One of the frameworks that has already been used in the EMBRACE project is the *DigCompEdu*, a common research-based *European Framework for the Digital Competency of Educators*, which helps to guide policy and to implement regional and national tools and training programs. In addition, it provides a common language and approach that help with the dialogue and exchange of best practices across borders. The DigCompEdu framework is directed towards educators at all levels of education, and it aims to provide a general reference frame for developers of Digital Competency models (Punie & Redecker, 2017). In the EMBRACE project, the DigCompEdu was used as a basis for the professional development of teachers, and as a competency framework for the three developed MOOCs: MOOC 1: Digipeda – Digital and Pedagogical Competences, MOOC 2: Active Pedagogies Using Digital Tools, and MOOC 3: Professional Involvement and Promoting Learners' Digital Competence.
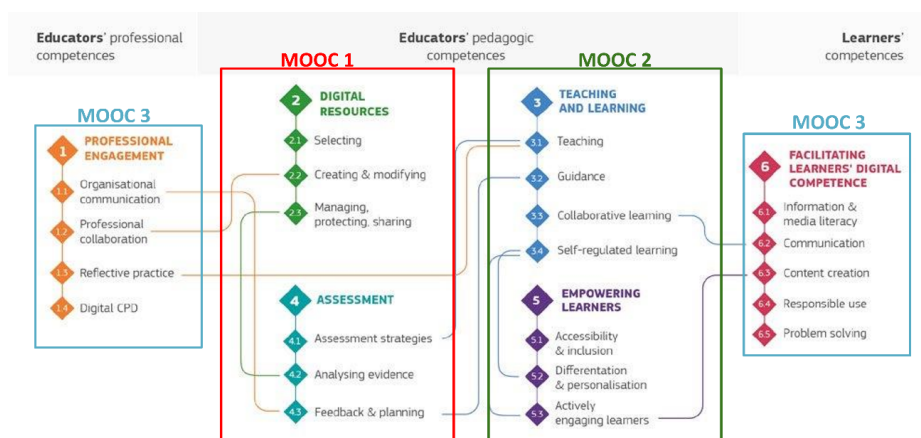
Figure 3. DigCompEdu framework and division of competencies in the developed three MOOCs

The digital competency development of teachers should address all these identified six critical areas of competencies. The focus is not on technical skills but rather on how digital technologies can be used to enhance and innovate teaching and learning processes. It is foreseen that the DigCompEdu framework will be updated in the near future to consider competencies related to the use of artificial intelligence in education.

UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS

The UNESCO's ICT Competency Framework for Teachers (ICT CFT) (UNESCO, 2018) is based on the thinking that ICTs are critical for the achievement of all 17 Sustainable Development Goals (SDGs), particularly Quality education (SDG 4), Gender equality (SDG 5), Infrastructure (SDG 9), Reduced inequalities within and across countries (SDG 10), Peace, justice and strong institutions (SDG 16), and Partnerships for the goals (SDG 17). Technology has the potential to provide innovative solutions to enable learners to take part in quality lifelong learning opportunities, to access information and knowledge, and to fully participate in society through digital citizenship.

The framework considers that effective integration of ICT in education can transform pedagogy and empower students. In this context, it is essential that teachers receive on-going, relevant professional development to gain the necessary ICT competencies so they can, in turn, ensure that their students develop the relevant skills, including digital competencies for life and work.

The ICT Competency Framework for Teachers (ICT CFT) is a tool to guide pre- and in-service teacher training on the use of ICTs across the education system responding to recent technological and pedagogical development, and incorporating inclusive principles of non-discrimination, open and equitable information accessibility and gender equality in the delivery of technology-supported education. Further, it addresses the impacts of recent technological advances on education and learning, such as Artificial Intelligence (AI), Mobile Technologies, the Internet of Things and Open Educational Resources, to support the creation of inclusive Knowledge Societies.

As illustrated in Figure 4 below, the ICT CFT consists of 18 competencies organized according to six aspects of teachers' professional practice, which are:

1. Understanding ICT in Education Policy;
2. Curriculum and Assessment;
3. Pedagogy;
4. Application of Digital Skills;
5. Organization and Administration; and
6. Teacher Professional Learning.

The ICT CFT is organized over three successive levels of a teacher's development in making pedagogical use of ICT:

- **Knowledge Acquisition**, where teachers acquire knowledge about using technology and basic ICT competencies. It means that teachers are aware of the potential benefits of ICT in education and can use technology to embark on lifelong learning and further professional development.

- **Knowledge Deepening**, where teachers acquire ICT competencies to facilitate student-centered and collaborative learning environments and to link policy directives with real action in the classroom, having the capacity to build technology plans to maintain the school ICT assets, and forecast future needs. In addition, teachers can study further by linking to national and global teacher networks.

- **Knowledge Creation**, where teachers acquire competencies to model good practice, and to set up learning environments that encourage students to create new knowledge required for more harmonious, fulfilling and prosperous societies.
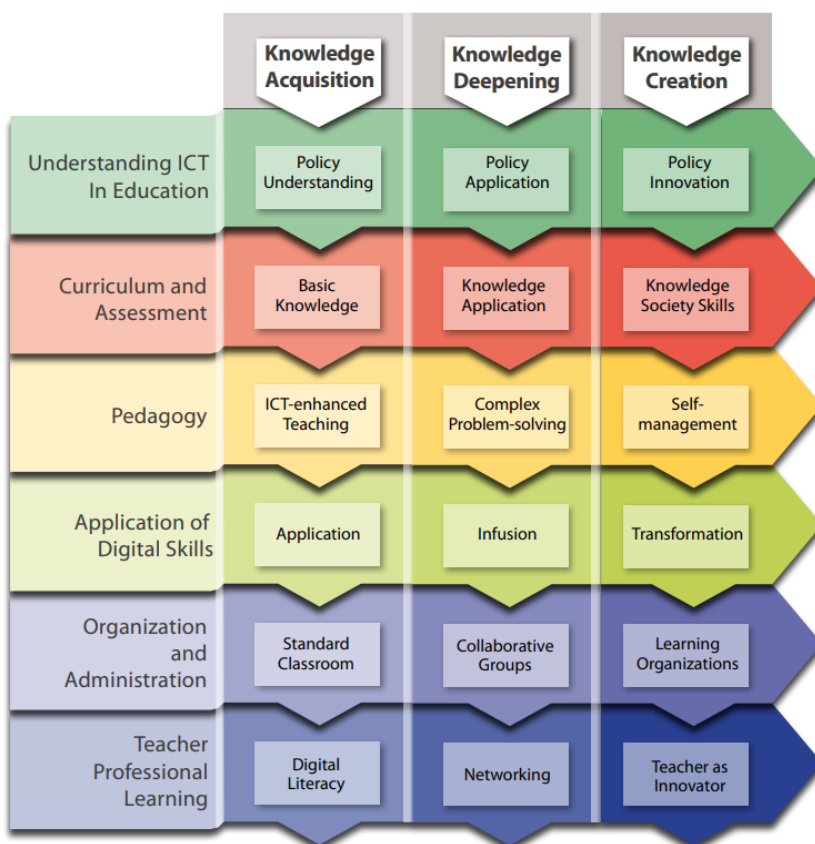
Figure 4. Competency-areas and levels of competencies in the ICT CFT framework

The framework is based on global principles of education such as declarations from the 2015 World Education Forum or the 2015 Qingdao Declaration. Further, it discusses cross-cutting principles related to the Knowledge Societies, Universal Design for Learning (UDL), and Inclusive education (language and culture, persons with disabilities, gender equality, ability).

The framework also addresses the potential and challenges of ICT innovations, such as Open Educational Resources (OER), Social networks, Mobile technologies, The Internet of Things, Artificial Intelligence (AI), Virtual Reality (VR) and Augmented Reality (AR), Big Data, Coding, Ethics and privacy protection.

The ICT CFT framework provides descriptions for all competency areas in all three levels and defines their curricular goals for teacher training, competencies (teachers can …), objectives (teachers should be able to …), and example activities of teachers. Further, it discusses the curriculum implications in teacher education to match the competency needs and gaps.

UNICEF EDUCATORS' DIGITAL COMPETENCY FRAMEWORK

The Educators' Digital Competency (EDC) framework, one of the UNICEF initiatives, is consistent with both the European framework for Digital Competency of Educators (DigCompEdu) (Punie & Redecker, 2017) and UNESCO's ICT Competency Framework for Teachers (UNESCO, 2018). The framework has been created as a result of research implemented in the Eastern Europe and Central Asia, including literature review, discussions with experts on local, European and international levels, as well as the synthesis of existing European and international frameworks (e.g. Punie & Redecker, 2017; UNESCO, 2018; European Agency for Special Needs and Inclusive Education, 2015; European Agency for Development in Special Needs Education, 2013). The EDC framework is also aligned with the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs).

The EDC framework offers detailed descriptions of a) *'what'*, i.e. what kind of competencies educators need to harness digital technologies and empower educational innovation in inclusive teaching and learning; and b) *'how'*, i.e. how to offer practical knowledge and support on designing learning environments, facilitating students'

learning, developing professional knowledge and settings as well as enhancing organizational communication that promote such competencies (UNICEF Regional Office for Europe and Central Asia ECARO, 2022). The competencies are divided into four areas: Knowledge development, Knowledge application, Knowledge sharing, and Knowledge communication (see Figure 5).
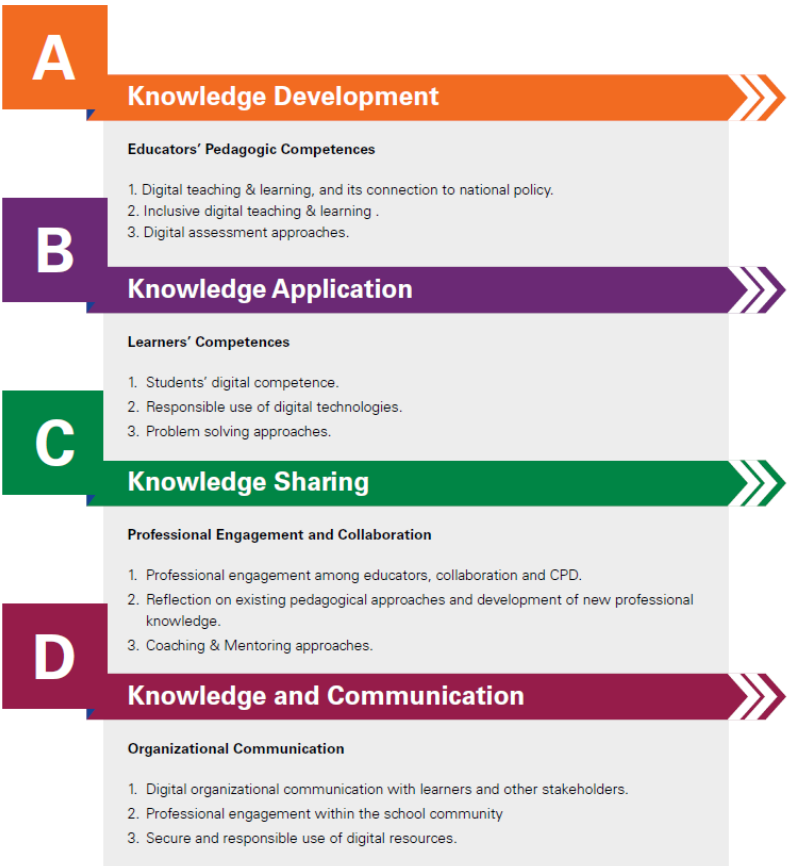
Figure 5. Areas of competencies of the Educators'
Digital Competency (EDC) framework

The first two competency areas are more related to the teaching and learning processes, whereas the two latter focus on the organizational learning community and communication with all stakeholders. ***Knowledge development*** means enhancing educators' digital pedagogical competencies related to teaching and learning aligned with the national policies and guidelines, whereas ***Knowledge application*** focuses on facilitating effective and responsible digital pedagogical processes that support students' learning and the development of their digital and problem-solving skills, as well as skills in transferring technological knowledge creatively to new situations. On the other hand, ***Knowledge sharing*** emphasizes the use of communities of practice (CoP) for professional development and the exchange of practices to develop digital competencies. Moreover, ***Knowledge communication*** addresses digital technologies to support organizational communication, with learners and other stakeholders, and the development of secure systems to use sensitive digital content. Each competency area is divided into more detailed topics with specific competencies and the ways educators can promote their development (UNICEF Regional Office for Europe and Central Asia ECARO, 2022)

IMPLICATIONS OF ARTIFICIAL INTELLIGENCE

Recently the most discussed topic when it comes to digitalization is the implications of Artificial Intelligence (AI) to education. It is evident that it is important for teachers to possess competencies to use AI in an ethical manner as well as to guide their students to utilize AI in a meaningful way in their studies. Since educational institutions and educators are researching and developing AI systems in collaboration with companies and society, and learning to integrate AI into everyday teaching, learning, and management, as well as educating future professionals in the responsible and creative use of AI, Ryymin (2024) poses a question "*if educators could play a role in socially responsible and humane way of using AI in education globally*".

UNESCO has published several recommendations on the use of AI in education, such as *The AI Competency Framework for Teachers* (UNESCO, 2024), *Recommendation on the Ethics of Artificial Intelligence* (UNESCO, 2022), and *Artificial Intelligence and Education: Guidance for Policy-makers* (UNESCO, 2021B) referring to human-centered AI systems that prioritize human needs and well-being, respect human rights, and ensure access to knowledge stressing the importance of bridging the digital divide within and between

countries, and including marginalized groups and communities. The comprehensive framework formed by these recommendations reflects the role of AI in education, its opportunities and challenges, as well as the competencies and values educators and learners need to master.

Further, many other cross-sectoral efforts to ensure the responsible and ethical use of AI are taking place globally. For example, the European Commission (2022) considers the ethical guidelines on the use of AI and guides all educators to ask questions related to human agency, transparency, fairness, societal well-being, privacy, technical robustness, and accountability when considering AI systems. *The Digital Services Act* (European Commission, n.d.) that proposes mandatory requirements for high-risk AI systems, including those used in education and aligned with EU policies like the General Data Protection Regulation (GDPR) and the proposed Data Act, ensuring ethical AI usage in education. Further, the United Nations' leading platform on Artificial Intelligence for sustainable development, *AI for Good Summit* (n.d.), promotes discussion on identifying trustworthy AI applications, building skills and standards, and advancing AI governance for sustainable development. AI is also a strategic priority of the European Network of National Human Rights Institutions ENNHRI (n.d.), whereas Geneva International Centre for Justice (n.d.) has a role in monitoring and reporting on the impact of AI on human rights.

The *World Economic Forum report* (2024) on the role of AI in Education 4.0 describes the transformative potential of AI emphasizing its role in addressing global educational challenges and enhancing Education 4.0. The report also concludes that AI can revolutionize teaching methodologies, personalize learning experiences, and streamline administrative processes, ultimately improving education outcomes. It can reduce the time teachers spend in administration by automating routine tasks, allowing teachers to focus on creative and interpersonal aspects of teaching. AI can also personalize learning experiences to meet individual student needs, improving engagement and outcomes by providing real-time feedback and analytics, enabling more agile and responsive educational processes. Integrating AI into curricula promotes digital literacy and can help students develop critical digital skills and ethical awareness.

No educational system, institution, nor educator can ignore the impact of AI on education. Navigating the transformative changes and balancing the opportunities and threats related to AI requires systemic development that ensures safe and responsible use of AI solutions and enhanced digital competencies of educators to create meaningful ways of using AI as well as to promote the understanding of AI and digital skills of their learners.

EMBRACE FRAMEWORK FOR TEACHERS' DIGITAL COMPETENCY DEVELOPMENT

The digital competency frameworks described in the previous chapter have the same type of foundation and logic, and they emphasize similar types of knowledge and skill requirements for educators. Table 2 provides an overview of the three chosen frameworks, and how they describe the required competencies of educators and proficiency levels.

	DigCompEdu	ICT Competency	Educators' Digital Competency
Competency areas	Professional engagement; Digital resources; Teaching and learning; Assessment; Empowering learners; Facilitating learners' digital competency	Understanding ICT in Education Policy; Curriculum and Assessment; Pedagogy; Application of Digital Skills; Organization and Administration; Teacher Professional Learning	Knowledge development – Educators' pedagogic skills; Knowledge application – Developing learners' skills; Knowledge sharing – Communities of practice; Knowledge and communication – Organizational communication
Competencies defined	Not completely	Yes	Yes

Competency objectives defined	Yes	Yes	Yes
Proficiency levels and descriptions	Newcomer (A1) Explorer (A2) Integrator (B1) Expert (B2) Leader (C1) Pioneer (C2)	Knowledge Acquisition Knowledge Deepening Knowledge Creation	Not included
Language versions	EN	EN	e.g. EN, ES, FR

Table 2. General comparison of the three selected frameworks
for educators' digital competency development

The digital competency development framework for teachers in the EMBRACE project is a combined and applied model of the previously presented three frameworks. The EMBRACE framework describes the competency areas and competencies that are found common in all the presented three frameworks as well as the shared elements of the levels of proficiency. The EMBRACE framework also highlights the issues that are the most important in the Latin American context. Table 3 presents the EMBRACE framework, and its contents and elements.

EMBRACE Framework for Teachers' Digital Competency Development	
Competency areas	1. Digitalization in education policies at global, national, and local levels 2. Digitalization in teaching and learning – Educators' digital pedagogical competencies 3. Facilitating learners' digital competencies 4. Learning communities and knowledge sharing for educators' professional development 5. Digitalization in educational organizations' administrational processes

Competencies defined	Digitalization in education policies at global, national, and local levels • Teachers are able to understand the role of digitalization in education globally and articulate how their classroom practices correspond to and support institutional and/or national policy. • Teachers are able to follow relevant channels to receive up-to-date information on digital transformation in education nationally and globally. Digitalization in teaching and learning – Educators' digital pedagogical competencies • Teachers are able to use computers, mobile devices, accessible software, and networks for both teaching and learning and management purposes within a framework of 'safe use'. • Teachers are able to analyze curriculum standards and identify how digital environments, tools and applications can be used pedagogically to support attainment of the standards • Teachers are able to make appropriate choices of digital environments, tools and applications to support specific teaching and learning methodologies, as well as guidance of learning. • Teachers are able to ensure inclusiveness and access for all learners by using various types of digital environments, tools and applications and by providing scaffolded support throughout the educational process. • Teachers are able to build learning processes considering safe use of digital environments, tools and applications, the copyright and data protection rules, ethical use of AI, and other relevant regulations. Facilitating learners' digital competencies • Teachers are able to facilitate students' digital competencies by incorporating pedagogical approaches, learning activities, assignments and assessments that encourage learners to use digital technologies effectively for communication, collaboration and community participation. • Teachers are able to develop teaching practices that assist learners in expressing themselves by creating digital content in different formats. • Teachers are able to ensure through their pedagogical choices that learners can identify and solve technical problems or transfer technological knowledge creatively to new situations.

Competencies defined, cont.	Learning communities and knowledge sharing for educators' professional development • Teachers are able to use digital platforms, tools and applications effectively to support their professional development and well-being. • Teachers are able to actively participate in digital learning communities locally, nationally and globally for their professional development. • Teachers are able to actively share their knowledge and best practices with their colleagues contributing to a learning organization and pedagogical co-development. Digitalization in educational organizations' administrational processes • Teachers are able to effectively communicate and distribute information with all relevant stakeholders by using digital environments, tools and applications. • Teachers are able to efficiently use digital administration systems of the institution. • Teachers are able to contribute to the development of their institution's digital strategy, systems, environments, tools and applications.
Proficiency levels and descriptions	Knowledge Acquisition (A1+A2): Teachers acquire knowledge about using technology and basic digital competencies. Teachers are aware of the potential benefits of digital tools in the classroom. Aligned with national policies and priorities teachers are able to plan and contribute to the institution's investments in digital environments, tools and applications. Teachers inquire further about professional development on digitalization and understand the use of technology as a significant part of lifelong learning. Knowledge Deepening (B1+B2) Teachers acquire digital competencies that enable them to facilitate learning processes and environments that are student-centered, collaborative and cooperative in nature. Teachers are able to link policy directives with real action in the classroom and have the capacity to contribute to the technology plans to maintain the institution's digital assets and forecast future needs. Teachers are connected to (digital) professional learning communities and national and global networks.

Proficiency levels and descriptions, cont.	Knowledge Creation (C1+ C2) Teachers acquire digital competencies that encourage them to model good practice and set up learning environments that encourage students to create new knowledge required for more harmonious, fulfilling and prosperous societies. Teachers play a leadership role in devising a technology strategy for their institution and contribute significantly to the development of a learning organization.

Table 3. The EMBRACE framework for teachers' digital competency development

The EMBRACE framework does not include the specific competency objectives as they can and should be specified at institutional level corresponding to the contextual situation and needs. The framework is also considered from the teacher's perspective and educational administrators, managers, and leaders require specific competencies that are not described here. However, it is important to point out that as a part of the teacher's competency framework there are competencies identified that are linked with administration and management processes of an educational institution, specifically related to digitalization.

INSTITUTIONAL GUIDELINES FOR TEACHERS' DIGITAL COMPETENCY DEVELOPMENT

In this chapter, there are five examples of guidelines for teachers' digital competency development presented – three from Brazil and two from Colombia. The examples are drawn from the institutional conditions and contexts but using a template that aligns the contents between the institutions and ensures that all relevant information is included. The example guidelines discuss, but are not limited to the following questions and topics describing first the current situation in the institution and then the desired development steps:

DESCRIPTION OF THE CURRENT SITUATION

Please describe the current situation related to the overall digitalisation of your institution, the digital competences of teachers, and their choices of digital tools and environments in teaching and for other purposes (e.g. research etc).

You can reflect the following headings and the guiding questions, but you can also include other aspects that might be relevant for your institution. Please provide concrete examples when you describe the current situation.

Strategy level

Is digitalisation included into the institution's strategy?
If so, please describe how.

- How does the institution's strategy address the challenges and opportunities of digitalisation (e.g., equity, access, pedagogy)
- How is the success of the digitalisation being measured and evaluated?
- How is the digitalisation strategy aligned with the institution's overall pedagogical philosophy and goals? How does the strategy support innovative teaching and learning practices?

Competence management

Are teachers' digital competences mapped out currently? If so, what is the current situation in teachers' competences in using digital tools, platforms, and pedagogy?

- What specific digital competences are considered essential for teachers in the institution (e.g., ISTE Standards for Educators)? What methods are used to assess teachers' digital competences (e.g., self-assessment, observation, portfolio review)? How are the results of competence assessments used to inform professional development and support?

- What kind of support is provided to teachers who need to improve their digital competences (e.g., mentoring, coaching, workshops)? Are there opportunities for teachers to share best practices and learn from each other (e.g., communities of practice, peer observation)?

Competence development

Is there any existing training to develop teachers' digital competences in the institution? Are there any support systems or resources to support teachers? If so, please describe briefly.

- How are training programs designed to meet the diverse needs and competence levels of teachers? How is the effectiveness of training programs evaluated? Do teachers have opportunities to apply new skills and knowledge in their classrooms with adequate support?
- What kind of ongoing support is available to teachers (e.g., online resources, help desk, coaching)? Are teachers encouraged to experiment with new digital tools and pedagogies? How is innovation in teaching with technology recognised and rewarded?

Digital pedagogy and tools

Are teachers using digital tools multi-functionally and aligned with the pedagogical approaches of the institution? Are teachers using digital tools in a pedagogically meaningful way to support students' active role in the learning process, to promote student collaboration, creativity, and critical thinking, or to personalize learning and meet the diverse needs of students?

Please describe briefly with concrete examples.

- How are teachers using digital tools and platforms currently? What tools are they comfortably using?
- Are there any specific pedagogical frameworks or models that guide the use of digital tools in the classroom (e.g., SAMR, TPACK)? How are teachers supported in integrating technology effectively into their teaching practices?
- How are students involved in the selection and use of digital tools? How is the institution ensuring that all students have equal access to technology and digital learning opportunities?

DIGITAL COMPETENCE DEVELOPMENT

Please describe the development ideas, responsibilities and schedules for digital competence development in your institution. You can reflect the following headings and guiding questions, but you can also bring up other important issues for your institution. Try to come up with a clear strategy and concrete steps for the development.

Strategy level

How to build or update, if necessary, the institutional **Digital strategy**, including ways to **use AI**, and aligning it with institutional mission, vision, and pedagogical goals? What are the key goals and concrete steps? How will the institution stay current with evolving technologies and pedagogical approaches in the digital age (Long-Term Vision)?

- How will stakeholders (teachers, students, administrators, parents) be involved in developing/updating the digital strategy?
- How will the strategy address potential challenges such as equity, accessibility, and data privacy?
- What specific AI tools or platforms are being considered for use in teaching and learning (e.g., AI-powered tutoring systems, personalized learning platforms)?
- How will the ethical implications of AI in education be addressed (e.g., bias, data privacy, transparency)? What measures will be taken to ensure responsible and effective use of AI in the classroom?

Competence development

How to use and develop digital tools, environments, and digital pedagogical processes?

- How will the training programs go beyond basic tool usage to foster deep understanding of digital pedagogies (e.g., blended learning, flipped classroom, project-based learning)?
- How will training programs address the use of digital tools to support different learning styles and needs?
- How will the institution promote the creation and sharing of open educational resources (OER) among teachers?

How to consider **data protection and safety aspects** and how to train teachers and staff on these topics?

- What specific data protection policies and procedures will be implemented (e.g., GDPR compliance, student data privacy)?
- How will the teachers and staff be trained to identify and address online safety risks (e.g., cyberbullying, misinformation)?

How to support **inclusion and accessibility** of digital tools and environments?

- How will the institution ensure that digital tools and environments are accessible to all students, specially for those with disabilities (e.g., assistive technologies, universal design for learning)?
- How will the training programs address the use of digital tools to support diverse learners and promote inclusivity?

How to **use AI in an ethical manner** in teaching and learning?

- How will the institution ensure that AI is used in a way that is fair, unbiased, and transparent?
- How will the teachers and students be educated about the ethical considerations related to AI in education?

Institutional support structures and practices

- How to organize **training for teachers and staff**? Who are the trainers in these?

- How to develop **internal guidelines and resources** for digitalisation? Who are responsible for creating these and updating them?

- How to organize the institutional resources (e.g., dedicated budget, continuous professional development) in a way that there are **dedicated persons to develop digitalisation and ongoing support** for digitalisation initiatives at the institutional level?

- How will the institution foster a **culture of collaboration and knowledge sharing** around digital pedagogy (e.g., learning communities, mentoring programs)?

- How will the institution encourage innovation and experimentation with digital tools and pedagogies?

- In terms of evaluation, how will the effectiveness of digitalisation initiatives be evaluated and measured?

- With a view on improvements, what mechanisms will be in place to gather feedback from teachers, students, and other stakeholders?

- What are the **concrete development steps** in each of the above-mentioned issues and the **schedule**, who are **responsible** for each development activity? How are all these aspects **embedded into institutional structures, processes, and practices**?

4.1

INSTITUTO FEDERAL DO ESPÍRITO SANTO
Guidelines for Teachers' Digital Competency Development

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The Federal Institute of Espírito Santo (Ifes) was established in 2008, uniting four federal educational institutions: Cefets and three federal agricultural schools. With roots dating back to 1909 with the School of Apprentice Craftsmen, Ifes provides diverse and integrated technological education.

Initially, Ifes comprised 12 campuses, including the Reference Center for Training and Distance Education (Cefor). Since then, the institution has expanded to 23 operational campuses and several distance learning centers, with additional campuses under development. Today, it is present in all micro-regions of Espírito Santo.

Ifes offers over 40,000 spots in courses ranging from technical to doctoral levels, covering 99 technical courses, 68 undergraduate programs, 46 lato sensu graduate programs, 12 master's programs, and one professional doctorate.

In 2021, Ifes received the space of the former IBC Warehouses, where the Innovation City is being developed. With the addition of new campuses in Laranja da Terra, Pedro Canário, and Muniz Freire, Ifes continues to promote education and innovation for sustainable development in Espírito Santo.

DESCRIPTION OF THE CURRENT SITUATION

Strategy level

Digitalization is included into the institutional strategy of Ifes. In recent years, institutional administrative processes have been digitized, as well as actions relating to teaching, research and extension, using a range of tools such as those for opening, controlling and progressing processes, the academic system, the human resources system (teleworking), issuing diplomas, registering for selection processes, registering for events, issuing ordinances, the virtual learning environment (Moodle), the open courses platform (MOOC), web conferencing tools, digital libraries, among many others. The digitalization strategy supports pedagogical goals and learning practices by providing majority of staff training courses, for example, organized through Moodle or through courses on the MOOC platform. In addition, all teachers, including classroom teachers, have access to a Moodle room, which is integrated with the academic system. However, there was no information available on how digitalization is measured or evaluated.

Competence management

Currently at Ifes, there has not been any systematic mapping of teachers' digital competences, although some research groups, such as Cefor, have used the DigCompEdu model in their research. However, over the last 18 years, Cefor has organized various training courses for teachers and other education professionals, at different levels and on a regular basis. In addition, it created and maintains the Ifes Open Courses Platform (MOOC), with various training opportunities through self-study, the Knowledge Base, and the Youtube Channels. Cefor also supports teachers in the use of technology, video lesson recordings, translations into Libras, among other things. In addition, the campuses have a structure called the Educational Technology Centre (NTE), which aims to support teachers locally.

Competence development

Ifes support the development of teachers' digital competences through Cefor courses (specialisation, further training, FIC, MOOCs), specific projects related to digitalization (such as the Embrace project), training for digital tools such as Science mapping and others. MOOCs for training leave. Every year, the institution draws up its personnel development plan (PDP), in which each campus maps out its training needs. In addition, Cefor and the NTEs receive demands from teachers

relating to distance learning and educational technologies, as well as offering support. Other forms of ongoing support for teachers are Cefor support system, DRTI (Information Technology Directorate) and CTI (Information Technology Coordination) on campuses. In addition, the professionals are encouraged to take part in the training offered by Cefor. Training undertaken by teachers is counted towards their progression and training leave.

Digital pedagogy and tools

Many teachers use digital technologies to support their teaching, especially since the pandemic. The most intensive use is with distance learning teachers. The most used digital tools and platforms are the Moodle virtual learning environment, web conferencing tools (such as RNP), Google tools (such as Google Drive), Periódico Capes, Virtual Libraries, Turnitin, games, etc. Teachers at Ifes are supported in integrating technology effectively into their teaching practices through training provided by Cefor and others are available on the Open Courses Platform (MOOC). Ifes promotes students' equal access to technology and digital learning opportunities with tools available on Moodle, such as accessibility, Turnitin, digital libraries, videos in Libras and with subtitles, etc.

DIGITAL COMPETENCE DEVELOPMENT

Strategy level

The institution is kept up to date on digitalization and the use of AI through the research carried out and through sectors that continually seek new updates, as is the case with Cefor, which has continually promoted training and updates such as online training, on-site training on campuses (Cefor Trail), discussion groups and training on AI, Open Course Platform (MOOC), among others. The stakeholder involvement (teachers, students, administrators, parents) in developing digital strategy is not institutionalized at Ifes, but more one-off actions by teachers or sectors.

The accessibility issues are handled through the Centres for the Care of People with Specific Educational Needs (NAPNE), inclusion standards and the use of adapted digital tools. Regarding the use of AI, there is no institutionalized guidelines of tools or platforms to be used, or for the ethical use of AI.

Competence development

As mentioned earlier, many teachers have received training by Cefor and through the Open Courses Platform (MOOC) over the years in the use of innovative methodologies and technologies so that they can implement improvements in their subjects. The aim of these trainings has been to work with a diversity of resources and approaches, such as textual resources, audiovisuals, games, interaction and creation activities, among others. The open educational resources (OER) is supported by the widely used is the Ifes Open Course Platform (MOOC), where not only teachers have access to how to use a variety of tools and methodologies. There is also the Knowledge Base, YouTube channels and repository rooms on Moodle and on the institution's pages. Many resources are also shared on national databases such as EduCapes and ProEdu.

Currently, the data protection and digital safety aspects are under an ongoing commission, but there are no published results yet. Regarding inclusion and accessibility, the virtual learning environment has accessibility plugins, and the institution has promoted the recording of materials in Libras and subtitles for the videos. Furthermore, there are a number of specific training courses on inclusion and accessibility offered on an ongoing basis through FICs, training courses, specializations and open courses on the MOOC platform. In addition,

there are specific subjects within the curricula of various courses, especially undergraduate programmes. Currently, Ifes has no institutionalized guidelines on the use of AI or ethical considerations related to AI in education.

Institutional support structures and practices

Training courses for teachers and staff are organized by the institution's Personnel Management Department. Some training programs are planned and carried out by the campuses. Special mention should be made of Cefor, which works hard to train teachers in the use of technology and distance learning. Regarding internal guidelines and resources for digitalization, the responsibility lies more broadly with the Information Technology Directorate (DRTI). In more specific cases of guidelines and digital resources for educational use, Cefor plays a central role. Cefor and the NTEs located on campuses are fostering a culture of collaboration and knowledge sharing around digital pedagogy through educational resources, research and continuing education. However, there is no information on the evaluation of the effectiveness of digitalization, or feedback mechanisms.

Institutional planning generally takes place through its institutional development plan (IDP)[2].

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[2] Available at https://prodi.ifes.edu.br/images/stories/PDI-IFES/PDI-2024-2-2029-1-CONSUP-254-2024.pdf

4.2

INSTITUTO FEDERAL DE SÃO PAULO
Guidelines for Teachers' Digital Competency Development

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The Federal Institute of São Paulo (Instituto Federal de São Paulo, IFSP) is a public, multi-campus institution dedicated to offering high-quality education in technical, technological, and higher education programs. First named as São Paulo School of Apprentices and Artificers (1909), then Federal Technical School in São Paulo (1965), then Federal Centre of Technological Education of São Paulo (1998), and lately as it is (2008), IFSP operates under the Federal Network of Professional, Scientific, and Technological Education, focusing on inclusive, innovative, and sustainable development.

With over 40 campuses across São Paulo state, the institute provides a diverse range of programs, including technical courses integrated with secondary school education, undergraduate degrees, and postgraduate specialisations. IFSP emphasises research, outreach activities, and community engagement, aligning its educational practices with regional and national socio-economic demands.

The institution is recognised for promoting technological advancements and fostering critical thinking, preparing students to excel in the modern labour market while contributing to society. Accessibility, equity, and environmental sustainability are central to its mission, ensuring education opportunities for all.

By integrating theoretical knowledge with practical experience, IFSP aims at developing skilled professionals who can address complex challenges, innovate responsibly, and uphold ethical standards. IFSP is a cornerstone of education and development in Brazil's most populous state.

DESCRIPTION OF THE CURRENT SITUATION

Strategy level

Digitalization is the cornerstone of IFSP strategy. Over the years, IFSP has been incorporating digital tools and platforms to enhance teaching, streamline administrative processes, and provide students with online resources. All of that include virtual learning environments, a robust IT infrastructure, and policies which encourage the adoption of technology across departments.

IFSP's strategy promotes lifelong learning and digital literacy, supports innovative practices like flipped classrooms and gamification,

facilitates research and collaboration through advanced tools, and fosters a culture of experimentation, enabling educators to test new technologies and methodologies.

IFSP focuses on equity by providing access to devices, internet, and technical support through funding and partnerships. Access is ensured via online portals with resources and collaboration tools, accommodating diverse needs. Pedagogy involves teacher training on digital tools and technology-integrated curricula, though it remains infrequent and could be more effective.

The digitalization strategy is evaluated at IFSP and the metrics include:

- Student Outcomes: Improved grades, retention rates, and engagement levels in digital courses;
- Usage Statistics: Adoption rates of digital tools among students and staff;
- Feedback Mechanisms: Surveys and focus groups to gauge satisfaction with digital initiatives;
- Operational Efficiency: Reduced processing times for administrative tasks and cost-effectiveness analysis.

Competence management

IFSP maps teachers' digital skills using DigCompEdu, categorising them into three levels:

- *Basic:* Uses digital tools for administration and content delivery.

- *Intermediate:* Integrates LMS, video conferencing, and online assessments.
- *Advanced:* Utilizes digital tools for collaboration, personalised learning, and innovative methods like gamification and project-based learning.

Essential competencies include: designing inclusive digital learning environments, facilitating active learning with digital tools, assessing student performance using digital tools, ensuring online safety and digital citizenship, and adapting teaching strategies with emerging technologies like AI and VR.

At IFSP, methods to assess teachers' digital competences include self-assessments, portfolio reviews, and performance metrics. These results help identify areas for improvement and guide targeted training programs, enabling tailored professional development and engaging advanced users as mentors.

At IFSP, support for teachers to develop digital competences includes workshops and training on tools like LMS and digital content creation, mentoring and coaching with tech-savvy mentors, and access to online resources like tutorials and webinars. In addition, IFSP fosters collaboration through communities of practice, knowledge sharing platforms, and showcase discussions where educators share solutions and highlight successful digital teaching strategies.

Competence development

IFSP offers structured training programs, including workshops on LMS, advanced sessions on digital pedagogy, and specialised courses on AI and VR. Support systems include IT help desks for real-time assistance and ongoing support through online libraries and resources with webinars, tutorials and guides. However, IFSP lacks continuous coaching or a peer mentoring program pairing experienced teachers with those needing guidance.

IFSP training programs address some teacher needs by identifying competence levels through surveys and self-assessments, offering flexibility with online and blended formats. However, there is a lack of differentiated programs at basic, intermediate, and advanced levels, and content customisation for specific teaching areas like STEM or special education.

Training effectiveness is evaluated through feedback surveys, impact assessments, and KPIs such as attendance rates and teacher retention. Teachers can apply new skills through pilot projects and follow-up workshops, though there is a lack of instructional coaches or IT specialists for classroom implementation.

Teachers are encouraged to experiment with new digital tools but face limited funding for pilot initiatives. While IFSP highly values experimentation, outcomes may vary. Success stories are publicised, but there is no clear policy on awards for innovative teaching practices or professional development credits for advanced achievements.

Digital pedagogy and tools

At IFSP, teachers use digital tools for content delivery (e.g., LMS platforms like Moodle, Google Classroom, PowerPoint, Google Slides, video lectures), student engagement (e.g., Kahoot, Mentimeter, Miro, Padlet, Trello), and assessment (e.g., Google Forms, quizzes, Turnitin), communication (e.g., Zoom, Google Meet), and creative projects (e.g., WeVideo, Adobe Spark). Many educators enhance learning outcomes with tools like PhET simulations for science, Google Workspace or Microsoft Teams for collaboration, Canva or Adobe Spark for creativity, and platforms like Khan Academy or Smart Sparrow for personalised learning. Examples include using Padlet in history, GeoGebra in math, and Audacity in language arts for collaborative, interactive, and creative tasks.

Teachers prefer user-friendly, widely adopted, and versatile tools, such as Google Classroom, Moodle, Google Meet, and Google Workspace, for assignments, virtual classes, and collaborative tasks. Tools like Padlet are used for brainstorming and discussions.

Some intermediate and advanced teachers at IFSP use frameworks to guide the integration of digital tools in their practices, including the SAMR Model (which evolves tasks from substitution to redefinition), TPACK (intersecting technology, pedagogy, and content knowledge), Blended Learning Models (combining face-to-face and digital methods), and Universal Design for Learning (UDL) for inclusive learning.

IFSP supports teachers with professional development workshops on these frameworks. However, the institution lacks instructional coaching, resource provision, peer collaboration, and a clear policy for recognizing and rewarding innovative use of digital tools. Ongoing technical support is available through IT teams or help desks.

At IFSP, students are engaged in decisions about digital tools through feedback mechanisms like surveys and focus groups, though the institution lacks student committees or representatives for tool selection and digital initiatives. There are also co-design opportunities where students collaborate with teachers to choose tools for specific projects, and they have choices in learning activities, such as selecting tools for assignments.

IFSP ensures equal access to technology by providing computer labs with modern systems and robust Wi-Fi across campus. However, the institution lacks loan programs for devices and partnerships to provide subsidised home internet access. There's no clear policy for assistive technologies, platforms adhering to Universal Design for Learning (UDL), or comprehensive support for students with disabilities. Although workshops and help desks are available, financial barriers remain due to limited subsidies for some software.

DIGITAL COMPETENCE DEVELOPMENT

Strategy level

Long-term vision in digitalization requires alignment with IFSP's Mission, Vision, and Pedagogical Goals:

- *Mission*: The strategy should prioritise inclusive, accessible, and innovative education, reflecting IFSP's commitment to equity and excellence;
- *Vision*: Integrate technology to prepare students for the demands of the 21st-century workforce while fostering critical thinking, creativity, and ethical responsibility;
- *Pedagogical Goals*: Emphasise student-centred learning, active engagement, and personalised education using digital tools and AI.

Key Goals for digitalisation include:

- *Equity and Accessibility*: Ensure that all IFSP students and staff have access to digital tools, devices, and training;
- *Innovation in Teaching and Learning*: Use AI to personalize learning, support adaptive assessments, and provide data-driven insights for educators;
- *Professional Development*: Equip teachers with the skills to integrate advanced technologies meaningfully into their pedagogy;
- *Ethical AI Use*: Develop policies to ensure transparency, fairness, and data privacy in AI applications;
- *Sustainability*: Implement environmentally sustainable practices in digital infrastructure.

Concrete Steps to improve digitalisation include:

- *Assessment*: Conduct a needs analysis of current infrastructure, tools, and skills; and map stakeholders' expectations and requirements;
- *AI Integration*: Identify AI tools to support personalised learning (e.g., adaptive learning systems, AI tutors); and develop guidelines for ethical AI use, emphasising transparency, data privacy, and bias mitigation;
- *Training and Support*: Implement ongoing professional development programs focusing on digital and AI tools; and create a support structure with help desks, online resources, as well as peer mentoring;
- *Infrastructure and Access*: Expand internet access, provide devices, and maintain up-to-date software and hardware; and ensure assistive technologies for students with disabilities;

- *Collaboration and Feedback*: Involve stakeholders (teachers, students, administrators) in strategy development through workshops and feedback loops; and, encourage student participation in tool selection and evaluation;
- *Monitoring and Evaluation*: Establish KPIs to measure the effectiveness of digital initiatives and conduct regular evaluations to refine the strategy based on emerging technologies and pedagogical trends.

Staying Current with Evolving Technologies:

- Create a Digital Innovation Task Force to monitor trends in technology and education.
- Partner with tech companies, academic institutions, and research organisations for knowledge exchange.
- Encourage participation in conferences, workshops, and training programs on emerging educational technologies.
- Promote a culture of experimentation and piloting tools and methods.

Involvement of Stakeholders in the Process:

Teachers

- Needs Assessment: Provide feedback on current digital tools and challenges through surveys or focus groups.
- Pilot Programs: Test new tools and provide feedback for improvement.
- Professional Development: Contribute to planning and feedback on PD sessions to align with teaching goals.
- Ongoing Feedback: Regularly assess digital tools' effectiveness and suggest refinements.

Students

- Surveys and Focus Groups: Offer feedback on digital tools and accessibility.
- Student Representatives: Serve in advisory groups for ongoing input.
- Pilot Testing: Participate in testing new tools and platforms.
- Digital Literacy: Help shape strategies for responsible technology use.

Administrators

- Strategic Oversight: Lead strategy development, ensuring alignment with educational goals.
- Policy Development: Develop policies on data privacy, security, and access to technology.
- Resource Allocation: Manage funding, resources, and infrastructure needs.
- Communication and Advocacy: Promote the strategy and garner support from the community.

Parents

- Surveys and Feedback: Provide input on children's digital learning experiences.
- Advisory Committees: Participate in discussions on equity, privacy, and well-being.
- Support for Learning at Home: Identify ways to enhance digital learning at home.
- Communication and Education: Promote digital literacy and stay informed on student tools and platforms.

IFSP Methods for Stakeholder Involvement include:

- *Collaborative Planning*: Engage stakeholders in meetings or workshops to develop or update the digital strategy, sharing best practices and aligning goals.
- *Regular Communication*: Provide updates and feedback channels (newsletters, emails, meetings) for transparency in decision-making.
- *Surveys and Feedback Loops*: Use surveys at various stages (needs assessment, mid-implementation, post-implementation) to gather stakeholder input.
- *Committees or Working Groups*: Form groups with representatives from each stakeholder to provide input on specific strategy aspects.
- *Pilot Programs*: Test new technologies or approaches with selected groups before school-wide implementation.
- *Training and Workshops*: Offer professional development for teachers and informational sessions for parents to support digital strategy adoption.

The digital strategy addresses equity, accessibility, and data privacy by focusing on:

- *Equity*: Ensuring all students have access to devices, internet, and high-speed infrastructure. The strategy includes providing tailored digital content through personalised learning tools and UDL principles, alongside professional development for teachers and parent workshops to support digital learning.
- *Accessibility*: The strategy aims to meet accessibility standards (WCAG) and support assistive technologies for students with disabilities. It emphasises inclusive content design, multimodal learning tools, and regular audits to identify and resolve accessibility barriers. Feedback

loops will be established to improve accessibility continuously.

- *Data Privacy*: The strategy ensures compliance with data privacy laws and clear policies on data use, encryption, and security. Parental consent is obtained for data collection, and the strategy limits third-party data sharing through contracts. It also focuses on educating students and parents on data privacy, though improvements are needed in digital citizenship education and resources for parents.

At IFSP, the following AI tools and platforms are considered for teaching and learning (the list does not exclude other tools or platforms)

- AI-Powered Tutoring Systems might include: Khan Academy with GPT Integration; Socratic, Carnegie Learning, MATHia, Squirrel AI, etc.
- Personalised Learning Platforms might include: Smart Sparrow, Knewton, ALEKS (Assessment and Learning in Knowledge Spaces), etc.
- AI-Driven Content Creation and Curriculum Design might include: Cram101, Quizlet, Edmentum, etc.
- AI-Enhanced Assessment Tools might include: Gradescope (by Turnitin), Formative, Tribal Group's e-Assessment, etc.
- AI-Powered Classroom Management might include: Classcraft, LanSchool (by Lenovo), etc.
- Speech Recognition and Natural Language Processing (NLP) Tools might include: Otter.ai, Google Speech-to-Text & Translate, Wordwall, etc.
- AI-Driven Learning Analytics might include: Cerego, Cognitivescale, etc.
- AI-Powered Virtual Assistants might include: IBM Watson Education, Microsoft's Virtual Learning Assistant (VLA), etc.
- AI-Enhanced Collaboration Tools might include: Miro, Slack, Trello, etc.

For IFSP to ensure responsible and ethical use of AI in education, a comprehensive approach is needed. This involves addressing issues of bias and fairness (which includes regular audits of AI algorithms, diverse data sets, and bias reduction training for educators), data privacy and security (ensuring adherence to legal standards, transparent data usage policies, data security measures, and data ownership and control), transparency and accountability (provide explainable AI (XAI) decision, continuous monitoring and feedback, ethical guidelines and governance), Teacher Empowerment and Professional Development (including professional development in AI literacy and ethics, critical use of AI, and collaborative decision-making), and last but not least inclusivity and accessibility (see to Inclusive AI Tools, Assistive Technologies Integration, Adaptive Learning).

By engaging stakeholders in the process and implementing robust governance structures, adopting explainable AI techniques, adhering to data protection laws, and providing continuous teacher training, IFSP can leverage AI technologies effectively while protecting students' rights and fostering a positive, equitable learning environment.

Competence development

Digital tools, learning environments, and digital pedagogical processes are transforming the educational landscape. To make the most of these resources, it's important to develop an integrated approach that

considers how technology can enhance teaching and learning. Here's how IFSP approaches the use and development of these elements:

- *Selection of Digital Tools*: Needs assessment; Tool integration; Scalability and Accessibility
- *Development of Digital Environments*: Blended Learning Spaces; Collaborative Spaces (Google Classroom, Microsoft Teams, Slack, etc.); Personalised Learning Environments.
- *Digital Pedagogical Processes*: Instructional Design for Digital Pedagogies; Data-Driven Teaching.

IFSP training programs focus on transformative use of digital tools:

- Blended Learning Models (station rotation, flex model, or lab rotation); Designing Engaging Digital Content (Edpuzzle, Nearpod, or Flipgrid); Student-Centered Learning
- Flipped Classroom Strategies (Screencast-O-Matic or Loom for video creation and platforms like Kahoot or Padlet for in-class engagement); Learning Management Systems (LMS)
- Project-Based Learning (PBL) with Digital Tools (Trello, for project management; Canva for design; and Google Workspace for collaboration); Assessment in PBL (Rubistar or Google Forms); Cross-Curricular Learning
- Advanced Pedagogical Skills; Transformative Pedagogy (critical thinking, creativity, and problem-solving); Scaffolded Learning

IFSP training programs focus on how to use these tools to support a wide variety of learning styles and needs: Universal Design for Learning (UDL) Principles, Adaptive Learning Technologies, Differentiated Instruction with Digital Tools, etc.

IFSP Open Educational Resources (OER) might allow teachers to collaborate, reduce costs, and provide high-quality, customisable resources to meet diverse student needs. IFSP can promote its creation and sharing by designing OER Creation Workshops, providing Tools for OER Creation, encouraging the use of OER Platforms, creating OER Networks, Provide recognition and incentives for OER Use, providing Supportive Policies, setting up internal OER repositories, etc.

In Brazil, the General Data Protection Law (Lei Geral de Proteção de Dados Pessoais, or LGPD) regulates the processing of personal data and is the primary framework for data protection in the country. This law applies to all sectors, including educational institutions. In addition to LGPD, educational institutions must also ensure compliance with other regulations that impact student data, such as data privacy standards for minors and any specific sectoral regulations.

Thus, IFSP has already implemented and complies with the LGPD, while safeguarding student data privacy by means of data protection policies, data handling procedures, data sharing and third-party contracts, data retention and deletion, security and technical measures,

training and awareness, the appointment of data protection officers.

Data protection and safety are crucial for safeguarding sensitive student information at IFSP, including personal, academic, and behavioural data. Compliance with legal frameworks and regulations, such as data minimisation and retention policies, is essential. The institution also implements technical measures, including encryption and access controls, along with regular security audits, to protect against unauthorised access and breaches.

Ethically, educators and staff must ensure informed consent, minimize data use, and apply anonymisation techniques. Training teachers and staff on data protection, legal requirements, and response procedures to data breaches is critical for creating a culture of data privacy and security at IFSP.

To use AI ethically in teaching and learning at IFSP, key principles should be followed, including fairness, privacy, transparency, and inclusivity. AI tools must be free from bias and protect student data, adhering to privacy regulations (e.g., LGPD, GDPR). AI systems should be transparent, with human oversight in decision-making, and inclusive for all students. Additionally, students should have control over their learning, and critical thinking about AI's ethical implications should be promoted. Continuous evaluation and ethical guidelines

should be established to ensure responsible AI integration in education.

Teachers and staff at IFSP will receive training to identify and address online safety risks, such as cyberbullying and misinformation, through a comprehensive approach. This includes understanding risks like cyberbullying, digital privacy, and misinformation; providing training on digital citizenship, ethics, and recognizing online threats; and offering practical resources like workshops, webinars, and case studies.

Educators will also be taught to integrate digital literacy into the curriculum and guide students on creating positive digital footprints. Preventative measures, such as secure platforms and clear reporting procedures, will be emphasized, along with ongoing support and professional development.

To support inclusion and accessibility of digital tools and environments, IFSP will implement a comprehensive approach focusing on ensuring all students can access and use educational technologies. This includes developing an inclusive digital strategy aligned with Brazilian regulations, choosing accessible tools compatible with assistive technologies, and ensuring course content is accessible by applying Universal Design for Learning (UDL) principles.

The institution will offer support services, provide faculty and staff training, and foster an inclusive digital culture. Additionally, regular

accessibility audits, continuous feedback, and collaboration with external organizations will help ensure ongoing improvement and alignment with national accessibility goals.

To ensure digital tools and environments are accessible to all students, especially those with disabilities, IFSP will adopt a comprehensive approach, incorporating Universal Design for Learning (UDL) principles, assistive technologies, and inclusive practices.

Key strategies include offering multiple means of engagement, representation, and expression in course content, selecting accessible platforms compatible with assistive technologies, and providing accessible course materials. Faculty and staff will receive training on creating accessible content, while personalised learning plans and support services will be provided for students with disabilities. IFSP will also collaborate with accessibility experts and ensure compliance with legal standards, conducting regular audits and continuous improvements.

Training programs at IFSP will support diverse learners and promote inclusivity by focusing on UDL principles, teaching faculty to create accessible digital content, and using assistive technologies. Faculty will be trained on flexible assessments, personalised learning, and inclusive pedagogical practices. Digital literacy and accessibility skills will be

built, while fostering collaborative learning through faculty communities and peer mentoring. The training will emphasize student-centred pedagogy, flexibility in learning pathways, and continuous professional development, with regular monitoring to ensure effectiveness. This approach will empower faculty to create inclusive and engaging digital environments for all students.

Institutional support structures and practices

Training at IFSP can be organized through workshops, webinars, and online courses led by experienced faculty, external experts, and IT staff. Trainers will include pedagogical specialists, instructional designers, and tech experts to ensure comprehensive training on digital tools and pedagogies.

Guidelines can be developed by the Digital Transformation Committee of IFSP, consisting of faculty, IT staff, and administrators. They will ensure resources align with institutional goals and continuously update them to reflect technological advancements and best practices in education.

By allocating a dedicated budget managed by a Digital Transformation Coordinator. This role will oversee professional development, ensuring sufficient resources for training, tool procurement, and support staff at IFSP. Key stakeholders include IT, human resources, and academic leaders for alignment and effective allocation.

It can be created at IFSP by learning communities and mentorship programs where faculty share experiences, strategies, and tools. These might encourage peer-to-peer collaboration and establish digital spaces (e.g., online forums) for continuous dialogue. Faculty leaders and educational technologists will facilitate knowledge-sharing sessions.

IFSP can promote pilot projects with new digital tools and pedagogy by offering incentives like grants, recognition, or dedicated time. It can also be provided a space for experimentation and reflection, encouraging faculty to test new approaches. IFSP innovation teams or research groups ought to support this initiative.

Evaluation of the digitalization at IFSP utilizes be structured channels for students, faculty, and staff to provide input on digital tools, training, and pedagogy. The evaluation measures include regular feedback collected via surveys, focus groups, suggestion boxes, and learning analytics to assess impact. Key metrics include student engagement, academic performance, and faculty satisfaction. The Digital Transformation Committee from IFSP analyses results and adjusts strategies based on feedback.

Development steps include creating IFSP training schedules, establishing guidelines, and allocating budget resources. Responsible parties are the Digital Transformation Committee, IT, and faculty leaders. These will be embedded in institutional structures through regular committee meetings, policy updates, and annual reviews to ensure integration with academic and administrative processes.

UNIVERSIDADE FEDERAL DO ABC
Guidelines for Teachers' Digital Competency Development

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When it was set up in 2006, the Federal University of ABC established a new scenario for proposing higher education courses, the characteristics of which were based on flexible and interdisciplinary curricula. The Interdisciplinary Entry Courses (CIIs) represented an alternative way of bringing Brazilian higher education closer to the models of higher education in the northern hemisphere, with degree-level training programs that lead to a diploma, with a focus on interdisciplinarity, dialogue between areas of knowledge and curricular flexibility. Curricular flexibility is presented to students as the freedom to choose and define their own academic path, guaranteed by the categorization of curricular units at UFABC (broken down as compulsory, limited option and free choice). In addition, access to curricular units at UFABC is not governed by traditional prerequisites, allowing students to exercise their autonomy when enrolling and to reorganize their paths in the event of unforeseen circumstances or changes in their educational profile. The choice of specific vocational

courses (CPEs) concurrently with the development of the CIIs is allowed by the high degree of sharing of curricular units between the courses, facilitating training reorientations when necessary.

Reflecting its academic interdisciplinarity, UFABC is not organized around classic disciplinary departments and chairs, but between three centers that bring together teaching researchers (all with doctoral degrees) to articulate between discovery, modelling and development. As a result, all UFABC courses value excellence by incorporating research and extension into their teaching practices.

Since 2008, UFABC has stood out for being a university that implements inclusion policies in its entrance selection processes that reduce structural inequalities by targeting the entry into higher education of minority groups in Brazilian society (students from public schools, students with low family incomes, students with disabilities, black, brown or indigenous students, refugee students, trans students). Permanence policies have been implemented, with the help of federal government programs, to ensure that students continue their studies. At UFABC they are implemented in the form of grants (permanence, housing, maternity, food, emergency), as well as subsidies for student meals at the university restaurant.

UFABC's internationalization has advanced since 2009 with the Science without Borders program, taking more than a thousand students to undergraduate and graduate programs at accredited universities around the world. In addition, curricular units are offered in other languages (mainly English), and courses in Portuguese for foreigners are offered to members of the community whose mother tongue is not Portuguese.

As a federal public institution, the Federal University of ABC (UFABC) stands out for its innovative organization, based on interdisciplinarity, excellence and social inclusion, which are the guiding principles of the institutional mission. An essential part of its operation is carried out by deliberative and administrative bodies that have specific and complementary functions. As far as digitization is concerned, four key bodies are responsible for implementing digitization strategies, namely: the Information and Communication Technology Strategic Committee (CETIC) and the Technical-Scientific Council (CTC), at the deliberative level, and the Information Technology Center (NTI) and the Technologies and Languages Educational Center (NETEL), at the administrative level.

CETIC plays a deliberative role and is responsible for establishing guidelines and regulations relating to Information and Communication Technology (ICT). Its main objective is to ensure that ICT policies and projects are aligned with the university's institutional mission and values, and it is an integral part of the IT governance system.

Also, at the deliberative level, CTC is linked to NETEL and aims to define action policies for the integration of new information and communication technologies, the convergence of face-to-face, hybrid and remote teaching modalities, as well as language policies for the development of actions related to language course provision.

The NTI, in turn, is the body responsible for implementing and managing UFABC's technological infrastructure. Its main objective is to guarantee the efficiency and continuity of information and communication technology services, as well as offering strategic, tactical and operational solutions to academic and administrative activities.

NETEL, on the other hand, is an executive body focused on implementing educational solutions that integrate digital technologies and language training. Its main objective is to promote the pedagogical use of technological tools, train teachers and students and expand access to quality educational resources.

UFABC recognizes the value of Information and Communication Technologies (ICTs) in higher education and is committed to accompanying and implementing digital solutions that promote innovation, inclusion and academic quality. The university adopts a critical and proactive approach, structuring itself to explore, experiment and implement digital initiatives compatible with the challenges of the 21st century and recognizes technology as an essential factor in modernizing processes and broadening the impact of academic activities.

Digitalization is present as an integral part of its institutional strategy, set out in its Institutional Development Plan (PDI), an institutional document approved by the University Council, which outlines the university's strategic guidelines for the next 10 years (between 2024 and 2033), especially in the context of teaching, research, extension, social inclusion and administrative management.

The initial diagnosis points to a reasonable level of digitization and technological infrastructure, with the use of integrated systems such as SIGAA (Integrated System for the Management of Academic Activities) to manage enrollment, academic and administrative activities, under the competence of the NTI.

In the educational context, there are investments in digital platforms such as Moodle, widely used as a Virtual Learning Environment (VLE), managed by NETEL. The university has also implemented video conferencing tools, such as the RNP (Brazilian Network for Education and Research) Web Conference, to offer remote and hybrid teaching.

However, there are still challenges that compromise the quality of teaching, such as:

- Academic management through fragmented processes, making it difficult to control enrollment, subject offerings, teaching allocations and, consequently, the teaching staff's workload;
- Administrative management, with regard to the integration of academic processes, which hinders workflows and increases bureaucratization and compromises efficiency.
- The lack of integration between communication platforms and tools hinders the dissemination of information, affecting transparency and institutional alignment;
- Technological infrastructure still needs to be expanded to meet the growing demands of face-to-face, hybrid and remote teaching, including laboratories, equipped classrooms and reliable internet access;
- Teacher and staff training: although the university has teachers and staff with a good range of digital skills and who are committed to exploring new digital tools for teaching and research, there is still a need to institutionalize a continuous training policy that is capable of effectively integrating the use of ICT into teaching practices to develop analytical and problem-solving skills, enabling students to research, collaborate

and create content, stimulating critical thinking and autonomy, promoting their creativity by linking the digital with real-world contexts;

- Digital Inclusion: ensuring that all students have equal access to quality devices and connectivity is a central challenge for the democratization of education.
- Evaluation and Monitoring: the implementation of evaluation methods that take into account the specificity of face-to-face, hybrid and remote modalities is still limited and needs further development and institutional alignment, as does data management to generate information for institutional decision-making.
- Evaluate the adoption of cloud technologies and environmental responsibility, based on regulations for their safe use and the definition of guidelines by planning and digital governance bodies, in order to meet the growing need for secure data processing and storage, while prioritizing energy-efficient technological solutions to minimize their ecological impact.

The strategies adopted in the face of the challenges and opportunities of digitalization have an emphasis on:

1. *Equity and Access*: implementation of inclusive digital infrastructure, including Virtual Learning Environments (VLE) and technical support for students and teachers. The university also plans to expand the offer of curricular components in the distance learning modality, prioritizing quality and inclusion, with the premise of promoting digital inclusion and accessibility, considering the principles of universal design. The focus is on improving and adapting technologies and systems to ensure accessibility for all members of the university community;

2. *Pedagogy and Innovation*: encouraging the use of active methodologies, such as project-based teaching, to promote student protagonism and interdisciplinarity. The focus is on exploring advanced e-learning and augmented virtual reality resources to enrich the teaching experience, promoting greater engagement and interaction between students and teachers. In addition, the recent increase in the use of AI and its ethical limits must be debated within the academic community and requires monitoring by the institution's management in the coming years;

3. *Extension and Academic Mobility*: digitization will be used to broaden the scope of academic activities and facilitate inter-institutional and international collaborations. This includes the use of extension curricular components and hybrid learning environments, the promotion of scientific dissemination, the development of an institutional communication policy and advances in audiovisual production. The aim is also to build a solid culture of scientific dissemination, involving specialized journalism, popularization of science and proactive relations with the press.

In its strategic planning, the institution points to the precariousness of teaching work and excessive standardization as possible risks of the digitization process, which can be mitigated by drawing up clear guidelines on the use of ICTs, as well as on evaluation processes.

The institution plans to evaluate the digitalization strategy by means of:

- *Engagement Indicators*: use and impact of ICTs in teaching and administrative practices;
- *Efficiency and Quality*: monitoring results through self-assessment processes and the Institutional Observatory, which monitors the practices and innovations implemented;
- *Community feedback*: holding public consultations and integrating contributions from the academic community.
- *Assessment instruments* that aim to qualify the process and not just quantify certain learning outcomes;
- Digitalization is aligned with the principles of the Institutional Pedagogical Project (PPI), promoting:

  - *Interdisciplinarity*: integration between areas of knowledge using digital tools.
  - *Social Inclusion*: use of ICTs to democratize access and broaden the participation of historically marginalized groups.
  - *Academic Excellence*: implementation of innovative pedagogical practices that strengthen teaching and research.

- The production of new teaching materials, spaces and resources, consistent with the four-month system;
- The development of innovative teaching practices based on the development of curricula for the courses that include the sharing of thematic content at the interface between different areas of knowledge and bringing research and the classroom closer together.
- With regard to innovative practices, UFABC intends to promote:

- Active Teaching: use of problem-and project-based methodologies, supported by ICTs, to develop critical thinking and creativity.
- Continuous Teacher Training: ICT training programs for teachers, strengthening digital pedagogical skills.
- Teaching-Extension Integration: offering extension curricular components with the support of digital technologies to increase the social impact of academic activities.

Although the issue of technology in teaching is included in the institutional development plan, UFABC is at an early stage in the development of its teachers' digital competences and, for this reason, does not yet have a clear mapping of the digital competences considered essential for the institution's teachers. Currently, these competences are assessed autonomously, with the teacher carrying out their own self-assessment based on their knowledge and reflection on their practices. At the end of each four-month period, the institution invites both teachers and students to evaluate their performance in class. The form contains questions about teaching resources in general, but is not specific to digital competences. The results of the evaluations are consolidated and sent to the course coordinators, who may or may not share them with the teachers. Although this process provides feedback on teaching performance, it is not currently used to map teachers' digital competencies.

Although UFABC recognizes the importance of teaching with technologies in its Institutional Development Plan (IDP), concrete actions in this area are still limited. The New Technologies and Methodologies for Education (NTME) course, started in 2017 by the Educational Center for Technologies and Languages (NETEL), aimed to promote the use of innovative technologies and methodologies, especially for teachers interested in distance learning. Initially semi-presential, the NTME underwent continuous reformulations based on participant evaluations, becoming an extension course that included professionals from all levels of education, including Early Childhood Education. The researchers were responsible for coordinating several editions, contributing to the planning of new training activities.

From the NTME reformulations came the Virtual Course Planning (PCV) course, launched in 2019 with a focus on developing skills for planning and creating virtual courses. In 2020, PCV was adapted to support UFABC teachers in the transition to remote teaching, a direct demand from the rectory in response to the Covid-19 pandemic. In 2021, the course was expanded to teachers from other institutions in the region. More than 400 teachers took part in the PCV and, over the last few years, UFABC has promoted initiatives such as awareness-raising talks, workshops and short courses, with the aim of supporting the development of digital and pedagogical skills for both its teachers and teachers from other institutions.

In 2022 and 2023, the PCV course underwent a new reformulation and was offered in a modular way, in the format of more practical workshops, still counting on the mediation of tutors. In 2024, UFABC, through NETEL, began offering the MOOC "Teaching with Technologies in Practice", with the aim of promoting continuing training in digital technologies for virtual, face-to-face and hybrid courses. The course, structured in four modules and with a workload ranging from 15h to 60h, was attended by 96 participants, including UFABC teachers and UAB teachers. In addition, that same year, NETEL started an informal space for dialogue and sharing experiences, proposing a collaboration with the academic community to debate the integration of digital technologies in higher education and the demands of digital transformation. Called NETEL Conecta, from August to December there were 4 monthly face-to-face meetings involving 15 UFABC professors who took part, sharing their experiences and learning and reflecting on the possibilities of continuing teacher training.

Through the involvement of NETEL management, UFABC also participated in ReDaES (Research Network on Teaching in Higher Education), which brings together public institutions in São Paulo to promote innovative and socially referenced practices in teacher and pedagogical training for higher education. In 2024, some managers and professors from UFABC participated in the ReDaES International Conferences, which discussed topics such as challenges in teacher

training, artificial intelligence, digital skills, and educational technologies.

Initiatives at UFABC are still in their early stages, and there is no formal mapping of teachers' needs for the development of digital skills. The PCV initiative, launched in 2020 by the rector's office, addressed pedagogical and technological issues in the context of virtual courses, reaching approximately 47% of the university's faculty. A survey of 214 professors (25% of the total) indicated that the majority evaluated the course positively, highlighting the activity map as a valuable tool for planning online courses. Participants reported significant impacts on their pedagogical practices, both in face-to-face and in hybrid and online teaching. However, concerns arose about the use of the Moodle VLE and digital tools in teaching and learning. Despite the lack of formal regulation on hybrid teaching at UFABC, professors demonstrated interest in new training to modernize their practices. Another important challenge is the infrastructure for the use of virtual tools and spaces. Between 2019 and 2020, the university migrated to Moodle, improving the management of courses and digital resources. However, access to basic tools, such as software packages and cloud spaces, still depends on the individual effort of professors and students, since the spaces made available are insufficient to meet the needs of professors and the portfolio work of students. additional for the development of digital and pedagogical skills.

Currently, at UFABC, the types of support offered include:

- *Help desk*: support related to technological issues such as e-mail, Moodle virtual learning environment (AVA), RNP and other technological infrastructures.
- *Videos and manuals/tutorials*: guidance materials on the use and resources of the Moodle virtual learning environment and other digital tools, such as software for recording video classes and web conferencing (RNP).
- *Initiatives such as NETEL Conecta and the MOOC* on digital technologies address topics to raise awareness among the teaching community and develop digital skills.

These small initiatives have begun to encourage teachers to use digital resources. However, innovation in teaching and the use of technologies are still not widely recognized, encouraged or rewarded. The understanding that a change is needed in the culture of higher education teachers at UFABC, all of whom have PhDs in various areas of knowledge, regarding the need for continuing education is a debate that has been conducted in specific NETEL actions. However, to raise awareness among teachers, the possibility of including a score in the progression of a teaching career when participating in courses and training activities is on the agenda.

Although there is no mapping or concrete data on the pedagogical appropriation of digital tools by UFABC professors, there are some known individual initiatives that align with more student-centered approaches, such as the use of e-portfolios, gamified strategies with the support of software such as Kahoot and Quizizz, and others that indicate a more teacher-centered use, such as the recording and making available of video classes on the professor's personal YouTube channel.

Regarding digital platforms, specifically Virtual Learning Environments (VLE), Moodle is the official VLE used at UFABC to support the offering of in-person courses. However, it is not possible to say that professors use the available tools comfortably. Most professors use the environment to make content available and receive assignments completed by students. Another official platform used is SIGAA, an academic management system that aims to be a space for managing courses and their respective classes.

Currently, it is possible to record student attendance and grades in this system. However, the tools for interaction, organization and provision of materials and monitoring of assignments are not so popular among teachers, causing discomfort due to not being integrated with the Moodle VLE. For synchronous meetings, the Web Conference platform (RNP) is used institutionally, in the same way as Meeting, Zoom, Teams and other platforms for online communication and interaction such as DISCORD.

Institutionally, the Center for Educational Technologies and Languages (NETEL) is the body responsible for planning, executing and evaluating the continuing education of teachers. There was a methodological evolution in the development of the courses, which went from instructional design (ADDIE Methodology) to the TPACK model, in an attempt to articulate technological and pedagogical knowledge of the content. However, there is no academic culture of continuing education and few teachers adhere to the training offers. In this sense, support for the majority, who do not take the courses, is provided through tutorials on the use of digital tools available on the NETEL website.

UFABC courses are taught entirely in person, and priority is given to lectures supported by slide projections. The use of digital tools in the teaching-learning process in the various disciplines offered depends on the professor's proposal, but also on the needs of the student, who independently selects the tools that best suit their specific demands. The institution guarantees computer labs for the exclusive use of students, and others for practical classes, which can be reserved for specific activities and provide everyone with equal access to the resources. Students who have their own resources (laptops, tablets and smartphones) have been using them daily for their academic activities and resorting to applications and other digital tools, such as generative

AI. Likewise, accessibility tools such as assistive technologies are made available on demand, which is still insufficient to meet everyone's needs. In this sense, digital learning opportunities still need to be widely discussed by the UFABC academic community.

Proposals for UFABC

A broad discussion must be encouraged in the academic community that can foster proposals regarding the ethical uses of AIs not only in student learning, but also in academic production, in the development of administrative processes, in merit assessments, in selection processes, in the development of skills and in the selection of managers for positions of trust. Such proposals can be triggered by workshops, seminars, intra and intersectoral discussions, but all of them involve the development of digital skills for the use of AIs in the various functions performed by the university. In the long term, establish a culture of permanent review of the use of technologies in work, academic and professional activities, with a view to maintaining the innovative and excellent character of the university in its areas of teaching, research, extension and management.

Regarding training aspects, experts can be invited by the university management to, within their work activities (i.e., without the burden of increasing work demand), develop pedagogical strategies to train the

community with the necessary tools to understand and use AIs in their functions. Such strategies can involve manuals, courses, meetings and dissemination so that the community is made aware and can collaborate with new elements for the review of their routine activities. It is important to note that such training must be carried out within the scope of the work activities of those involved. Internal research groups can be brought together by sectors that are already dedicated to implementing technologies in the university's core activities (such as CETIC, NETEL, UAB, NTI, among others) to develop and guide the synchronous and asynchronous training of the community.

It is suggested that such meetings (seminars, workshops, discussions) can formalize resolutions and regulations that regulate the processes and productions of the community that involve the university's core activities. To this end, committees and councils should be mobilized so that discussions can be democratic and representative of the community's demands. Such documents will guide the production of a new Institutional Development Plan that articulates the ongoing training of the academic community and the variation in technological/ digital development and its consequences on the performance of work tasks with other focal aspects of the institutional mission and pillars of institutional development (such as excellence, inclusion, interdisciplinarity, internationalization). It is also essential that committees and sectors linked to process and institutional evaluation

(such as the CPA) can implement indicators that identify the variation in institutional and personal learning, such as changes in work cultures and improvements in community well-being.

Considering the democratic participation of the community, representative bodies linked to the university (such as student organizations, extension action centers, research groups, class councils) can be invited to collaborate with elements for professional and digital training and for the review of procedures and production (such as research reports, field notebooks, master's dissertations, doctoral theses, educational and cultural products, among others) carried out at the university. The guarantee of community participation does not consolidate the inclusion of their points of view and demands to those specific to minority populations; thus, thematic working groups can be formed to identify such specificities and address them transversally in the development of proposals.

Based on the mapping of the digital tools available at the university, its investment capacity and the level of digital competence of the community members, the necessary platforms for the development of learning situations and work procedures can be proposed and reviewed. It is suggested that the university commit to ensuring that the time from the mapping phase to the implementation phase of these tools does not exceed one year. Also, one of the criteria for investment is the

malleability of the tools and the internal training for their adaptation, with a view to the sustainability of the investments.

Ethical discussions should permeate the entire training, review and regulatory process, so that external committees can access the parameters created and the results achieved and indicate, periodically (a period of 2 years is suggested between each evaluation process), new institutional and personal indicators that allow for ongoing development. At UFABC, the use of digital tools can be integrated into pedagogical processes, with a focus on promoting active and innovative methodologies. To this end, training programs that go beyond the basic use of tools can be developed and implemented, with the aim of training teachers in a deep understanding of digital pedagogies. These training programs could include not only mastery of educational platforms and technologies, but also advanced pedagogical strategies, such as blended learning, flipped classroom and project-based learning. The idea is to train teachers to integrate technologies in a creative and effective way, promoting interaction between students and the use of digital resources to enrich the learning experience. Workshops and webinars focused on how to apply these methodologies in the digital context can be offered, as well as collaborative study groups where professors can share experiences. This will allow for the creation of more flexible, personalized, and collaborative learning environments.

To make this happen at UFABC, it is important that the issue of continuing education is no longer part of the PDI and becomes part of an action plan, in which the rectorate needs to support this objective, for example: by strengthening and inviting professors to work at NETEL, Prograd, or in the working group that will be responsible for these actions. Recognizing the people involved in mapping UFABC's needs, generating content, planning, executing actions, and measuring the impacts of these actions. In practice, this would involve converting teaching loads into administrative positions, in addition to allocating funding to them, for example, which could include scholarships for postgraduate students, IC, or administrative and/or educational technicians to work, support, and facilitate these actions. These actions cannot be one-off but rather create a sector or strengthen an existing one so that these actions can happen and be sustained in the long term.

Training programs at UFABC may address the use of digital tools to meet different learning styles and needs. Differentiated training may be provided so that teachers can use digital resources in an inclusive manner, such as adaptive learning platforms, multimodal content (videos, texts, audios) and collaboration tools. The goal will be for teachers to be able to personalize learning for students with different paces and preferences, using technologies that favor interaction, flexibility and accessibility, promoting a more inclusive and effective learning environment, always aiming at the protagonism and autonomy of teachers.

In UFABC training programs, some simple and effective practices may be implemented to meet different learning styles. Online forums and discussions will be used to promote interaction, allowing students to express themselves in different ways. Short videos and audios/podcasts may be created to explain concepts in an accessible way, meeting different learning styles. Interactive tools such as Google Forms or Kahoot! can be used to create quizzes and provide instant feedback to students, in addition to online bulletin boards, mind mapping tools, and emerging technologies. Flipped classrooms can also be used, with videos and read-aheads, allowing class time to be used for hands-on discussions. In addition, accessibility features such as automatic captions and screen readers will ensure that students with hearing or visual impairments can access content efficiently. These strategies will create a more inclusive and dynamic learning environment.

UFABC can promote the creation and sharing of Open Educational Resources (OER) among professors through collaborative digital platforms, such as internal repositories or the use of Google Drive and Moodle, where professors can share presentations, teaching materials, videos, and articles. The university will encourage the creation of open content such as lecture slides, teaching plans, and assessment questions to facilitate the exchange of resources. Workshops will be offered on how to create and adapt OER, in addition to promoting collaboration

between academic centers to develop interdisciplinary materials. The institution may also establish awards and incentives to recognize teachers who contribute most to the sharing of OER. In addition, the use of Creative Commons licenses will be encouraged to ensure free and appropriate use of resources. An event to share teaching experiences and materials and strategies may be held once a year.

UFABC adopts practices aligned with the General Data Protection Law (LGPD - Law No. 13,709/2018), ensuring the security and privacy of personal data of students, staff, and third parties. In practice, the university has implemented internal policies and standards to guide the responsible use of information in academic and administrative activities.

UFABC can ensure the privacy of student data by implementing security protocols to protect sensitive information. It can create handbooks for students, staff, and professors regarding data security. In this way, it can ensure that all data collected, whether academic or personal, is treated confidentially and stored securely. In addition, the use of this data may be restricted to academic purposes, and any sharing will be done with the explicit consent of students. In addition, it can offer ongoing training, for example through MOOCs, discussion groups, and forums to raise awareness among the academic community about the importance of data protection and privacy.

UFABC may adopt a simple plan to promote digital security in the academic community.

- *Initial Awareness*: lectures on digital risks (cyberbullying, misinformation, data security) and a basic guide with tips on online security could be held. A diagnostic questionnaire will help to map the community's level of knowledge.
- *Simplified Training*: Short workshops on identifying cyberbullying, verifying online information, and basic notions of digital security (phishing, passwords) could be offered. Short videos will explain key concepts or the use of instructive MOOCs.
- *Response Protocols*: a simple flow of action could be developed for cases of cyberbullying and misinformation, with a focal point for questions.
- *Ongoing Communication*: monthly newsletters could be sent and semiannual awareness campaigns on digital ethics could be held.
- *Resources*: Spaces with internet, a small team (2-3 people), and simple materials (presentations, guides) will be used.

To create this structure again, it is important that the people involved in these actions, both in the construction of documents, elaboration of actions, execution and evaluation, need to be recognized and rewarded, as well as the staff and students who participate in the actions, acquiring knowledge and innovating in their roles. This can guarantee long-term sustainability from the point of view of data security.

The institution will ensure, through the execution of actions based on the 2024-2033 Institutional Development Plan, that UFABC must have as a premise the promotion of digital inclusion and accessibility, considering the principles of universal design. This commitment will be reflected in the implementation, improvement and adaptation of technologies and systems to guarantee accessibility for all members of the university community. The execution of inclusion and accessibility actions is the responsibility of the Pro-Rectory of Community Affairs and Affirmative Policies - PROAP[3] and is carried out through specific notices for the area.

PROAP already promotes some types of training in the area of accessibility and inclusion[4], however, it is still quite incipient and more focused on the training of its monitors; Training in this area should be planned by PROAP based on a diagnosis of the area and carried out by multidisciplinary professionals who make up the UFABC community; it is worth highlighting here the possibility of collaboration in the Universal Design discipline, which is common to Engineering and which would contribute to discussions with students on this important topic, so that such training brings together the perspectives of all stakeholders in the community.

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[3] Information at https://proap.ufabc.edu.br/acessibilidade-ufabc

[4] Information at https://proap.ufabc.edu.br/acessibilidade-ufabc/cursos-palestras-e-eventos

Seeking the necessary conditions for the adoption of cutting-edge and innovative technologies to improve both teaching and learning and the administration of UFABC is also a guideline proposed in the 2024-2033 Institutional Development Plan. This includes the exploration of advanced e-learning resources, virtual and augmented reality to enrich the teaching experience, promoting greater engagement and interaction between students and professors. In addition, the ICT area has strived to identify and apply innovative technological solutions for the university's administration, aiming at the automation of processes, the optimization of workflows and the provision of relevant information more efficiently. The recent increase in the use of AI and its limits should be a topic of debate in the academic community and requires monitoring by the institution's management in the coming years.

The UFABC Code of Ethics, a 2016 document, contains an item on "INFORMATION TECHNOLOGY RESOURCES", however, given the period of its creation, there is nothing specific about the ethical considerations related to AI in education[5].

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[5] https://www.ufabc.edu.br/images/stories/comunicacao/Boletim/consuni_ato_decisorio_157_anexo.pdf

Furthermore, UFABC has three ethics committees: the Research Ethics Committee (CEP), the Animal Use Ethics Committee (CEUA), and the UFABC Ethics Committee (CE)[6]; it is worth highlighting the CE, which seeks to help raise awareness of ethical conduct within the University, acting preventively in a pedagogical and educational manner, as well as responding to queries or complaints addressed to it, individually or collectively, seeking to provide support for a better understanding of the subject matter consulted or to censure conduct considered inappropriate at the end of formalized processes.

The CE is part of the UFABC Control and Monitoring Bodies Forum. Given the scenario presented, it would be highly recommended to review the UFABC Code of Ethics to include such ethical considerations, as well as educational actions by the CE based on the revised document with the Institution's community.

Staff training can be carried out by community experts (teachers, administrative staff, students, outsourced staff and members of civil society) who guide the planning of training (identifying the status quo, establishing indicators, evaluating and proposing revisions), the training process and developing work reorientations. These trainers will be involved in these activities as part of their workday already established at the university, without increasing their workload - that is,

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[6] https://www.ufabc.edu.br/administracao/comissoes/comissao-de-etica#

with a reorientation of their ordinary activities so that they can dedicate themselves to this process. The guidelines should be developed by the users themselves, as part of their training process. In this way, it is ensured that people are imbued with their own training and evaluation development.

These guidelines should be evaluated and reoriented by the working groups responsible for staff training, based on dialogic meetings that respect tacit knowledge and individual development rhythms. It is suggested that the development of training activities, participation in training and the institutional development of guidelines and resources be viewed by management as part of an institutional training project lasting one year, with a reorientation of the workload to ensure the effective participation of the community in the process of institutional transformation. In addition to the dialogic process in the development of indicators of pedagogical, administrative, cultural and digital development, the production of a permanent culture of review is essential to monitor the continuous development of the institution and to reflect the technological development in which the university is inserted.

Therefore, it is suggested that the university implement a culture of continuous, formative and participatory evaluation that is linked to the processes of functional progression and acquisition of credits (in the

case of students). It is essential to emphasize that such indicators must be selected at the beginning of the process by the evaluated subject and that the parameters to be achieved are clear and objective so that, at the end of the process, their results can be presented and discussed with the subjects directly affected by their role in the university, for reorientation in a next cycle of development guidelines.

Considering a one-year cycle for the development of skills and guidelines, and two 2-year cycles for ongoing assessment of those involved in order to review and reorient the guidelines, it is suggested that the process of training and production of guidelines be reassessed, with a view to functioning as a process for producing elements to guide the production of new university policies in the Institutional Development Plan. Thus, 1 year of training and design of guidelines, 2 cycles of 2 years of implementation; followed by another 1-year stage of training and design of guidelines, 2 cycles of 2 years of implementation. Management should be committed to collecting elements to take, after the two 5-year cycles, data for reviewing institutional policies. This ensures the implementation of a permanent assessment practice that produces information that will guide the planning of university policies for the next cycle.

It is suggested that the guidelines produced as part of the training process include assessment indicators for the next 2-year cycles. Each subject being assessed will choose which indicators will be under their scope of development for a 2-year cycle, producing the results needed for assessment, discussion and reorientation for action on new indicators in the next cycle. A culture of valuing the subject being assessed is essential for participation in the process to be representative and to avoid persecution: thus, every assessment cycle will always involve members of the direct agents of the subject being assessed action at the university. The indicators chosen for each cycle will be assessed by the subjects of the institutional action of the subject being assessed through digital forms, which will be open to voluntary expression. While the results of the indicators are made available by all those involved in the assessment (so that they are also included in their own assessment), the expressions will be confidential and made available only to the subject being assessed, so that they can be considered in their own personal and not institutional assessment.

As a possibility for implementing the proposals, a simplified schedule can be summarized as follows:

Step	Action	Date	Responsible
Training	Planning of pedagogical strategies	1st quarter	Experts
	Development of pedagogical material	1st quarter	Experts
	Educational Tutoring	2nd and 3rd quarter	Experts
	Courses	2nd and 3rd quarter	Academic Community
	Development of guidelines and creation of indicators	2nd quarter	Academic Community Experts
	Production of normatives	3rd quarter	Academic Community
1st evaluation cycle	Choice of indicators	4th quarter	Subject evaluated
	Training for indicators	4º quarter	Subject evaluated
	Data production - Evaluation questionnaires	5th to 8th quarter	Academic Community
	Presentation of Results	9th quarter	Subject evaluated Subjects affected by the assessed person's actions
	Revision of indicators	9th quarter	Subject evaluated

Step	Action	Date	Responsible
2nd evaluation cycle	Choice of indicators	10th quarter	Subject evaluated
	Training for indicators	10th quarter	Subject evaluated
	Data production - Evaluation questionnaires	11th to 14th quarter	Academic Community
	Presentation of Results	15th quarter	Subject evaluated Subjects affected by the assessed person's actions
	Revision of indicators	15th quarter	Subject evaluated
	Development of new guidelines	15th quarter	Subject evaluated Experts

It is worth noting that during the evaluation cycles, the specialists become the subjects being evaluated but maintain their roles within the process as consultants. External agents should also be consulted to audit the process and the university management would be responsible for implementing the resources needed to execute the guidelines outlined.

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4.4

UNIVERSIDAD TECNOLÓGICA DE PEREIRA
Guidelines for Teachers' Digital Competency Development

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The Technological University of Pereira is a public university, subject to inspection and surveillance by Law 1740 of 2014 and Law 30 of 1992 of the Ministry of Education of Colombia. It began operations in 1961. Currently (2024-2), it has approximately 17,200 students enrolled in undergraduate and graduate levels, pursuing their studies in daytime, evening, and special schedule hours.

The Technological University of Pereira holds High-Quality Accreditation according to Resolution No. 2550 of June 30, 2005, through which this distinction is granted to the first University in the region to be recognized for its excellence; which makes it one of the 10 best universities in the country, one of the 100 best in Latin America.

DESCRIPTION OF THE CURRENT SITUATION

Strategy level

The Universidad Tecnológica de Pereira (UTP) has strategically included digitalization in its educational strategy in the institutional development plan (PDI) and in the Institutional Educational Projects (PEI). This integration is manifested in the development of interactive spaces and environments where digital information and communication technologies (ICT) are implemented that allow teachers and students to improve their teaching-learning process. The strategy aims to facilitate access to education, promoting equity through more flexible academic programs adapted to the needs of students, including virtual education.

The digitalization strategy is closely aligned with the UTP philosophy, which promotes interactive, dialogic and critical pedagogies. Thus, it seeks not only the incorporation of technological tools, but also a transformation in the educational culture that fosters autonomy and critical thinking in students. UTP promotes innovative practices by developing an ICT ecosystem that allows teachers to experiment and adopt new methodologies, facilitating an active and collaborative learning environment. It provides teachers with a robust data network, with backup plans, specialized rooms for computer use with a good offer of general and specific software according to academic programs.

The success of the digitalization strategy is measured through ICT appropriation diagnoses, carried out from the LMS platform, both in students and teachers, which allows identifying areas for improvement and establishing concrete action plans to increase the effectiveness of technologies in the classroom.

Competence Management

The digital competencies of teachers at UTP are of great relevance. Currently, essential competencies are identified and mapped as standards for teachers and students. The framework of the *"ICT Competencies for Teacher Professional Development*" of the Ministry of National Education of Colombia also allows us to provide teachers and students with new perspectives on the use of ICT. These include, for example, the ability to integrate emerging technologies into the educational process and encourage critical thinking and collaboration among students.

At Universidad Tecnológica de Pereira, the academic freedom that teachers have allows for the implementation of methodologies that reflect this autonomy. It is essential that educators deploy their knowledge and experience without imposed restrictions, favoring a more dynamic and enriching educational environment.

Within this framework, it is essential to consider Digital Competencies, in line with the "ICT Competencies for Teacher Professional Development" of the Ministry of Education of Colombia. Information and Communication Technologies (ICT) must be effectively integrated into educational environments, since their true value lies in the use that is given to them in the teaching and learning processes. At UTP, there are various training programmes and support resources for those who need to improve their digital skills. Workshops and courses are provided. There are no formal communities of practice.

Competence development

UTP has training programs designed to meet the diverse needs and different levels of competence of teachers. These programs are flexible and are structured by the Educational and Information Resources Center and by Univirtual, evaluating their effectiveness through satisfaction surveys and evaluations regarding the objectives of the training processes. The UTP Educational and Information Resources Center (CRIE office) leads teacher training in ICT, through a program to "strengthen digital competences for teachers and students". This process is an important indicator in the Institutional Development Plan. The program is related to the use of technology in the classroom.

The latter have been specially conditioned with specialized hardware and software, which allow teachers to use ICT in their academic activities. The training in question aims to strengthen specific digital techno-pedagogical skills for the use of these rooms.

Given the flexibility of the methodologies and pedagogies implemented by teachers, it is they themselves who evaluate the effectiveness of their training in their educational processes. As they identify deficiencies, they are free to select new training processes offered to them. The evaluation of training programs is not limited to purposeful questions only; it is also carried out through the planning of the techno-pedagogical model in the classroom, with the aim of verifying whether the new skills are being applied effectively.

Resources for teachers such as online platforms, discussion forums and help desks are available at UTP. Teachers are encouraged to experiment with new digital tools and innovate in their teaching practice. Through the academic vice-chancellor's office, Adamic training processes are offered by the Educational Resources Center. Currently there is no incentive plan for the academic community that encourages educational innovation using ICT.

Pedagogy and digital tools

Teachers, based on their ICT skills and academic freedom, use digital tools in a multifunctional way. For example, learning platforms such as Moodle and Google Classroom are used to foster collaboration and teamwork, allowing students to actively engage in their learning process. The most commonly used tools by teachers include LMS (Learning Management Systems) platforms, video conferencing software such as Zoom, and collaborative applications such as Google Drive. These tools are used comfortably and regularly in teaching. For example, the use of LMS platforms allows teachers to create a course, generally with the same name as the subject they teach in person. There they share content, assessments, and in general academic material, as reinforcement for face-to-face activities and those of the academic program and semester. On the other hand, some subjects from face-to-face programs are offered by the university in virtual mode, offering students alternatives for the strategic use of time. The subjects offered are few in relation to the more than 100 academic programs we currently offer.

The Technological University of Pereira highlights the need to implement models that respond to current educational challenges, prioritizing interactivity, dialogue, and critical thinking. These models seek to build knowledge collectively through discussion between

students and teachers, focusing on meaningful relationships in the educational context. Key aspects of these pedagogies include:

- deliberate teaching to develop critical skills and autonomy;
- reflective learning that connects new knowledge with past experiences;
- continuous assessment that facilitates progress and knowledge transfer;
- the use of information and communication technologies (ICT) to enrich the educational process and prepare students for the challenges of the 21st century.

There is no formal institutional model, and there is no measurement of how many models and which ones are used by teachers in the classroom.

The process of selecting and using digital tools involves students, aligning with the needs of the learning units and the established objectives. The institution is committed to ensuring that all students have equal access to technology, offering a campus with extensive connectivity and exclusive rooms for the use of digital tools and necessary equipment.

Developing digital skills

To build or update the institutional digital strategy, projects related to strengthening digital skills in teachers and students were prioritized in the institutional development plan. UTP established clear objectives and concrete steps, ensuring alignment with its educational mission and vision, while staying up to date with technological advances.

FUNDACIÓN UNIVERSITARIA DEL ÁREA ANDINA
Guidelines for Teachers' Digital Competency Development

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The Fundación Universitaria del Área Andina with more than 40 years of experience in Higher Education, our institution is proud to be accredited with High Quality and to be a Multicampus entity by CNA (Consejo Nacional de Acreditación de Colombia) and EQAA (European Quality Assurance Agency). We already have more than 130,000 graduates, and currently we have more than 40,000 active students in our different modalities, present in more than 85% of the national territory and beyond.

As a Multicampus institution, we have three main locations in Bogotá, Pereira and Valledupar, and we reach all corners of the country with more than 42 University Service Centers. We have a total of 74 undergraduate programs and 27 postgraduate programs, offering a wide range of educational opportunities for our students.

DESCRIPTION OF THE CURRENT SITUATION

Strategy level

Digitalization is a fundamental pillar of Areandina's institutional strategy. It is integrated transversally in all areas, from administrative management to teaching-learning processes and social projection. Robust virtual platforms, Digital educational resources, Connectivity and access, Teacher training in ICT, Basic Learning analytics and Digital academic management.

The aim of the institution's digital strategy is to democratize access to higher education by offering virtual and distance learning programs that eliminate geographic and time barriers. Scholarships and support programs are implemented for low-income students. (Example: Scholarships for students from rural areas studying virtual programs). The use of active and student-centered methodologies is promoted, such as project-based learning, collaborative learning, and flipped

classroom learning, with the support of ICTs. (Example: Use of discussion forums and online collaboration tools for the development of group projects). The quality of virtual education is ensured through rigorous instructional design of courses, the training of qualified virtual tutors, and the continuous evaluation of programs. Also, some kind of accessible content and activities are designed for students with disabilities, following the principles of Universal Design for Learning (UDL).

The digitalization strategy is aligned with Areandina's mission to train comprehensive, competent professionals committed to social development by offering quality, accessible and innovative education. It seeks to promote autonomous learning, critical thinking, creativity and collaboration, which are the institution's core values. (Example: If the institution promotes problem-based learning, digitalization focuses on providing tools and resources for project development and problem-solving in virtual environments. The digitalization strategy facilitates experimentation with new methodologies and pedagogical approaches, such as: Adaptive learning, Gamification, Virtual and augmented reality, Learning analytics, among others.

Quantitative and qualitative indicators are used to measure and evaluate the digitalization strategy, such as: Student retention and graduation rate in virtual programs. Level of satisfaction of students and teachers

with digital platforms and resources. Student learning outcomes in assessments and projects. Number of teachers who use ICT in innovative ways in their classes. Impact of digitalization on the efficiency of administrative processes. External evaluations and accreditations of virtual programs.

Competence management

Teachers in Areandina are trained in digital competencies, for example, there is ongoing training (SEPA courses Areandina Seal of Professional Experience) that allow teachers to be constantly updated, every semester teacher must take some courses, which address issues of digital skills, soft skills and institutional skills, among others. Teachers are also trained in the use of LMS platforms (Moodle and Canvas) as well as applications and software specialized in educational informatics, tools for information processing, simulators, evaluators, among others.

In Areandina, research has been conducted on the competency levels of our teachers, surveys have been applied and direct observations have been made to teaching practices, as research processes when working with ISTE, MEN and DigCompEdu competences. Currently, according to the DigCompEdu competence levels, the digital competences of teachers in Areandina vary between B1 and B2.

Digital competences are part of the teachers' evaluation carried out by students and academic directors every semester with a review of the classroom plan (classroom pedagogical project) is made where the teacher uses ICT as a didactic strategy to impact the learning processes. Each semester there is also an activity of successful and innovative experiences where the best practices of teachers are awarded, with an external jury, experiences that are shared and invite other teachers to impact their learning processes with ICT. If teachers are not fulfilling the requirements and have too big of a competence gaps, they must have an improvement plan, which includes SEPA courses and other training processes, or mentoring from other teachers, which help them to improve their competences, digital competencies are one of them, likewise, they can be sponsored by other teachers. Teachers who stand out for their didactic implementations in the classroom, participate in the semester contest and in addition to this, their experiences are shared with the teaching community nationwide with a public recognition.

Competence development

To develop teachers' digital competences, Areandina has had teacher training plans, MOOC type courses, SEPA courses (in Moodle), Educamp, short workshops and events for socialization of experiences, which are also training spaces, in which not only new ways of

impacting the educational process with ICT are shown, but also support is given to teachers to experiment and take to the classroom.

The SEPA courses and training processes through workshops come in levels that start from elementary to complex situations, an example of this is that at the end of this year 2024, there were training processes in 4Prot and other 2D and 3D animation and design tools, as well as video applications. Teachers are expected to apply all these tools in their training courses with students.

The SEPA courses are a bank of courses, about 60 courses, each of at least 48 hours (one academic credit) and growing, that deal with digital competencies and other competencies required by our teachers and administrative staff of the academy. These courses are online, free of charge for our teachers.

This course bank encourages them to generate innovations in the classroom and to participate in the competitions that are held so that their achievements are publicly recognized. Teachers impact their teaching and learning processes and the institution recognizes their achievements with awards such as scholarships, study sponsorships, academic exchanges with other institutions and even free money.

Digital pedagogy and tools

Areandina teachers are progressively integrating digital tools in a multifunctional way and aligned with institutional pedagogical approaches, which generally focus on active learning, skills development, and comprehensive training. Examples include: -Teachers use forum platforms (such as Moodle) to encourage discussion and debate on relevant topics, allowing students to collaboratively build knowledge. Interactive content creation tools (such as H5P) are also used to design activities that promote exploration and discovery. -Online collaborative work tools (such as Google Docs, Microsoft Teams, or Mural) are used for students to work on group projects, share ideas, and build knowledge together. -Interactive presentation creation tools (such as Prezi or Genially) and video creation tools (such as Adobe or Canva) are used for students to creatively express their ideas and develop communication skills. Concept mapping tools (such as XMind or Mindomo) are used to promote analysis and synthesis of information. - Adaptive learning platforms (where available) are used or differentiated activities within the VLE are designed to cater to different student learning paces and styles. Online formative assessment tools (such as Kahoot! or Socrative) are used to obtain immediate feedback on student progress and to adjust instruction.

Teachers use a variety of tools and platforms, including: Virtual Learning Environments (VLE): Moodle, Canvas, and a proprietary MOOC platform, which are the main tools for course management, communication with students, assignment submission, and assessment. Communication tools: Email, discussion forums, video conferencing (Zoom, Google Meet, Microsoft Teams). Productivity tools: Google Suite (Docs, Sheets, Slides), Microsoft Office. Content creation tools: Tools to create presentations, videos, infographics, etc. And Online assessment tools: Quizizz, Socrative, Google Forms, among many others.

Teachers are generally more comfortable with tools they already know and use in their personal lives, such as email, word processing tools, and video conferencing. However, through ongoing training, they are encouraged to become proficient in using other teaching tools.

Areandina, although in most cases it does not specify it directly among its teaching staff, uses frameworks such as SAMR (Substitution, Augmentation, Modification, Redefinition) or TPACK (Technological Pedagogical Content Knowledge), as frameworks for the effective integration of technology. With SAMR, teachers are helped to reflect on how technology transforms learning tasks, moving from simple substitution to redefinition of the same. And with TPACK, the interrelation between content knowledge, pedagogical knowledge and

technological knowledge is emphasized, highlighting the importance of integrating these three elements for effective teaching with technology.

Additionally, Areandina offers several continuing professional development programs for teachers in the pedagogical use of ICTs. These include: -Training workshops: On the use of specific digital tools and on the application of pedagogical frameworks such as SAMR or TPACK. -Pedagogical accompaniment: Support, often individualized, for teachers to integrate technology into their classes. Communities of practice for teachers to share experiences in the use of technology. Resources and support materials: Guides, tutorials and examples of activities with technology, among other less recurrent activities.

Students participate in the selection and use of digital tools through the application of some surveys to find out their preferences and needs regarding the use of digital tools. Also in class, the use of technology in the classroom is discussed, and new tools are encouraged to be proposed. Students are also invited to participate in educational innovation projects, where they can collaborate in the design and implementation of activities with technology.

To ensure equal access, Areandina seeks to implement strategies to promote access to devices and internet connectivity with operators that provide Wi-Fi access points throughout the institution. On the other hand, so that all students acquire the necessary skills to use technology

effectively, work is done on various transversal subjects embedded in the different academic programs. It also seeks to ensure that the content and activities are accessible to students with disabilities.

DIGITAL COMPETENCE DEVELOPMENT

Strategy level

The digital strategy is an active protocol from the Academic Vice-Rectorate of Areandina, reviewed and updated periodically, with the participation of several institutional actors. This process includes the evaluation of strengths, weaknesses, opportunities and threats, in relation to digitalization and AI in our higher education environment, and additionally the alignment with the institutional mission, vision and pedagogical objectives by seeking to ensure that said digital strategy contributes to the comprehensive training of students, to the development of relevant skills for the 21st century and to the promotion of inclusive and quality education.

Among the key objectives, specific, measurable, achievable, relevant and time-bound (SMART) goals can be identified, such as increasing the use of active methodologies supported by technology by a significant percentage in the next five years and, in fact, there are already implementations of the flipped class type, project-based learning, problems and challenges, in addition to gamified models. Also

implementing tutoring, both face-to-face and virtual, with the use of AI for all students in the next four semesters, as part of the curricular transversalization. And, on a more obvious level, training all our teachers in advanced digital skills, in the next three years.

Concrete steps include the interaction of various strategic groups across the institution, with representatives from areas such as the academic vice-rector, teachers of educational computing, the administrative area unit in charge of multimedia resources, and technology experts, on and off campus. With these actors, we seek to analyze best practices among our campuses and also from other institutions, in the use of technology and AI in training. In this way, some action plans have been developed at various levels, with activities, those responsible, schedules, and budgets identified. To monitor the different implementations, each unit reviews its progress around its strategy and we all make adjustments.

AI has been integrated into the digital strategy to enhance learning, teaching and institutional administrative management. To this end, goals have been set for learning personalization, content recommendation and selection of adaptive learning platforms. Chatbots have also been reviewed to answer questions from various sectors, including companies and students, providing feedback and academic support. Administrative work is being done on basic data analysis to identify learning patterns and personalize pedagogical intervention.

To stay up to date, at Areandina we must: monitor technological trends through research, participation in conferences and collaboration with other institutions; promote experimentation with pilot projects of new AI technologies to be transformed into methodologies; invest in professional development of teachers and administrative staff in the use of ICT and AI and establish alliances with companies.

Stakeholder engagement has been crucial to the success of Areandina's strategy. Several mechanisms have been obvious, such as surveys to gather feedback, focus groups to discuss specific issues, our participatory workshops with local industries to generate collaborative proposals, feedback consultations and various advisory committees with myriad representatives from various trades.

In terms of equity, access to devices and connectivity is provided, training in digital skills is sought so that different population groups have the necessary skills to use technology, and an effort is made to ensure that content is accessible to all, including those with disabilities. Accessibility is the goal of making digital platforms accessible to people with visual, hearing, and motor disabilities, among others, through the use of alternative text formats, transcripts, audio descriptions, and others.

Institutional privacy policies, in most cases, inform users about how their data is collected, used and protected. This is part of Areandina's protocol, given compliance with current regulations on data protection, Law 1581 of 2012 of Colombia. The implementation of technical and organizational measures to protect data from unauthorized access, total or partial loss of data is also provided.

Areandina seeks to evaluate different AI tools, taking into account their needs. In this case, some educational chatbots are already being used, as assistants that offer academic feedback. Work is also being done on adapting personalized learning platforms that allow content to be managed at the learning pace of each student. With this, these platforms use data to identify learning standards, recognize performance, and personalize pedagogical intervention. And AI content creation tools have also been found, which help our teaching peers create interactive materials.

The ethical implications of AI are certainly addressed proactively at Areandina, although it seems that we are still lacking in recognition. For example, some occasional audits are carried out to detect possible biases. Regarding privacy, policies are implemented in accordance with the law, such as obtaining informed consent from users and anonymizing data as far as possible. This has been achieved by explaining, via institutional email, to users how AI systems work and

how their data would be used, which has allowed for the establishment of supervision and control mechanisms to ensure that AI is used responsibly.

And although ethical training for teachers and students regarding AI is not yet very robust, several principles and guidelines are established for its implementation on the national campus, identifying some possible problems and making permanent adjustments through an open dialogue with the community and promoting responsible use.

Competence development

The aim is to start the competence development from an analysis of the learning needs and pedagogical objectives. Criteria of functionality, usability, accessibility and alignment with Areandina's pedagogical approaches are taken into account in the blocks of: communication, as well as collaboration with discussion forums, videoconferences, online collaborative work tools (Google Workspace, Microsoft Teams). The content creation block such as Moodle, interactive presentation creation tools, and animation creation instruments. On the side of the formative assessment block, the online test management platforms, both external and embedded in the same platforms. And finally, the multimedia resources block such as virtual libraries, video repositories, as well as simulations.

If tools are required that do not exist on the market, Areandina considers internal development, as it has done with its MOOC, by having a team to create its own tools. Also, collaboration with other institutions or even companies for joint productions and, somewhat obviously, the adaptation of open source resources, have allowed it to meet many of the institution's specific needs.

Learning environments seek to be designed taking into account the principles of Universal Design for Learning to gradually ensure inclusion, through intuitive interfaces, clear organization of information, accessibility for people with difficulties, as well as integration with other platforms.

Pedagogical processes are intended to be designed to promote active, meaningful and collaborative learning. Standards such as a good definition of learning objectives, being open to the selection of appropriate pedagogical methodologies, designing interactive learning activities, maximizing the implementation of formative assessment strategies and prioritizing learning feedback are considered.

Teacher training programs go a little further than just technical management, they also associate the development of digital pedagogical skills, which implies a focus on digital pedagogies such as

blended learning, flipped classroom, project-based learning (PBL), problem-based learning (PBL), challenge-based learning (PBL), in addition to the transition from traditional models to more active ones, with the use of these active methodologies, participation, collaboration and critical thinking of students is encouraged. On the instructional design side, the goal is for them to learn to design meaningful mediated experiences, which include spaces for reflection on teaching practice with technology, the exchange of experiences and the construction of collective knowledge. Examples include our practical in-person and online workshops, where teachers are encouraged to design their teaching units using different digital pedagogies and these can be shared as resources and experiences across campuses nationwide.

The training enables teachers to identify the different learning styles of children using diagnostic tools. This diversifies teaching through different content formats (text, audio, video), interactive activities, adaptive resources, etc. Also, although somewhat slowly, it is intended to implement differentiation strategies for specific personalization needs and thus promote inclusion with accessibility.

Related to the creation and sharing of open educational resources (OER), Areandina implements the following strategies:

- Creation of an institutional repository, where teachers share their resources and access those created by others.
- Training in resource licensing via Creative Commons.
- Institutional creation policies embedded in teacher evaluation.
- Organization of events, workshops and communities of practice, through the national pedagogical unit, to promote the exchange of resources and teaching experiences.
- Integration of resources into training programs, for use by students.

Security and data protection aspects are considered a cross-cutting axis in most of the institution's activities, from the design of platforms and systems to the implementation of pedagogical and administrative processes, all of which implies implementing proactive measures to avoid incidents, assuming a comprehensive approach that considers aspects of confidentiality, integrity and availability, all within the current legislation on data protection, Law 1581 of 2012 in Colombia.

The training is tailored to the different roles of institutional actors. In this regard, there are workshops on privacy, online security, password management, etc., to raise awareness of the importance of protected information. With some supporting materials, practical exercises are carried out to test the knowledge acquired.

Areandina implements specific policies, which address the aspects of the Privacy Policy, as a document that explains how the personal data of students, teachers, administrative staff and other users are collected, used, stored and protected and establishes accessible channels so that data owners can exercise their rights, such as a protocol for the detection, reporting, management and resolution of incidents. The principles of the GDPR also apply to Areandina when offering services to citizens of the European Union, when necessary. On the other hand, consent is obtained and data portability is guaranteed, paying special attention to the privacy of students, especially minors.

The training for Areandina teachers addresses topics such as cyberbullying in its different forms, which invites them to implement prevention strategies, as well as providing support to victims in order to foster an atmosphere of coexistence online. It also works with staff to identify reliable sources of information, promote critical thinking and data verification.

Among the many risks discussed are: Phishing, malware, identity theft, sexting, grooming, etc. Among the resources, there are case studies, role-playing games and, in particular, for independent work, collaboration with experts such as psychologists, pedagogues and computer security experts.

Furthermore, Areandina adopts a comprehensive approach to support inclusion and accessibility through its institutional policies from the management of physical infrastructure, including the use of digital technologies known by a broad sector of the educational community. This seeks to implement the principles of UDL in the design of all digital environments, offering different ways of presenting content, with respect to the different learning styles and sensory needs, so that students interact with the content and demonstrate what they have learned. On the other hand, some assistive technologies have been addressed that help students with disabilities access and participate in learning activities, and examples of this are screen readers, voice recognition software, adapted keyboards, etc. Under the above premises, work is done to raise awareness for teachers, administrative staff and students on inclusion issues and adjustments are made as necessary.

To ensure accessibility of its digital tools and environments, Areandina applies some of the following measures:

- It seeks to ensure that digital platforms and resources have partially applied international standards such as the Web Content Accessibility Guidelines (WCAG).
- Some accessibility tests have been reviewed with users with disabilities to identify and correct possible problems.

- It is intended to ensure that platforms are compatible with the most common assistance technologies, such as screen readers, voice recognition software and display magnifiers.
- It attempts to apply some alternative formats such as subtitles and transcripts for videos and audios, audio descriptions for images, among other auxiliary designs focused on the user.

In addition, teacher training aims to raise awareness about diversity and inclusion through a culture of respect and appreciation of diversity. To learn about special educational needs, information is provided on the characteristics of disabilities and the focus on these students. With the use of assistive and accessibility technologies, teachers are taught to use the technologies available in the institutional environment, such as those released by academic peers from other institutions and even the national government, with respect to this item. Additionally, inclusive pedagogical strategies such as differentiated learning, cooperative learning and curricular adaptations are the order of the day, even with the help of support professionals.

The ethical use of AI at Areandina involves considering principles that guarantee that such technology is used for the benefit of the educational community in general. Therefore, the way to improve teaching and learning processes is being investigated, and not as an end in itself. That is, supporting teachers, personalizing learning, facilitating access to information and, obviously, promoting the development of skills.

Users are expected to understand how decisions are made and how their data is used, even though the "black boxes" imply an opaque internal logic. Therefore, AI should not perpetuate or amplify existing biases and therefore representative data sets should be used to train algorithms with periodic audit options to detect and correct possible trends. On the other hand, Areandina strengthens access to AI resources for students, regardless of their socioeconomic origin, gender, race, disability, etc. In this order of ideas, AI is an instrument that supports our teachers, not replaces them; they maintain control of the academic process and pedagogical decisions.

To ensure fairness, impartiality and transparency in the use of AI, Areandina implements, in general terms, the following: -It seeks to define clear principles and guidelines that guide the development and use of AI in the institution. Actions, which are public throughout the educational community. -This involves evaluating the impact of AI on different groups, especially students, to detect possible biases. Although this has not been fully achieved, processes are intended to be established for users to report concerns related to the use of AI, encouraging dialogue and participation in such items among teachers, students, experts and other members of the educational community.

Education on ethical considerations of AI is an early component of teacher training programs and curricula. Different strategies are channeled into it, referring to specific workshops on data privacy, algorithmic biases, etc. This addresses ethical considerations in the different study disciplines, promotes critical analysis of their social impact, while reviewing real situations of ethical dilemmas related to AI. Given this, these various materials are made available to everyone to promote a code of conduct in the responsible use of AI in the institution.

Institutional support structures and practices

Areandina has three very important units that support digitalization through teacher training:

The first is the national sub-directorate of Teacher Development, which depends on the Academic Vice-Rectory, this unit traces the route of teacher training semester by semester and names each year with an intentionality, for example, 2023 was the year of Educational Innovation and 2024 of Teaching Creativity, this directs the training processes and the goals to be met by teachers.

Another office that has to do with the use of ICT in education is the national sub-directorate Virtual Operations, which also depends on the Academic Vice-Rectory, this office administers and manages the LMS platforms, in Areandina there are 2, Moodle for face-to-face and Distance and Canvas for 100% virtual programs, in addition to this, it has two more units within it, One for the development of educational content, with filming studios, animation and everything that has to do with the construction of quality content and has another for pedagogical support to teacher authors, which guide the process prior to the creation of content, ensuring that the didactics comply with the institutional educational guidelines and ensure the learning processes.

The third unit is the CEITA, Center for Technological Innovation in Education, which depends on the National Directorate of Technologies and Information Systems, whose main objective is to contribute to the development of academic, scientific, cultural and administrative activities, manages the audiovisual spaces and IT laboratories (computer technologies) where work is done with students and among teaching peers, and also provides workshops on the use of these spaces, as well as the smart boards that are in most academic spaces of the institution.

These three units manage an annual budget and goals, which are articulated with the institutional development plan, each quarter the institutional senior management receives progress reports of the goals and budget execution and each semester the progress is presented to the community, with an annual closure that is reported to the entire institution after approval by the academic council and the superior council.

The Academic Vice Rectory leads the teacher training process from its two departments, Teacher Development and Virtual Operations. This process is contrasted with the semesterly evaluation of teachers, which is carried out by students, the program or department director and the teacher himself (self-evaluation) where, among other issues, the use of technologies in educational processes, the use of LMS platforms, teacher training, activities in another language and the creativity and innovation of teachers to impact the curriculum are considered.

The rapid advancement of digital technologies has transformed education worldwide, demanding continuous development of digital competencies among educators. As highlighted in these guidelines, effective digital transformation in education requires a systematic approach encompassing teacher training, institutional leadership, and robust digital infrastructure. The EMBRACE project and global digital frameworks, such as DigCompEdu and UNESCO's ICT Competency Framework, provide essential guidelines for fostering digital literacy and pedagogical innovation in higher education.

While digitalization enhances accessibility and flexibility, challenges remain in ensuring equity, ethical AI integration, and sustainable digital strategies. Therefore, this guideline document underscores the need for structured policies, institutional collaboration, and ongoing professional development to bridge the digital divide. By aligning with global best practices, educational institutions can cultivate inclusive, competency-based learning environments, ultimately strengthening the role of

digital education in advancing social and economic development. Therefore, to conclude this guideline document, it is important to revisit each partner institution's reality, potentialities and areas of improvement.

The Federal Institute of Espírito Santo (IFES) has made significant progress in digital transformation, aligning with global trends. It has digitized administrative and academic processes and expanded access to online learning. However, key challenges remain, including the need for a structured evaluation of its digitalization strategy, a formal assessment of teachers' digital competencies, and the establishment of ethical guidelines for AI use, which have not yet been addressed. Digital transformation in education depends on teacher competencies, leadership, and high-quality digital content. The EMBRACE project aims to enhance the digital and pedagogical competencies of higher education teachers in Latin America. IFES' initiatives, such as Moodle-based learning, training by CEFOR, and the use of MOOCs, align with EMBRACE's goal of fostering competency-based education and digital inclusion.

Despite digitizing core processes, IFES lacks an evaluation mechanism for its digital strategy, mirroring the broader challenge of strategic implementation. Additionally, IFES' decentralized approach to digitalization, where various sectors undertake independent, non-

institutionalized initiatives, contrasts with the structured, system-wide approach recommended in UNESCO's Six Pillars for Digital Transformation. CEFOR has applied the DigCompEdu model in research, which aligns with structured professional development. However, IFES does not currently have an institutionalized framework for teacher competency mapping. This is why the EMBRACE framework's three-stage model—knowledge acquisition, deepening, and creation—can provide a structured progression path for educators at IFES.

In terms of digital pedagogy, IFES actively leverages digital platforms for teaching innovation. While teachers utilize Moodle, Google Drive, web conferencing tools, and Turnitin, the integration of digital pedagogy frameworks remains necessary to ensure that technology fosters student engagement, creativity, and critical thinking. Another pressing issue is the lack of an institutional AI policy, leaving AI ethical implications largely unaddressed. This presents an opportunity for IFES to adopt best practices outlined in the document to ensure responsible AI use. However, the institution has made strides in digital accessibility, offering Moodle plugins, video translations in Libras, and open educational resources, aligning with EU recommendations. Additionally, IFES benefits from CEFOR and campus-based Educational Technology Centres (NTEs), which provide vital training and support.

Find below a table where both the potentialities and the fragilities of IFES are summarized:

Category	Potentialities	Fragilities
Institutional Commitment to Digital Transformation	Digitized administrative and academic processes as well as extensive use of Moodle and MOOCs. Digitalization included in institutional strategy is well aligned with EMBRACE goals	Need for improvement in the structured evaluation of digitalization impact via a decentralized approach. However, there is an absence of formal success measurement mechanisms which are now based on a non-systematic implementation
Teacher Digital Competency Development	CEFOR provides structured training with massive participation in EMBRACE project	No institutionalized competency assessment is on which uneven digital skills among teachers
Equity and Inclusion in Digital Education	Excellent accessibility tools in Moodle as well as Libras translations and digital resources	Digital divide still present which uneven access to technology
AI Integration and Ethical Considerations	Growing awareness of AI's role in education	Nonetheless, there is no institutionalized AI policy and Ethical concerns are not yet addressed
Institutional Strategies and Global Collaboration	Use of digital tools such as Moodle, Google Drive, and Turnitin is a must at IFES. Heavy support from CEFOR and campus-based NTEs	Need for deeper integration of pedagogical frameworks (SAMR, TPACK). There is limited collaboration across departments due to lack of structured knowledge sharing
Measuring Success in Digitalisation	Strong institution participation in digital competency research (DigCompEdu)	There is no clear evaluation framework for digital initiatives as well as formal feedback mechanisms

In conclusion, IFES has taken meaningful steps toward digitalization but it's advisable to focus now on competency evaluation, ethical AI integration, and strategic assessment. By adopting structured frameworks for competency development, refining AI policies, and institutionalizing continuous evaluation mechanisms, IFES can solidify its leadership in digital education in Latin America, ensuring equity, innovation, and sustainability.

Moving forward, the next institution to be at the core is the **Federal Institute of Education, Science and Technology of São Paulo,** thereupon **IFSP**. The intersection between the Federal Institute of São Paulo (IFSP) and the broader digital transformation in education highlights a shared commitment to inclusive, accessible, and innovative education. IFSP, as a key institution in Brazil's professional, scientific, and technological education network, aligns with global strategies by prioritizing digitalization, teacher competence development, and sustainable educational practices.

IFSP's approach to digitalization aligns with UNESCO's "Six Pillars for the Digital Transformation of Education" and the EMBRACE Project once the institution's long-term vision incorporates key elements such as equity, accessibility, and technological innovation, reflecting global efforts in integrating digital tools into education.

Another relevant key point to highlight is IFSP's framework for digital competency development that is rather consistent with DigCompEdu, UNESCO's ICT Competency Framework for Teachers, and UNICEF's Educators' Digital Competency Framework, all of which emphasize teacher training, professional development, and digital literacy. IFSP maps teachers' digital skills, categorizing them into basic, intermediate, and advanced levels, and integrates LMS, AI, and emerging technologies into teaching practices.

A key concern addressed in IFSP's strategy is bridging the digital divide. IFSP ensures internet access, hardware availability, and assistive technologies, echoing policies such as Brazil's Política Nacional de Educação Digital (PNED) and Colombia's Estrategia Nacional Digital. However, IFSP acknowledges the lack of structured device loan programs and subsidies, areas that require further development. As regards AI Integration and Ethical Considerations, IFSP's vision for personalized learning aligns with AI's role in Education 4.0. UNESCO's recommendations for ethical AI use, data privacy, and transparency directly relate to IFSP's need for structured guidelines on bias reduction, algorithmic fairness, and data security.

The EMBRACE project, which includes IFSP as a partner, focuses on digitalizing Latin American higher education. IFSP's framework already emphasizes professional learning communities, mentorship,

and open educational resources (OER), which aligns with UNESCO's and the European Commission's vision for teacher training and digital pedagogy. IFSP evaluates its digitalization strategy based on student performance, tool adoption rates, feedback mechanisms, and operational efficiency which are methods that reflect global best practices. Nonetheless, IFSP recognizes the need for instructional coaching, IT support, and funding for experimental digital teaching which remains as an area for great improvement whatsoever.

The convergence of IFSP's strategies with global digital education trends indicates its pivotal role in shaping Brazil's higher education digital landscape. However, IFSP understands that there are many challenges yet to be addressed such as, 1) bridging the digital gap in underserved communities by expanding infrastructure and financial support; 2) enhancing AI integration with clear ethical guidelines and governance frameworks; 3) strengthening continuous professional development by ensuring mentorship, advanced training, and institutional incentives; and, 4) fostering a culture of innovation by supporting pilot programs, recognizing digital teaching excellence, and involving students in decision-making.

Find below a table where both the potentialities and the fragilities of IFSP are summarized:

Category	Potentialities	Fragilities
Institutional Commitment to Digital Transformation	Strong alignment with global frameworks (UNESCO, DigCompEdu, EMBRACE). Clear strategy incorporating digitalization across teaching and administration.	Some aspects of digitalization remain underdeveloped, such as a lack of structured device loan programs.
Teacher Digital Competency Development	Use of DigCompEdu framework to assess teacher competencies. Integration of LMS and digital tools for education.	Training programs lack differentiation for basic, intermediate, and advanced levels. Need for more structured peer mentoring and IT support.
Equity and Inclusion in Digital Education	Ensures internet access, basic digital infrastructure, and policies for inclusive education.	Limited financial aid for students regarding software access. Lack of clear policies on assistive technologies and Universal Design for Learning.
AI Integration and Ethical Considerations	AI-powered tools considered for personalized learning. Commitment to data security and responsible AI use.	No structured guidelines on bias reduction and AI fairness. Limited institutional training on AI ethics.
Institutional Strategies and Global Collaboration	Partnerships with EMBRACE and European institutions, fostering international collaboration.	Limited funding and resources for experimental teaching methods. Lack of clear incentives for digital teaching innovations.
Measuring Success in Digitalisation	Defined success metrics including student outcomes, engagement levels, and operational efficiency.	Insufficient instructional coaching and IT support for teachers. Need for more data-driven decision-making tools.

Despite the gaps to be minded, IFSP is ultimately well-positioned to serve as a model for digital transformation in Brazil. However, continued alignment with global frameworks, ethical AI policies, and

inclusive digital education practices will be critical in ensuring sustainable, high-quality learning experiences for the entire IFSP community.

The next partner institution under consideration is the **Federal University of ABC (UFABC)**. The discussion on digital transformation in higher education, particularly within UFABC, aligns closely with global and regional debates on digital education. The introduction of these guidelines presents a broad framework that contextualizes the importance of digitalization in education at an international level, discussing policies, frameworks, and challenges related to the adoption of digital tools, teacher competency development, and equity concerns. These global perspectives resonate with UFABC's institutional strategies and challenges.

One of the key aspects to be highlighted about UFABC is its recognition of digital competencies as fundamental to modern education. Frameworks such as DigCompEdu, UNESCO's ICT Competency Framework for Teachers, and UNICEF's Educators' Digital Competency Framework emphasize the need for teachers to be equipped with digital skills to support effective pedagogy. Similarly, UFABC acknowledges that although there have been initiatives such as the MOOC "Teaching with Technologies in Practice" and NETEL Conecta, it is still in the early stages of formally mapping teachers'

digital competencies. Both initiatives highlight that digital competency development should not be a one-time effort but rather an ongoing process supported by institutional policies and professional learning communities.

Another critical concern for UFABC is digital inclusion and access. These guidelines underscore the digital divide, highlighting that access to technology and connectivity remains a challenge, particularly in countries like Brazil. UFABC explicitly addresses this issue, pointing out the need for expanded technological infrastructure, reliable internet access, and assistive technologies for students with disabilities. The shared emphasis on universal design, accessibility, and institutional strategies for equitable digital education underscores the alignment between global policy recommendations and UFABC's needs.

Moreover, UFABC acknowledges the role of AI and emerging technologies in education. UNESCO's recommendations on AI in education, including ethical concerns, data privacy, and AI literacy among educators, are essential. UFABC recognizes AI's growing presence in academic work and administrative functions but lacks a clear institutional policy on its ethical use. Thus, structured training programs and interdisciplinary discussions on AI adoption are necessary, along with governance mechanisms to ensure responsible AI use in educational settings.

The challenges of academic and administrative digital integration are also important. Data-informed decision-making and robust IT infrastructure are crucial for successful digital transformation. UFABC reflects these concerns, citing fragmented academic processes, inefficient workflows, and a lack of integration between platforms such as Moodle and SIGAA. Both sources advocate for a systematic approach to digital governance, ensuring that digitization efforts streamline operations rather than add bureaucratic complexity.

Strategically, UFABC highlights the necessity of institutional support structures to sustain digital transformation. The EMBRACE project aims to develop teacher competencies through structured professional development. Meanwhile, UFABC proposes strengthening NETEL, formalizing training incentives, and restructuring workloads to prioritize digital competency development. Both acknowledge that without strong institutional backing, digital education initiatives risk being short-lived and ineffective.

UFABC's institutional challenges reflect a common vision aligned with global perspectives on digital transformation in higher education. While UFABC has made notable progress in promoting interdisciplinarity, inclusion, and digital initiatives, challenges such as teacher training, infrastructure, governance, and ethical AI adoption remain critical areas

for development. Insights from global frameworks reinforce UFABC's strategic approach, suggesting that a coordinated, well-resourced, and participatory model of digital transformation is necessary to ensure sustainable, equitable, and innovative higher education. Moving forward, UFABC's Institutional Development Plan (PDI 2024–2033) must integrate these lessons, leveraging international best practices to create a future-ready educational ecosystem.

The table below points out UFABC's potentialities and the fragilities:

Category	Potentialities	Fragilities
Institutional Commitment to Digital Transformation	Strong alignment with global frameworks (UNESCO, DigCompEdu, EMBRACE). Clear strategy incorporating digitalization across teaching and administration.	Some aspects of digitalization remain underdeveloped, such as a lack of structured device loan programs.
Teacher Digital Competency Development	Use of DigCompEdu framework to assess teacher competencies. Integration of LMS and digital tools for education.	Training programs lack differentiation for basic, intermediate, and advanced levels. Need for more structured peer mentoring and IT support.
Equity and Inclusion in Digital Education	Ensures internet access, basic digital infrastructure, and policies for inclusive education.	Limited financial aid for students regarding software access. Lack of clear policies on assistive technologies and Universal Design for Learning.
AI Integration and Ethical Considerations	AI-powered tools considered for personalized learning. Commitment to data security and responsible AI use.	No structured guidelines on bias reduction and AI fairness. Limited institutional training on AI ethics.

Institutional Strategies and Global Collaboration	Partnerships with EMBRACE and European institutions, fostering international collaboration.	Limited funding and resources for experimental teaching methods. Lack of clear incentives for digital teaching innovations.
Measuring Success in Digitalisation	Defined success metrics including student outcomes, engagement levels, and operational efficiency.	Insufficient instructional coaching and IT support for teachers. Need for more data-driven decision-making tools.

All in all, UFABC's commitment to digital transformation reflects a forward-thinking approach that embraces innovation, inclusion, and excellence. While challenges remain in infrastructure, digital competency development, and AI governance, the institution's strategic initiatives, global collaborations, and dedication to equity position for success. By refining policies, strengthening institutional support, and fostering continuous professional development, UFABC is poised to lead a future-ready academic ecosystem by creating a dynamic, inclusive, and technologically advanced academic environment that meets the demands of the 21st century.

The next partner institution to be highlighted is the **Fundación Universitaria del Área Andina**, hereafter referred to as **Areandina**. The digital transformation of education extends beyond mere technological integration—it represents a paradigm shift in pedagogical methodologies, institutional strategies, and equitable access to learning opportunities.

Areandina exemplifies this transformation by embedding digitalization as a core institutional strategy, aligning it with its pedagogical philosophy and social development mission. Its commitment to innovative teaching and learning practices through digital platforms, ICT training, and active methodologies underscores its alignment with global trends and frameworks, including those presented in the EMBRACE project.

Areandina's approach resonates with broader discussions on digital transformation in education, which emphasize the need for comprehensive, equitable, and strategically implemented reforms. For instance, UNESCO's *Six Pillars for Digital Transformation in Education* advocates for connectivity, capacity-building, and sustainable digital strategies—elements evident in Areandina's implementation of virtual learning environments (VLEs), faculty training programs (such as SEPA), and policies promoting digital equity.

A critical connection between Areandina's digital strategy and the EMBRACE project is its focus on developing digital competencies among educators. The institution recognizes that empowering teachers with digital skills is central to ensuring quality digital education. Its structured faculty training programs, competency assessments, and

incentives for innovation align with key international frameworks such as DigCompEdu, UNESCO's *ICT Competency Framework for Teachers*, and UNICEF's *Educators' Digital Competency Framework*, all of which advocate for progressive competence development, digital pedagogy, and ethical AI integration.

Additionally, the EMBRACE framework underscores the importance of establishing professional learning communities, an aspect that Areandina fosters through mentorship, peer learning, and knowledge-sharing initiatives. Its model of identifying digital competence levels (B1–B2 proficiency) and providing improvement plans parallels EMBRACE's structured competency development pathway.

Another notable connection is the increasing role of AI and emerging technologies in education. Areandina recognizes AI's potential for personalized learning, streamlining administrative processes, and enhancing student engagement. It has already initiated AI-driven adaptive learning strategies, chatbot implementations for academic support, and ethical AI discussions—mirroring the EMBRACE project's emphasis on responsible AI integration, privacy, and data protection. Furthermore, its alignment with UNESCO's *AI Competency Framework for Teachers* further solidifies Areandina's forward-thinking stance on AI ethics in education.

Furthermore, Areandina actively addresses equity and inclusion in digital education, a significant contemporary concern. It ensures digital accessibility through scholarships for rural students, support for students with disabilities, and the application of *Universal Design for Learning (UDL)* principles. These measures reflect concerns raised in the broader discourse on the digital divide in Latin America and the need for inclusive, high-quality digital learning experiences.

Areandina stands as a leading example of how a multicampus higher education institution can effectively integrate digital transformation into its core mission. Its strategies, policies, and innovations not only align with international frameworks but also contribute to the broader goals of democratizing education, fostering digital competence, and leveraging AI for inclusive learning. Moving forward, a sustained commitment to professional development, ethical AI use, and adaptive strategies will be essential for maintaining momentum and ensuring long-term success in digital education.

Areandina's potentialities and the fragilities are summed up the table that follows:

Category	Potentialities	Fragilities
Institutional Commitment to Digital Transformation	Strong alignment with global frameworks; Digitalization embedded as a core institutional strategy; Well-developed virtual platforms (Moodle, Canvas); Commitment to innovation; Institutional leadership plays a role in overcoming barriers.	Challenges in maintaining equitable digital access across all campuses; Need for continuous technological updates; Digital divide concerns in rural areas; Further investment in IT infrastructure is necessary.
Teacher Digital Competency Development	Ongoing teacher training programs (SEPA); Competency levels (B1–B2) mapped and monitored; Use of international frameworks (DigCompEdu, UNESCO ICT, UNICEF EDC); Mentorship and peer learning programs are helping address competency gaps.	Teachers still require improvement plans if they do not meet competency standards; Need for more hands-on, innovative training in emerging tech areas.
Equity and Inclusion in Digital Education	Scholarships for rural students; Universal Design for Learning (UDL) principles applied; Policies ensuring accessibility for students with disabilities.	Digital accessibility measures are still developing; Dependence on external funding for some inclusion programs; Infrastructure limitations in some areas; Pace of implementation of inclusive learning environments through technology is a challenge.
AI Integration and Ethical Considerations	AI-driven adaptive learning initiatives; Chatbots for academic support; Ethical discussions on AI use; Alignment with UNESCO AI Competency Framework.	AI ethical considerations still in early stages; Limited research on AI's long-term impact on education; Need for clearer institutional AI policies and guidelines.

Institutional Strategies and Global Collaboration	Participation in the EMBRACE project; Collaboration with European and Latin American institutions; Clear institutional digitalization roadmap.	Potential dependency on external partnerships for digital growth; Need for stronger internal capacity-building programs; Bureaucratic hurdles in project implementation.
Measuring Success in Digitalisation	Use of qualitative and quantitative indicators (retention rates, student/teacher satisfaction); External accreditations and evaluations; Continuous improvement policies.	Challenges in defining long-term digitalization impact; Need for continuous feedback loops; Potential gaps in tracking AI's impact on pedagogy.

Areandina stands as a forward-thinking institution, deeply committed to digital transformation, teacher competency development, and inclusive education. Through strategic global collaborations, AI integration, and continuous innovation, it is shaping a dynamic learning ecosystem. While challenges remain, its proactive approach to digital equity and pedagogical advancement ensures steady progress. By embracing emerging technologies and refining its strategies, Areandina is well-positioned as one of the leaders of the future of higher education in Latin America.

Finally, the **Technological University of Pereira (UTP)**, with its established reputation for academic excellence and innovation, has strategically incorporated digitalization into its educational strategy, recognizing that digital transformation in higher education is now an imperative rather than an option, driven by global trends, national

policies, and institutional needs. This commitment aligns with both national and international frameworks that emphasize digital competency as a cornerstone of educational advancement.

UTP's digitalization efforts demonstrate a structured and forward-looking approach. The integration of digital tools and pedagogical strategies is not merely an adoption of technology, but a comprehensive transformation aimed at fostering critical thinking, interactive learning, and equitable access to education. The university has embedded these principles within its Institutional Development Plan (PDI) and Institutional Educational Projects (PEI), reflecting strong alignment with international models such as UNESCO's ICT Competency Framework for Teachers, DigCompEdu, and UNICEF's Educators' Digital Competency Framework.

The EMBRACE project provides a broader international and policy-driven perspective, reinforcing UTP's digitalization initiatives. This project, which involves UTP alongside other higher education institutions from Latin America and Europe, underscores the necessity of developing teachers' digital competencies to ensure high-quality, technology-integrated education. It highlights the crucial role of digital transformation policies in Brazil and Colombia, which offer structured approaches to improving digital education, ensuring digital inclusion, and promoting AI literacy in academic settings.

The key connection between UTP's digitalization strategy and the EMBRACE project is their shared emphasis on teacher competency development. Both recognize that the success of digital transformation largely depends on teachers' ability to effectively integrate digital tools into pedagogical practices. The EMBRACE framework's focus on knowledge acquisition, deepening, and creation aligns with UTP's approach, where teachers are given autonomy to evaluate and refine their digital competencies through flexible training programs.

Furthermore, both sources emphasize the importance of inclusive and equitable access to technology. UTP's provision of specialized digital classrooms, virtual education initiatives, and a strong ICT ecosystem aligns with global best practices discussed in the EMBRACE project. This ensures that digitalization does not create new barriers but instead serves as a catalyst for educational accessibility and social inclusion.

However, challenges remain, such as the risk of a digital divide and the need for systemic, human-centred digital transformation to ensure equitable access to technology, especially in diverse socioeconomic contexts like Colombia. While UTP has significant digital infrastructure, there is room for improvement in incentive structures for innovation, formal communities of practice, and systematic evaluation mechanisms for the effectiveness of digital learning.

Looking forward, UTP can enhance its digital strategy by integrating AI-driven educational tools, leveraging data analytics for decision-making, and fostering a culture of continuous professional learning among educators. The six-pillar framework from UNESCO, which emphasizes coordination, infrastructure, sustainability, capacity, content, and data-driven strategies, provides a robust model for guiding these next steps.

To sum up, the Technological University of Pereira's digitalization efforts are well-aligned with international best practices and the policy frameworks outlined in the EMBRACE project. While UTP has made notable strides in digital education, ongoing efforts should focus on strengthening teachers' professional development, ensuring the sustainability of digital initiatives, and fostering a more collaborative digital learning environment. By doing so, UTP can further solidify its role as a regional and national leader in digital higher education, bridging the gap between traditional and technology-enhanced learning experiences.

See the table below for a visualization of the potentialities and fragilities of UTP:

Category	Potentialities	Fragilities
Institutional Commitment to Digital Transformation	Strong alignment with national and international digital transformation frameworks; Institutional Development Plan (PDI) and Institutional Educational Projects (PEI) embed digitalization strategies.	Need for more structured incentive mechanisms for digital innovation; Absence of formalized digital transformation leadership structures.
Teacher Digital Competency Development	Structured teacher training programs in digital competencies; Alignment with DigCompEdu, UNESCO, and UNICEF competency frameworks.	Limited incentive plans for teachers to innovate with technology; Lack of formal communities of practice for ongoing digital pedagogy support.
Equity and Inclusion in Digital Education	Provision of digital classrooms, virtual education initiatives, and strong ICT infrastructure to support diverse learning needs.	Potential risk of digital divide in economically disadvantaged student populations; Need for more structured equity-focused policies.
AI Integration and Ethical Considerations	Awareness of AI's role in education; Strategic approach to integrating AI-driven educational tools.	Limited institutional guidelines on AI ethics and responsible AI use; No formal strategies for AI integration into curricula.
Institutional Strategies and Global Collaboration	Active participation in EMBRACE project with international collaboration; Integration of best practices from global digital competency frameworks.	Dependence on external collaboration for digital strategy development; Need for stronger internal policy frameworks for sustainability.
Measuring Success in Digitalisation	Use of ICT appropriation diagnoses and data analytics for assessing effectiveness; Continuous evaluation of digital strategies.	Lack of comprehensive long-term measurement tools for assessing digitalization impact; Need for more systematic evaluation frameworks.

The Technological University of Pereira has made remarkable strides in digital transformation, aligning its strategies with global frameworks and fostering a robust digital ecosystem. While challenges remain, such as enhancing AI integration and incentivizing digital innovation, UTP's commitment to teacher competency development and inclusive digital education sets a strong foundation. By refining its strategies and strengthening institutional policies, UTP is well-positioned to lead in digital higher education, ensuring equitable, innovative, and future-ready learning experiences.

Heading to conclusion, it's important to reinforce that the EMBRACE project stands as a milestone in advancing digital education across Latin America, uniting five key institutions—IFES, IFSP, UFABC, UTP, and Areandina—toward a shared vision of modernizing higher education. The following table summarizes a comprehensive comparison of both the potentialities and the rooms for improvement in all the HEIs that compose EMBRACE's

Common Potentialities and Fragilities in EMBRACE HEIs

Category	Common Potentialities	Common Fragilities
Institutional Commitment to Digital Transformation	All institutions (IFES, IFSP, UFABC, UTP, Areandina) have strong alignment with EMBRACE goals and global frameworks, integrating digitalization into their strategic plans.	Fragmented digitalization approaches in some institutions (UFABC, IFES, UTP) require better integration and structured evaluation mechanisms.
Teacher Digital Competency Development	All institutions (IFES, IFSP, UFABC, UTP, Areandina) engage in structured training programs aligned with DigCompEdu and other global frameworks.	Need for more structured competency assessments, mentoring programs, and differentiated training for teachers at various skill levels in IFES, IFSP, UFABC, and UTP.
Equity and Inclusion in Digital Education	Commitment to digital accessibility, offering policies and tools for inclusion such as assistive technologies and scholarships for underserved communities (IFES, IFSP, UFABC, Areandina, UTP).	Persistent digital divide and infrastructure limitations, particularly affecting rural and economically disadvantaged populations in IFSP, UFABC, Areandina, and UTP.
AI Integration and Ethical Considerations	Growing awareness of AI's role in education and its potential for personalized learning (IFES, IFSP, UFABC, UTP, Areandina).	Lack of formal AI policies and guidelines; institutions require structured training on ethical AI usage (IFES, IFSP, UFABC, UTP, Areandina).
Institutional Strategies and Global Collaboration	Active participation in EMBRACE and collaboration with international organizations, reinforcing digital transformation strategies (IFES, IFSP, UFABC, UTP, Areandina).	Resource constraints for sustaining international collaborations; need for stronger internal capacity-building to support long-term initiatives (UFABC, IFSP, Areandina, UTP).

Measuring Success in Digitalisation	Use of student engagement and performance indicators to assess digital education effectiveness (IFES, IFSP, UFABC, Areandina, UTP).	Limited long-term monitoring and evaluation frameworks; insufficient data-driven decision-making processes (IFES, IFSP, UFABC, Areandina, UTP).

The EMBRACE HEIs share a strong commitment to digital transformation, aligning with global frameworks and fostering structured teacher training programs. They actively promote digital accessibility, inclusion, and AI awareness while engaging in international collaborations. However, challenges persist, including fragmented digitalization strategies (UFABC, IFES, UTP), a lack of structured competency assessments (IFES, IFSP, UFABC, UTP), and persistent digital divides (IFSP, UFABC, Areandina, UTP). Additionally, all institutions require formal AI policies, better capacity-building for collaborations, and improved long-term evaluation mechanisms. Addressing these gaps will be key to sustaining innovation, inclusion, and effectiveness in their digital education strategies.

Despite the rooms for improvement in all institutions either in one or more categories, the collaboration of IFES, IFSP, UFABC, UTP, and Areandina underscores the essential role of digitalization in fostering inclusive, competency-based learning environments, ensuring that educators are equipped with the necessary skills to navigate the

evolving educational landscape. By leveraging global frameworks like DigCompEdu and UNESCO's ICT Competency Framework, these institutions are not only bridging the digital divide but also positioning Latin America as a leader in digital innovation and pedagogical transformation.

Through structured professional development, ethical AI integration, and commitment to accessibility, the EMBRACE project exemplifies how cross-institutional efforts can drive meaningful change. Each participating institution, as demonstrated, contributes its unique strengths and insights, creating a robust, adaptable framework that supports teachers in implementing digital tools effectively. With a focus on collaboration, equity, and innovation, this initiative might somehow and to a certain extent shape the future of education in Latin America, ensuring that digital transformation is both sustainable and impactful for students and educators alike.

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