ISSN 2183-8208

Unidade de Monitorização de Políticas Públicas

POLICY PAPERS

SHAPING KNOWLEDGE IN HIGHER EDUCATION: WHY PORTUGAL NEEDS THE DISHE-PT+ BAROMETER. MONITORING DIGITAL COMPETENCES, AI LITERACY, DIGITAL FINANCIAL LITERACY AND PUBLIC POLICY LITERACY IN HIGHER EDUCATION

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UMPP Policy Papers Nº 7 | 2026

UNIVERSIDADE DE ÉVORA

Ficha Técnica/Technical Specifications:

Designação da publicação/Publication title: UMPP Policy Papers

Série/Series: UMPP Policy Papers - Unidade de Monitorização de Políticas Públicas (UMPP)

Diretor dos UMPP Policy Papers/Editor-in-Chief of UMPP Policy Papers: Paulo Neto

Autores deste Policy Paper/Authors of this Policy Paper: Paulo Neto, Pedro Pinheiro, Maria Luísa Silva, Ricardo Emanuel Correia and João Geraldes

Numeração/Number: UMPP Policy Papers nº 7 | 2026

Edição/Edition: Universidade de Évora/University of Évora, Portugal

Data/Date: 2026

ISSN: 2183-8208

Periodicidade/Frequency: Quadrimestral/Quarterly

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APRESENTAÇÃO DA UMPP / UMPP PRESENTATION

A Unidade de Monitorização de Políticas Públicas (UMPP) da Universidade de Évora é uma estrutura técnica e científica dedicada à produção de conhecimento e informação sobre conceção, monitorização e avaliação de políticas públicas.

A UMPP foi criada com o apoio do Programa Operacional Regional do Alentejo 2007-2013 (INALENTEJO) e tem como objetivo principal promover a avaliação e monitorização das políticas públicas implementadas ou em processo de implementação na unidade territorial NUTS II do Alentejo, em Portugal e na União Europeia, bem como assegurar a ampla disseminação desse conhecimento neste âmbito territorial.

A competitividade dos países, das regiões e das empresas está cada vez mais dependente das condições em que uns e outras tomam decisões e as concretizam de forma eficiente e eficaz. Neste sentido, a capacidade e competência na definição e implementação de políticas públicas por parte do Estado e a assertividade na concretização de estratégias e iniciativas bem sucedidas por parte das demais organizações são hoje fatores decisivos para o desempenho das sociedades em que se inserem.

A relevância, pertinência, coerência e valor acrescentado das políticas públicas são hoje aspetos absolutamente cruciais para as condições de desenvolvimento dos países, dos territórios, das organizações e dos indivíduos. Desde logo, em função dos contextos regulamentares e de enquadramento que estabelecem, dos mecanismos de incentivo e estímulo em que assentam, dos paradigmas e visão de futuro para que apontam, do nível de sofisticação e inovação que lhe está associado e da intencionalidade estratégica que imprimem e transmitem, numa perspetiva de médio e longo prazo, aos setores e atividades a que se destinam.

Num momento em que é cada vez maior o nível de exigência técnica e científica associado ao processo de planeamento da economia, da sociedade e dos territórios, e à construção e salvaguarda das suas condições de competitividade e de desenvolvimento, a Universidade de Évora entendeu criar uma Unidade de Monitorização de Políticas Públicas dedicada à produção de conhecimento e à avaliação e monitorização de políticas públicas aplicadas, ou em processo de aplicação nesta região.

A UMPP pauta a sua atividade por princípios de rigor, isenção, transparência e responsabilidade, e uma preocupação constante de auscultação e colaboração com as entidades e agentes da região Alentejo, mas também relativamente às de âmbito nacional e internacional.

Convidamo-lo(a) a conhecer o trabalho que fazemos.

The Public Policy Monitoring Unit (UMPP) of the University of Évora is a technical and scientific unit dedicated to producing knowledge and information on the design, monitoring, and evaluation of public policies.

UMPP was established with the support of the Alentejo Regional Operational Programme 2007-2013 (INALENTEJO). Its main mission is to promote the monitoring and evaluation of public policies that have been implemented, or are currently being implemented, in the NUTS II region of Alentejo, in Portugal and the European Union while also ensuring the broad dissemination of knowledge in this field across the territory.

The competitiveness of countries, regions, and organisations increasingly depends on the conditions under which decisions are made and translated into effective and efficient action. In this context, the State's capacity to design and implement public policies, together with the ability of other organisations to deliver successful strategies and initiatives, has become a decisive factor in the performance of the societies in which they operate.

The relevance, consistency, coherence, and added value of public policies are now crucial to the development prospects of countries, territories, organisations, and individuals. This is reflected in the regulatory and institutional frameworks they establish, the incentive mechanisms on which they are built, the paradigms and future visions they promote, the degree of sophistication and innovation they embody, and the strategic direction they provide to the sectors and activities they are intended to support over the medium and long term.

At a time when the technical and scientific demands associated with planning the economy, society, and territories – and with strengthening and safeguarding their competitiveness and development – are becoming ever more complex, the University of Évora created UMPP as a dedicated unit for the production of knowledge and for the monitoring and evaluation of public policies applied, or in the process of being applied, in the region.

UMPP carries out its work in accordance with the principles of rigour, impartiality, transparency, and responsibility, while maintaining an ongoing commitment to dialogue and collaboration with institutions and stakeholders in the Alentejo region, as well as with partners at national and international level.

We invite you to explore our work.

UMPP POLICY PAPERS

Os UMPP Policy Papers são documentos síntese elaborados sobre questões de natureza metodológica, ou de debate técnico e científico, em torno de questões avaliativas ou de monitorização de políticas públicas. Os UMPP Policy Papers abordarão, entre outros aspetos, exercícios de avaliação e análise em torno de políticas ou de instrumentos de política pública concretas, e serão concebidos com a preocupação de apresentar recomendações ou propostas de orientação futura.

Esta publicação destina-se a cumprir um dos objetivos da UMPP, nomeadamente a produção de conhecimento e de informação sobre a conceção, monitorização e avaliação das políticas públicas implementadas ou em processo de implementação na Região Alentejo, em Portugal e na União Europeia, bem como promover a disseminação dessa informação no contexto regional, nacional e europeu.

O UMPP Policy Paper No. 7 | 2026 tem como objetivo central demonstrar a necessidade de Portugal dispor de um instrumento nacional, estável e recorrente de monitorização das competências digitais no ensino superior, capaz de ultrapassar a atual fragmentação da evidência disponível.

O texto parte do reconhecimento de que a transformação digital e a rápida difusão da inteligência artificial generativa estão a alterar profundamente os contextos de ensino, aprendizagem, avaliação, governação institucional e participação cívica, sem que exista ainda, no caso português, uma infraestrutura de evidência suficientemente robusta, comparável e orientada para a decisão pública e institucional.

Neste quadro, o *Policy Paper* propõe o DiSHE-PT+ Barometer como resposta a essa lacuna, assumindo-o como um instrumento estratégico para monitorizar competências digitais, literacia em IA, literacia financeira digital mediada por IA e literacia em cidadania e políticas públicas no ecossistema do ensino superior.

UMPP Policy Papers are concise publications addressing methodological issues and technical and scientific debate in the field of public policy monitoring and evaluation. Among other topics, they include evaluation and analytical exercises focusing on specific public policies or policy instruments, and are designed to present recommendations and proposals for future action.

This publication contributes to one of UMPP's core objectives: the production of knowledge and information on the design, monitoring, and evaluation of public policies implemented, or in the process of being implemented, in the Alentejo Region, while also promoting the dissemination of this knowledge at regional, national and European levels.

The central objective of this UMPP Policy Paper *No. 7 | 2026* is to demonstrate why Portugal needs a stable, recurrent and policy-relevant national instrument for monitoring digital competences in higher education, one capable of overcoming the current fragmentation of available evidence.

The paper starts from the recognition that digital transformation and the rapid expansion of generative artificial intelligence are reshaping teaching, learning, assessment, institutional governance and civic participation, while Portugal still lacks a sufficiently robust and comparable evidence infrastructure focused on the higher education ecosystem. In response to this gap, the paper proposes the DiSHE-PT+ Barometer as a strategic instrument for monitoring digital competences, AI literacy, AI-mediated digital financial literacy, and citizenship and public policy literacy in Portuguese higher education.

SHAPING KNOWLEDGE IN HIGHER EDUCATION: WHY PORTUGAL NEEDS THE DISHE-PT+ BAROMETER. MONITORING DIGITAL COMPETENCES, AI LITERACY, DIGITAL FINANCIAL LITERACY AND PUBLIC POLICY LITERACY IN HIGHER EDUCATION

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UMPP Policy Papers nº 7 | 2026

This Policy Paper is published by UMPP – Public Policy Monitoring Unit, University of Évora. It is intended as a contribution to the debate on digital competences, AI literacy, AI-mediated digital financial literacy and public policy literacy in higher education, as well as on the need for a robust evidence infrastructure to support governance and decision-making in Portugal. The views expressed are those of the authors.

Suggested citation: Neto, P., Pinheiro, P., Silva, M. L., Correia, R. E., & Geraldes, J. (2026). *Shaping knowledge in higher education: Why Portugal needs the DiSHE-PT+ barometer. Monitoring digital competences, AI literacy, digital financial literacy and public policy literacy in higher education* (UMPP Policy Paper No. 7/2026). University of Évora.

Abstract

Higher education is undergoing a profound digital transformation driven by the expansion of digital platforms, data infrastructures and, more recently, generative artificial intelligence. These developments are reshaping teaching, learning, assessment, research, institutional management and the wider civic and professional environments in which students and staff operate. In Portugal, however, the available evidence on these changes remains fragmented, methodologically inconsistent and weakly comparable over time. While useful studies and reports exist, the country still lacks a stable, policy-relevant and recurrent monitoring instrument focused specifically on the higher education ecosystem.

This Policy Paper argues that Portugal should establish the DiSHE-PT+ Barometer as a strategic annual instrument for monitoring digital competences, AI literacy, AI-mediated digital financial literacy, and citizenship and public policy literacy in higher education. Conceived as a joint initiative of UMPP and ISCAL, the Barometer is designed not simply as a measurement tool, but as a policy-oriented evidence infrastructure capable of informing institutional governance, curricular reform, academic support, digital ethics and national strategy.

The proposed model combines a stable core, anchored in the main domains of the European Digital Competence Framework for Citizens, with a flexible modular component addressing emerging challenges associated with AI use, trust, human–AI interaction, financial decision-making in digital environments, and digitally mediated public policy understanding. This dual architecture seeks to balance comparability over time with responsiveness to fast-moving technological and social change.

The paper further argues that monitoring digital transformation in higher education requires attention not only to access and skills, but also to judgment, critical verification, responsible autonomy and equity. In particular, it highlights the importance of identifying behavioural risks, metacognitive equity gaps and differentiated patterns of AI use across institutions and social groups. The broader conclusion is that the DiSHE-PT+ Barometer can become a national reference instrument for shaping knowledge in higher education, strengthening evidence-informed governance in Portugal and positioning the country more effectively within European and international debates on digital competences and responsible AI adoption.

Executive Summary

This Policy Paper proposes the creation and consolidation of the DiSHE-PT+ Barometer - the Digital Skills Barometer in the higher education ecosystem in Portugal - as a strategic instrument for monitoring digital competences, AI literacy, AI-mediated digital financial literacy, and citizenship and public policy literacy across the Portuguese higher education system.

The Barometer is a joint initiative of UMPP and ISCAL, inspired by the French *Baromètre du numérique* (ARCEP, 2026) and designed to fill a significant evidence gap in Portugal. While several reports exist for the general population and while some higher education institutions have produced occasional studies, the available information remains fragmented, methodologically inconsistent and weakly comparable over time. There is no stable and comparable national instrument capable of producing regular evidence on how students, teachers, technicians, staff, families and other institutional stakeholders use digital technologies and what competences they have in increasingly AI-mediated academic environments (ANACOM, 2024; OECD, 2023b; Lucas et al., 2022; Zhao et al., 2021).

This gap has become more pressing as generative artificial intelligence rapidly expands across higher education (Kasneci et al., 2023; Wang et al., 2024). New opportunities for learning, research and administrative support are emerging, but so are significant risks concerning information verification, academic integrity, critical judgment, privacy, cybersecurity, trust and unequal access to digital support (Foltýnek et al., 2023; UNESCO, 2023; OECD, 2023b). At the same time, digital environments increasingly shape how citizens interact with financial products, public services and public policies (European Commission, 2023; European Union/OECD, 2022; OECD, 2023a). In this context, higher education needs better evidence not only on digital competence in general, but also on the ability to navigate AI-mediated information, financial decision-making and public policy environments.

The proposed Barometer responds to this challenge through a dual architecture. It maintains a stable core aligned with DigComp and related European frameworks - covering information and data literacy, communication and collaboration, digital content creation, safety and problem solving (European Commission, 2020; Vuorikari et al., 2022; Cosgrove & Cachia, 2025) - while adding a flexible modular component with four additional dimensions: AI-mediated digital financial literacy, attitude and trust in AI, human-AI interaction style, and citizenship and public policy literacy, including a specific focus on public financial policies such as taxation, financial consumer protection, deposit guarantees and public pension systems.

The Barometer is designed as a policy-oriented evidence infrastructure. It combines simple, communicable indicators with 0-100 scores to enable annual comparison, trend analysis and support for institutional and public decision-making. It also allows differentiated analysis by region, type of institution, cycle of study, field of education and training, socio-economic status, worker-student profile and specific needs, thus making it possible to identify inequalities, explanatory factors and priority areas for intervention.

This Policy Paper argues that the DiSHE-PT+ Barometer can become a strategic tool for shaping knowledge in higher education. Its annual outputs - including a report, infographic, anonymised dataset with variable dictionary and online dashboard - can provide actionable intelligence for curricular reform, academic support, AI literacy and ethics policies, financial literacy strategies, digital citizenship education and better-informed institutional governance.

The paper concludes that Portugal would benefit from establishing the DiSHE-PT+ Barometer as a stable, annual and policy-relevant reference instrument. In doing so, it would strengthen evidence-informed governance in higher education and position itself more effectively in the European debate on digital competences, responsible AI adoption and the future of learning in digitally mediated societies.

The paper further argues that monitoring digital competences requires not only measuring what users know about AI, but also how they interact with it. Drawing on the 4D AI Fluency Framework - Delegation, Description, Discernment and Diligence - the Barometer incorporates an operational model for assessing the quality of human-AI interaction, distinguishing between productive cognitive partnership and passive reliance. The paper identifies metacognitive equity gaps as a key analytical concern: the risk that students and other actors from the higher education ecosystem with weaker prior skills or less social capital may be disproportionately prone to over-trust AI outputs and under-invest in their own critical engagement. It also situates the proposal within the regulatory context of the EU AI Act, which classifies education as a high-risk domain for AI deployment, and outlines an evidence-to-policy pathway designed to translate Barometer findings into concrete institutional and curricular action.

Keywords

Digital competences; higher education; DigComp; artificial intelligence literacy; digital financial literacy; public policy literacy; Portugal.

1. Introduction

Higher education is being reshaped by a profound digital transition. Teaching, learning, research, institutional management and student life increasingly depend on digital platforms, data infrastructures and algorithmically mediated systems. More recently, the rapid diffusion of generative artificial intelligence has accelerated these transformations, creating new possibilities for academic work while also raising new questions for institutions, policymakers and society. Universities and polytechnics are no longer simply users of digital technologies; they are becoming central arenas in which digital competence, AI literacy, critical judgment and digital citizenship are formed, tested and institutionalised. In this context, the quality of institutional responses will influence not only academic performance and innovation capacity,

but also employability, trust and the quality of democratic participation in increasingly digital societies.

In Portugal, however, the evidence base required to understand and govern these changes remains insufficient. Relevant information exists, but it is dispersed across reports on the general population, isolated institutional studies and ad hoc research initiatives. As a result, the country still lacks a stable, comparable and policy-relevant monitoring instrument specifically focused on the higher education ecosystem. This creates a significant governance problem.

Without recurrent and methodologically coherent evidence, it becomes difficult to identify structural patterns, compare institutions, track change over time, or design proportionate and targeted policy responses. What currently exists is valuable, but it is better understood as a fragmented patchwork of observations than as a cumulative national evidence system capable of supporting institutional learning and strategic decision-making.

This gap is particularly problematic because the challenges facing higher education are no longer limited to basic digital access or operational skills. The spread of generative AI has made it necessary to examine not only digital competence in general, but also responsible AI use, trust calibration, critical verification, privacy, cybersecurity, academic integrity and the quality of human–AI interaction. At the same time, digital environments increasingly shape how students and staff engage with financial information, public services, public debate and policy communication. This means that higher education must now address a broader literacy agenda: one that includes digital competences, AI literacy, AI-mediated digital financial literacy, and citizenship and public policy literacy. These are no longer peripheral concerns. They are becoming central to the mission of higher education in digitally mediated societies.

It is in response to this problem that this Policy Paper proposes the creation and consolidation of the DiSHE-PT+ Barometer. The Barometer is conceived as an annual monitoring instrument for the Portuguese higher education ecosystem, designed to capture how key actors—students, teachers, technicians, staff, families and other institutional stakeholders—use digital technologies and what competences they possess in relation to digital practices, AI-mediated environments, financial literacy and public policy literacy. Inspired by the French *Baromètre du numérique* but adapted to Portuguese higher education realities, the DiSHE-PT+ Barometer is presented not merely as a survey instrument, but as a strategic evidence infrastructure for higher education governance in Portugal. Its purpose is to help move the system from episodic diagnosis to recurring, policy-oriented and context-sensitive monitoring.

A central strength of the proposal lies in its conceptual architecture. The Barometer combines continuity and innovation through a dual structure. Its stable core is anchored in recognised European reference frameworks, especially DigComp, thereby ensuring conceptual robustness, annual comparability and communicability. At the same time, its modular component is designed to respond to emerging issues that are especially salient in contemporary higher education. These include AI-mediated digital financial literacy, attitudes and trust in AI, human-AI interaction style, and citizenship and public policy literacy. This design is intended to avoid

two common weaknesses of competence measurement: excessive rigidity, which makes instruments obsolete in rapidly changing environments, and excessive fluidity, which undermines comparability over time. By distinguishing between what should remain cumulative and what should remain adaptive, the DiSHE-PT+ Barometer seeks to provide a more resilient and policy-relevant model of monitoring.

The relevance of such an instrument is not only analytical but also institutional and normative. Generative AI is already altering the nature of academic work, from drafting and summarizing to feedback, problem-solving and assessment support. These developments create opportunities for more personalised learning and more efficient support, but they also generate risks related to overreliance, plagiarism, low-quality verification, unequal access, privacy and the erosion of critical thinking. In parallel, digitally mediated environments are reshaping how students and staff function as citizens, consumers and future professionals.

They increasingly encounter public issues, financial decisions and policy information through platforms, algorithms and AI-assisted interfaces. Institutions therefore need better evidence to distinguish between productive, risky and exclusionary forms of digital and AI use, and to design governance arrangements that are proportionate, transparent and learning-oriented.

The DiSHE-PT+ Barometer is especially valuable because it also foregrounds questions of equity and human judgment. The paper argues that one of the major risks of AI-mediated environments lies in the emergence of metacognitive equity gaps: situations in which students with weaker prior skills or lower levels of social capital may be more likely to over-trust AI outputs and under-invest in their own critical engagement.

In this sense, digital transformation is not neutral. It may amplify capabilities for some groups while creating new dependency traps for others. A robust monitoring instrument must therefore do more than measure skills in the abstract; it must also capture behavioural risks, patterns of cognitive offloading, trust calibration and differentiated vulnerabilities across social, territorial and institutional profiles.

Against this background, the core argument of this Policy Paper is that Portugal would benefit significantly from establishing the DiSHE-PT+ Barometer as a stable, annual and policy-relevant reference instrument. Such an instrument could support curricular adaptation, institutional strategy, ethical and regulatory reflection, and more evidence-informed public policy in areas such as digital education, AI governance, digital financial literacy and citizenship.

It could also strengthen Portugal's capacity to participate more actively in European and international debates on the future of learning, responsible AI adoption and digital competences in higher education. In this sense, the DiSHE-PT+ Barometer is proposed as a tool not only for measuring change, but for shaping knowledge and improving governance in a period of deep digital transformation.

2. Why this Policy Paper matters now

Higher education is being reshaped by a profound digital transition (OECD, 2023b; Vuorikari et al., 2022). Teaching, learning, research, institutional management and student life increasingly depend on digital platforms, data infrastructures and algorithmically mediated systems (OECD, 2023b). More recently, the rapid diffusion of generative artificial intelligence has accelerated these transformations, creating new opportunities but also raising new challenges for academic institutions, policymakers and society (Kasneci et al., 2023; Wang et al., 2024; UNESCO, 2023).

These developments matter because higher education is no longer merely a user of digital tools. It is becoming one of the central arenas in which digital competence, AI literacy, critical judgment and digital citizenship are formed, tested and institutionalised (European Commission, 2020; OECD, 2023b; UNESCO, 2023). The way institutions respond to these challenges will influence not only academic quality, but also employability, innovation capacity, institutional trust and the quality of democratic participation in increasingly digital societies (OECD, 2016; OECD, 2023b).

In Portugal, however, the evidence required to monitor these changes remains weak. Relevant information exists, but it is scattered across general population reports, isolated higher education studies and institution-specific initiatives (ANACOM, 2024; Lucas et al., 2022; Zhao et al., 2021). This means that the country still lacks a stable, comparable and policy-relevant monitoring instrument focused on the higher education ecosystem (OECD, 2023b).

This is the problem addressed by the present Policy Paper. It argues that Portugal needs a structured and recurrent evidence infrastructure capable of monitoring digital competences and adjacent forms of literacy in higher education. The proposed response is the DiSHE-PT+ Barometer.

3. The policy problem: fragmented evidence in a rapidly changing digital environment

Portugal already has useful sources of information on digital competences, financial literacy and digital inclusion. National institutions have produced relevant reports on the general population, telecommunications, digital inclusion and financial capability. At the same time, some Portuguese higher education institutions and researchers have developed case studies on students' and teachers' digital competences and, more recently, on the use of generative AI in academic contexts.

Yet three limitations remain.

3.1. Fragmentation

The available evidence is fragmented across different institutions, methodologies and target populations. Concepts are not fully aligned, indicators are often not comparable and results are difficult to aggregate or interpret from a system-wide perspective.

This fragmentation also produces a second-order policy problem: even when useful evidence exists, it is often locked into institution-specific or project-specific contexts and therefore fails to generate cumulative system knowledge.

As a result, Portuguese higher education lacks a common analytical language for discussing digital competences and AI-related literacies across institutions, disciplines and stakeholder groups. What is currently available is better understood as a patchwork of partial observations than as a coherent monitoring architecture capable of informing national and institutional strategy.

Moreover, fragmentation weakens the capacity to distinguish between structural patterns and isolated institutional effects. A high result in one institution may reflect stronger student intake, a specific field profile or better digital support, but in the absence of comparable indicators it is difficult to know which explanation matters most. This limits the policy value of existing studies, because they can describe local realities but cannot easily support benchmarking, aggregation or the identification of system-wide inequalities and priority areas for intervention.

3.2. Temporal inconsistency

The available evidence is not sufficiently regular to support longitudinal analysis. This makes it difficult to understand whether competences are improving, stagnating or worsening, and which institutional or policy changes may be influencing those trajectories.

Temporal inconsistency is especially problematic in a field where practices, tools and institutional responses are evolving at high speed. In the absence of regular and methodologically stable data collection, even well-designed snapshots quickly lose explanatory value. They may capture a moment of transition, experimentation or concern, but they do not allow researchers or policymakers to determine whether observed patterns are temporary, cyclical or indicative of longer-term structural change.

This limits the ability of higher education institutions and policymakers to learn from their own interventions. Without a stable time series, it is difficult to assess whether new guidelines on AI use, changes in assessment practices, training programmes for staff, or digital support services are associated with measurable improvements in competences, confidence or responsible behaviour. A policy system without longitudinal evidence is therefore more likely to react to visible problems than to learn systematically from change over time.

3.3. Insufficient scope for the AI era

Most existing instruments were not designed for the current moment. The growing use of generative AI in higher education requires evidence not only on digital competence in general, but also on AI literacy, responsible use, trust, critical verification, security, ethical awareness and the capacity to navigate AI-mediated financial and public policy environments.

This last point is especially important. Digital transformation in higher education is no longer only about access to devices or basic operational skills. It increasingly concerns the quality of judgment, the reliability of information, the responsible use of automated systems, and the ability to function as an informed citizen in digital societies. These are not marginal issues. They are now central to the mission of higher education.

3.4. Digital financial literacy as an applied strand of media and AI literacy

While the core focus of this policy paper is on students' general digital and AI literacy, there is a strong rationale for examining an applied strand in the financial domain. Recent European and national initiatives, including the OECD/Banco de Portugal Digital Financial Literacy Strategy for Portugal (OECD, 2023a), emphasise that financial decision-making increasingly occurs in fully digital and algorithmically mediated environments, from mobile banking and instant payments to credit scoring, robo-advice and investment platforms. In such contexts, vulnerabilities to fraud, over-indebtedness and misselling are amplified when low financial literacy combines with opaque AI-driven recommendation and profiling systems.

At the same time, AI-enabled tools, such as comparison platforms, robo-advisors and conversational agents, can lower information and search costs, help users simulate scenarios and support more disciplined financial behaviour. Behavioural finance research, however, shows that these potential benefits are contingent on users' ability to understand basic product characteristics, to recognize their own cognitive and emotional biases, and to treat AI as a decision aid rather than an infallible oracle (Campbell, 2011; OECD, 2017).

Of particular concern are well-documented biases such as automation bias (a tendency to over-trust automated outputs), over-confidence in one's understanding of complex products, herding in investment decisions amplified by social and algorithmic feeds, and present bias in consumer credit choices that focus on short-term affordability rather than long-term cost (Parasuraman & Riley, 1997; Barber & Odean, 2001; Bikhchandani & Sharma, 2000; Laibson, 1997).

Against this backdrop, AI-mediated digital financial literacy can be framed as a specific, high-stakes application of the broader competences captured in the PISA 2029 MEDIA and AI Literacy (MAIL) framework (OECD, 2026) - particularly Access and Use, Analyse and Evaluate, and Reflect and Act Ethically and Responsibly - rather than as a separate policy priority.

Emerging Portuguese evidence already suggests that generative AI is no longer a marginal issue in higher education, but an institutional one. Recent research with Portuguese university students indicates measurable patterns of acceptance, intention to use and actual use of AI tools in academic contexts, reinforcing the argument that isolated institutional studies are no longer sufficient and should be complemented by a stable national monitoring instrument (e.g., Ribeirinha et al., 2025).

4. Why existing frameworks are necessary but not sufficient

As argued by the OECD (2023) and by O'Sullivan et al. (2025), conceptual frameworks are essential for establishing a common language around digital competences, but they are not sufficient to generate a national evidence system. What Portugal still lacks is a recurring monitoring architecture capable of producing stable indicators, comparable time series, and policy-relevant intelligence across institutions and stakeholder groups. In this context, the added value of the DiSHE-PT+ Barometer lies not in replacing DigComp, UNESCO, or OECD frameworks, but in operationalising them through a recurrent, context-sensitive, and governance-oriented evidence infrastructure for Portuguese higher education (European Commission, 2020; Vuorikari et al., 2022; UNESCO, 2023; OECD, 2023a).

The proposal for the DiSHE-PT+ Barometer is not intended to replace existing frameworks. On the contrary, it builds on them. European and international reference frameworks such as DigComp, DigCompEdu, DigCompOrg, the European Digital Skills Certificate feasibility work, UNESCO's AI guidance and teacher competency frameworks, and OECD work on digital education and digital financial literacy all provide strong conceptual foundations (Vuorikari et al., 2022; Cosgrove & Cachia, 2025; UNESCO, 2023; OECD, 2023).

At the institutional policy level, frameworks such as the Higher Education Authority of Ireland's Generative AI Policy Framework have demonstrated how national bodies can translate broad competence standards into actionable guidance for higher education institutions, offering a relevant comparator for the Portuguese context (HEA, 2024).

These frameworks are essential because they provide:

- Conceptual robustness;
- Cross-country comparability;
- Recognised domains of competence;
- Methodological legitimacy.

However, they are not sufficient by themselves for the Portuguese higher education policy challenge.

First, they do not automatically generate a stable national evidence system (OECD, 2023; O'Sullivan et al., 2025). Second, they do not focus specifically on the Portuguese higher education ecosystem (Lucas et al., 2022; Zhao et al., 2021). Third, they do not necessarily combine digital competence, AI literacy, digital financial literacy and public policy literacy in one integrated monitoring architecture (OECD, 2023; OECD, 2023a; European Union/OECD, 2022).

The policy challenge, therefore, is not to invent a framework from scratch, but to create a national instrument capable of translating existing conceptual foundations into a recurring, policy-oriented and context-sensitive monitoring system (OECD, 2023; O'Sullivan et al., 2025).

5. The proposal: what is the DiSHE-PT+ Barometer?

The DiSHE-PT+ Barometer is conceived as an annual monitoring instrument for the Portuguese higher education ecosystem. It is designed to capture how key actors - students, teachers, technicians, staff, families and institutional stakeholders - use digital technologies and what competences they possess in relation to digital practices, AI-mediated environments, financial literacy and public policy literacy (European Commission, 2020; Vuorikari et al., 2022; OECD, 2023).

The Barometer is inspired by the French *Baromètre du numérique* (ARCEP, 2026), but adapted to the Portuguese higher education context and to the strategic needs identified by UMPP and ISCAL.

Its design combines continuity and innovation. Continuity is ensured through a stable core based on established European competence frameworks, especially DigComp, allowing annual comparability (Vuorikari et al., 2022; Cosgrove & Cachia, 2025). Innovation is introduced through a modular architecture that responds to emerging challenges in higher education and in the wider digital society, especially the rise of generative AI and the growing digitisation of financial and public policy environments.

The purpose of the DiSHE-PT+ Barometer is therefore broader than measurement. It is intended to function as a strategic evidence infrastructure for higher education governance in Portugal (OECD, 2016; OECD, 2023b).

In this sense, the Barometer responds to broader calls for recurring, system-level monitoring instruments that move beyond isolated surveys towards stable, policy-relevant evidence architectures in education (OECD, 2023; Lodge & Loble, 2026)

6. Conceptual architecture of the Barometer

A further strength of the conceptual architecture lies in the fact that it combines analytical coherence with policy usability. The stable core provides a shared language through which institutions and policymakers can interpret digital competence in ways that remain comparable over time, while the modular component allows the instrument to remain sensitive to domains in which technological change, behavioural adaptation and policy concern are evolving more rapidly.

This dual structure is particularly valuable in higher education, where institutions need an instrument that is stable enough to support benchmarking and trend analysis, yet sufficiently flexible to capture emerging forms of literacy and risk that may not be fully reflected in established competence frameworks.

In this sense, the architecture of the Barometer is not only conceptually sound; it is also designed to support a more resilient and policy-relevant model of monitoring.

6.1. Stable core

The stable core should remain anchored in the main domains of the European Digital Competence Framework for Citizens (Vuorikari et al., 2022; Cosgrove and Cachia, 2025):

- Information and data literacy;
- Communication and collaboration;
- Digital content creation;
- Safety and digital protection;
- Problem solving.

This core is important for three reasons. First, it ensures conceptual continuity with existing European standards. Second, it enables annual comparison. Third, it makes the instrument easier to communicate to institutions and policymakers.

6.2. Modular component

The distinctive value of the DiSHE-PT+ Barometer lies in its modular component. The current proposal includes four additional dimensions.

1. AI-mediated digital financial literacy

This dimension captures the ability to understand, assess and navigate financial information, products and risks in digital and AI-assisted environments.

2. Attitude and trust in AI

This dimension examines perceptions of AI, confidence in outputs, perceived usefulness, perceived risks and critical awareness.

3. Human-AI interaction style

This dimension examines seeks to understand how users interact with generative AI systems in academic, informational and decision-support contexts.

4. Citizenship and public policy literacy

This dimension captures the ability to understand public policy issues in digital environments, including a specific sub-module on public financial policies such as taxation, consumer protection, deposit guarantees and public pension systems.

The architecture is also important because it avoids two common design problems in competence measurement. On the one hand, instruments built only around a stable framework may become progressively less responsive to new practices and institutional needs. On the other hand, instruments that adapt too quickly to every emerging issue may lose comparability and conceptual clarity.

The DiSHE-PT+ Barometer addresses this tension by separating what should remain cumulative from what should remain adaptive (OECD, 2023b). The core domains ensure continuity with recognised European reference frameworks, while the modular strands make it possible to incorporate higher-order issues such as AI-mediated financial decision-making, calibrated trust in AI and digitally mediated public policy literacy.

This makes the conceptual architecture particularly well suited to a higher education environment in which digital transformation is both structural and fast-moving.

From a policy perspective, the relevant objective is not to maximise trust in AI, but to foster calibrated trust. Users need to know when AI can function as a useful support tool, when its outputs require careful verification, and when human judgment should remain fully decisive. Measuring this calibration is especially important in higher education, where apparently fluent outputs may conceal error, bias or superficial reasoning, and where over-trust and under-trust can both undermine learning and institutional decision-making (Hoff & Bashir, 2015; Wang et al., 2024).

This modular logic is one of the strongest features of the proposal. It allows the Barometer to remain stable enough for annual monitoring while also adaptable enough to incorporate new technological and policy developments.

6.2.1. AI-mediated digital financial literacy

Within this modular architecture, the DiSHE-PT+ Barometer treats AI-mediated digital financial literacy not as a separate competence framework, but as an applied strand that operationalises

selected MAIL and EC–OECD AI Literacy competences in high-stakes financial contexts. It operationalises selected MAIL and AI Literacy competences in the concrete arena of personal finance, where young adults routinely interact with AI-enhanced systems such as mobile banking apps, instant payment services, credit scoring algorithms, robo-advisors and online investment platforms.

It is explicitly aligned with the national Digital Financial Literacy Strategy for Portugal, which calls for stronger evidence on how different population groups navigate digital financial services and on emerging risks and opportunities created by AI-driven tools (OECD, 2023a).

Conceptually, the sub-module connects three strands that are rarely brought together in higher education measurement (OECD, 2026; OECD, 2025; OECD, 2023a; Campbell, 2011): (i) general media and AI literacy (MAIL and the EC–OECD AI Literacy Framework), (ii) digital financial literacy as defined in recent OECD and Banco de Portugal work, and (iii) insights from behavioural finance on cognitive biases and decision-making under uncertainty. It focuses on how students use AI-enabled tools to access, compare and choose financial products, how they evaluate risks of fraud and manipulation in digital channels, and how they manage cognitive offloading-using AI to support, rather than outsource, the core cognitive and evaluative work of financial decision-making (Risko and Gilbert, 2016; Lodge and Loble, 2026).

6.2.2. Attitude and trust in AI

This dimension focuses on how students and staff perceive AI systems, how much confidence they place in their outputs, and the extent to which they maintain a posture of critical engagement rather than passive acceptance. It reflects a combination of cognitive, emotional and ethical stances: beliefs about what AI can and cannot do, perceived usefulness in everyday tasks, hallucinations, worries about bias, privacy and fairness, and the willingness to question, cross-check and, when necessary, override algorithmic advice.

In line with emerging AI literacy frameworks, attitudes and trust are therefore treated not as simple “for or against AI” positions, but as indicators of whether users can hold informed, proportional trust that is calibrated to AI’s capabilities and limitations in specific contexts. We argue for a shift away from traditional delegation of tasks to AI systems without interaction or critical scrutiny - as in fully automated AI workflows or autonomous AI agents - towards augmentation models in which human intelligence and artificial intelligence interact so that one plus one genuinely becomes more than two. Within this “3A” spectrum - Automation, Agents, and Augmentation - the Barometer explicitly treats augmentation as the preferred interaction style, embedding automation and agents in workflows that keep humans actively engaged, accountable, and in control of key decisions.

In higher education, this dimension is especially relevant because generative AI tools are becoming embedded in routine study, assessment and administrative practices, often in ways that are invisible to users. The Barometer will capture how different groups balance perceived benefits (efficiency, feedback, access to support) against perceived risks (hallucinations, hidden

data practices, over-reliance, erosion of critical thinking), and whether they see human oversight as indispensable when AI informs high-stakes decisions. It will also examine the extent to which learners and educators are aware that AI systems reflect human choices and perspectives, understand that AI is not all-knowing nor neutral, and feel both empowered and responsible to interrogate, contest or decline AI use when it conflicts with academic values, equity or wellbeing.

The emphasis on calibrated trust aligns with research in human–automation interaction, which highlights that both over-trust and under-trust in automated systems can lead to suboptimal outcomes. Trust must therefore be dynamically adjusted to the system's actual reliability and context of use. In the case of AI systems, this calibration is particularly challenging due to their opacity and probabilistic nature, reinforcing the need for explicit measurement of users' trust formation processes (Hoff and Bashir, 2016).

This need for calibrated trust is well established in the literature on human–AI interaction, which shows that users tend to rely on automated systems in ways that are not always aligned with their actual reliability, particularly when outputs are presented with high fluency and apparent authority (Lee & See, 2004). More recent research further highlights that the opacity and probabilistic nature of AI systems make it especially difficult for users to develop appropriate mental models, reinforcing the importance of explicitly fostering critical engagement and verification practices in educational contexts as referred by Bender et al. (2021). Also added that trust in AI is shaped not only by system performance, but also by perceived transparency, social cues and users' prior beliefs about technology (Glikson & Woolley, 2020).

6.2.3. Human AI interaction style

This dimension focuses on the concrete ways in which students and staff engage with generative AI systems: (i) how they formulate prompts, (ii) interpret and refine outputs, (iii) decide when to accept, revise or reject AI suggestions, and (iv) how far they are willing to delegate cognitive work to automated tools.

It captures whether users treat AI primarily as a search engine, a co-author, a tutor, a simulator or a decision-support partner, and whether they maintain active control of the process (iterative questioning, cross-checking, integrating multiple sources) or slide into passive reliance on fluent but potentially unreliable outputs.

In academic, informational and decision-support contexts, this dimension is particularly important for distinguishing between productive cognitive offloading (using AI to structure information, generate options or provide examples) and harmful outsourcing of judgment (allowing AI to define problem frames, select evidence and draw conclusions without meaningful human oversight).

To move from describing interaction patterns to assessing interaction quality, the Barometer draws on the 4D AI Fluency Framework (Dakan, and Feller, 2025), which identifies four

interconnected competences necessary for effective, efficient, ethical and safe AI use. Delegation concerns the ability to set goals and decide whether, when and how to engage AI, the conscious choice of what to offload versus what to retain. Description refers to the capacity to communicate clearly enough to prompt useful AI behaviours, including specifying output format, context, constraints and expected reasoning. Discernment captures the ability to evaluate AI outputs critically, detecting hallucinations, assessing relevance, and calibrating trust to the AI system's actual capabilities and limitations in a given context. Diligence encompasses responsibility for the final product, including transparency about AI assistance and accountability for accuracy and ethical implications.

These four competences map directly onto the interaction styles the Barometer seeks to capture. Delegation provides the decision framework that distinguishes conscious cognitive partnership from passive default to AI. Description operationalises the prompting and task-specification skills that determine output quality. Discernment underpins the calibrated trust already proposed in Section 6.2.2. Diligence connects to the broader accountability and transparency agenda of Section 8.6. Crucially, the 4D framework also recognises three modes of human-AI interaction - Automation, Augmentation and Agency - which align with and reinforce the 3A spectrum proposed in this paper, with augmentation as the preferred mode for higher education contexts where human judgment must remain central (Dakan and Feller, 2025). The Barometer will therefore examine the balance between AI-assisted and AI-free work, and users' self-reported ability to explain, in their own words, why they did or did not follow a given AI recommendation.

For analytical purposes, the Barometer could distinguish between assistive, collaborative and substitutive patterns of AI use. Assistive use refers to situations in which AI supports limited tasks without displacing core reasoning; collaborative use refers to iterative interaction in which the user remains actively engaged in framing, verifying and refining outputs; substitutive use refers to cases in which users offload substantial parts of interpretation, synthesis or judgment to AI. This distinction would help differentiate productive augmentation from forms of dependence that may weaken learning and critical autonomy. This typology is proposed here as an analytical device, informed by the literature on AI literacy and by current higher education debates on student uses, benefits, risks and institutional guidance surrounding generative AI (Chan & Hu, 2023; Laupichler et al., 2022; Wang et al., 2024).

6.2.4. Citizenship and public policy literacy

This dimension captures how students and staff understand, interpret and act upon public policy issues in digital and increasingly AI-mediated environments, from everyday interactions with public services and social rights portals to exposure to political communication, regulatory debates and algorithmically curated news. It focuses on whether users can make sense of how policies are designed, communicated and implemented online, recognise the role of digital platforms and AI systems. in shaping. visibility and participation, and evaluate claims and

narratives about taxation, social protection, environmental policy or EU regulation with appropriate levels of scepticism and evidence-seeking.

This challenge is closely related to research on digital and civic literacy, which shows that individuals often struggle to critically evaluate online information, particularly in environments shaped by algorithmic curation and platform dynamics as mentioned by Kahne and Bowyer (2017). In such contexts, the ability to assess credibility, recognise bias and understand how information is prioritised and framed becomes a central component of informed citizenship in digital societies.

Within this broader domain, the Barometer includes a specific sub-module on public financial policies such as taxation, financial consumer protection, deposit guarantee schemes and public pension systems, examined through the lens of how they are presented, simulated or mediated in digital interfaces (OECD, 2016; OECD, 2023a; Campbell, 2011). The aim is not to assess specialist expertise in public finance, but to understand whether higher education actors can navigate AI-enabled public communication, detect misrepresentation or oversimplification of complex policy choices, and exercise informed, responsible citizenship when digital tools mediate their relationship with the state and collective resources.

6.3. Measurement approach for the modular component

Methodological credibility will depend on avoiding an excessive reliance on self-perception items alone. For this reason, the Barometer should combine at least three types of evidence: self-reported practices and attitudes, scenario-based items that test judgment in realistic contexts, and a small number of behaviour-proximate items capable of distinguishing confidence from demonstrated evaluative capacity. This mixed measurement logic would strengthen construct validity while preserving feasibility for annual implementation (Molerov et al., 2020; OECD, 2023b).

6.3.1. AI-mediated digital financial literacy sub-module

The AI-mediated digital financial literacy sub-module is designed as an applied strand within the student questionnaire. It comprises a small set of vignettes and Likert-type items that capture how students use AI-enabled tools in typical financial contexts (e.g. consumer credit, savings and investment choices, exposure to online scams), and how they assess the reliability and fairness of algorithmically mediated offers and advice.

Rather than measuring detailed technical knowledge of financial products, the sub-module targets cross-cutting competences that are directly mapped onto the MAIL framework—Access and Use, Analyse and Evaluate, Create, and Reflect and Act Ethically and Responsibly—while also drawing on AI Literacy dimensions such as “AI reflects human choices and perspectives” and “AI reshapes work and human roles”.

Three clusters of competences are operationalised through scenario-based items.

First, understanding AI-enhanced financial services, including the ability to distinguish between generic information, personalised marketing and automated advice, and to recognise that many services rely on algorithmic profiling and risk scoring.

Second, using AI to compare products without delegating judgement, for instance by prompting a conversational agent to explain differences in total cost, risk and liquidity between two credit or savings options, while cross-checking outputs against official sources such as product information sheets or supervisory authorities.

Third, detecting fraud, manipulation and harmful cognitive offloading in digital financial contexts, including recognising deepfake-enabled scams, questioning "too good to be true" investment promises amplified by AI-curated feeds, and identifying when reliance on AI is drifting from beneficial support (e.g. simulations, calculations) towards detrimental outsourcing of core understanding and evaluative judgement.

Responses from this sub-module will not be used to construct a separate "financial literacy score", but will feed into the broader analytical agenda of the DiSHE-PT Barometer. In particular, they will allow the project to (i) characterise patterns of AI use in financial decision-making among higher education students, (ii) explore potential metacognitive equity gaps - whether students from less advantaged backgrounds are more prone to harmful outsourcing when interacting with financial AI tools - and (iii) generate evidence to inform future iterations of the national Digital Financial Literacy Strategy and institutional initiatives on digital and AI literacy in financial contexts (OECD, 2023a).

7. Why higher education needs this instrument

7.1. A new environment for learning and assessment

Generative AI is changing the nature of academic work. Students increasingly use AI systems for drafting, summarising, problem-solving, information retrieval, translation and idea generation. Teachers are also experimenting with AI tools for course preparation, content adaptation, feedback and assessment support.

These developments create opportunities for more personalised learning and more efficient academic support. But they also create risks: overreliance, plagiarism, loss of critical thinking, low-quality verification, unequal access, privacy problems and unclear boundaries between legitimate support and academic misconduct.

A further implication is that learning and assessment are increasingly being shaped by hybrid configurations in which human effort, digital support and AI-generated assistance are

intertwined in ways that are not always visible to institutions (OECD, 2023b). This complicates traditional assumptions about authorship, originality, independent work and the demonstration of competence, particularly in tasks such as drafting, summarising, translation, problem-solving and formative assessment support. In this setting, the central policy challenge is not simply whether AI is present, but how it is being used, by whom, under what conditions, and with what effects on learning quality, metacognitive engagement and fairness.

For higher education institutions, this creates a strong case for systematic evidence capable of distinguishing between forms of AI use that extend learning and those that weaken understanding, reduce critical effort or create new asymmetries between students with different levels of prior knowledge, support and confidence.

Assessment is one of the domains most directly unsettled by the spread of generative AI in higher education, because it challenges established assumptions about how competence is evidenced, how effort is inferred and how performance is compared across students. Assignments that traditionally served as relatively stable proxies for individual knowledge production - including essays, reports, take-home examinations and explanatory problem-solving tasks - can now be completed with varying degrees of AI assistance that are neither uniform nor easily visible to evaluators.

The central issue, therefore, is not simply whether AI is used, but whether existing assessment designs remain valid for the learning outcomes they are intended to measure. This creates a clear policy imperative for institutions: to revisit the alignment between assessment formats, intended competences, disclosure expectations and evaluative criteria, and to move beyond a narrow emphasis on detection towards a more robust framework of assessment validity, transparency and fairness in AI-mediated academic environments (OECD, 2023b).

The expansion of generative AI also requires a more conceptually demanding understanding of the relationship between learning and academic integrity. In AI-mediated contexts, integrity cannot be reduced to the traditional boundaries of plagiarism or unauthorised assistance alone. It increasingly concerns epistemic responsibility: the obligation to engage critically with generated content, to exercise informed judgment about its reliability and limitations, and to remain transparent about the role of digital assistance in academic work.

This is particularly important because students may produce outputs that are formally polished and procedurally acceptable without necessarily developing the underlying comprehension, disciplinary reasoning or reflective capacity that higher education seeks to foster.

From a policy perspective, this means that academic integrity should be treated not only as a compliance issue, but also as a pedagogical and developmental one. Institutions require stronger evidence on actual patterns of AI use in order to design responses that uphold standards while also protecting meaningful learning, intellectual agency and the formation of genuine competence.

Higher education institutions need better evidence to distinguish between productive use, risky use and exclusionary use.

7.2. A new environment for citizenship and decision-making

Students and staff do not encounter digital technologies only as learners. They also encounter them as citizens, consumers and future professionals. Financial choices, public service interactions, access to social rights, information verification and public debate are increasingly mediated by digital systems and, in many cases, by AI-enhanced interfaces.

This means that higher education must consider a broader literacy agenda. Digital competence is necessary, but not enough. Students also need the ability to interpret financial information, understand public policy instruments, recognise risk, verify information and act responsibly in complex digital environments.

This transformation also implies that citizenship increasingly depends on the capacity to operate within digitally mediated policy environments rather than only through direct interaction with formal institutions or static sources of official information. Public issues are now encountered through platform logics, algorithmically curated feeds, AI-assisted search, conversational interfaces and digitally simplified service environments that may improve accessibility while also reshaping how problems are framed, prioritised and understood. In this context, higher education institutions must prepare students and staff not only to access information, but to evaluate how digital systems influence visibility, trust, interpretation and choice in matters of public relevance.

This requires a stronger form of civic and policy literacy: the ability to recognise when complex public issues are being oversimplified, strategically framed or inaccurately represented, and to respond with informed, critical and responsible judgment. For that reason, citizenship and public policy literacy should be treated not as an ancillary complement to digital competence, but as a core component of higher education's role in preparing individuals for participation in contemporary democratic and policy environments.

Citizenship and public policy literacy in digital environments should also be understood as a question of critical online reasoning. In increasingly platform-mediated settings, citizens are required not only to access public information, but to evaluate source credibility, recognise strategic framing, identify simplification and bias, and understand how algorithms shape the visibility of policy claims. For that reason, this dimension should be anchored not only in digital citizenship discourse, but also in research on critical online reasoning and algorithmic literacy (Archambault et al., 2024; Molerov et al., 2020).

7.3. A new environment for institutional governance

Institutions themselves need better knowledge. The growth of AI use in higher education raises questions for curricular design, student support, digital ethics, quality assurance, teacher training, assessment rules and institutional governance. Without reliable evidence, responses risk becoming either reactive or excessively generic.

This governance challenge is becoming more complex because AI-related decisions are no longer confined to specialist digital units or isolated pedagogical experiments. They increasingly affect mainstream institutional functions, including programme design, teaching and assessment policies, staff development, student support, data governance, quality assurance and external accountability. In this setting, institutional leaders need evidence that is sufficiently granular to identify where AI is being adopted, how it is being perceived, and which risks or asymmetries are emerging across the higher education ecosystem.

A further issue is that governance without evidence can easily become either overly restrictive or insufficiently protective. Institutions may adopt broad prohibitions that fail to distinguish between legitimate and illegitimate uses, or they may rely on informal tolerance without developing clear safeguards for quality, fairness and transparency. A barometer-based evidence system can help avoid both extremes by supporting more proportionate, context-sensitive and learning-oriented governance, grounded in actual patterns of use rather than in anecdote, institutional anxiety or technological enthusiasm alone.

The Barometer can help institutions move from anecdotal perceptions to structured knowledge.

7.4. Behavioural risks and metacognitive equity gaps in AI-mediated environments

The expansion of AI-mediated environments in higher education does not only raise technical and ethical questions; it also creates new behavioural risks that interact with existing social and educational inequalities. Research on media and AI literacy has begun to highlight how smartphones, algorithmic feeds and AI-driven platforms can exacerbate cognitive offloading, encouraging users to externalise not only routine tasks but also core understanding and evaluative judgement.

In parallel, behavioural economics and decision-science work show that individuals with lower prior knowledge or lower confidence in their own abilities are often more likely to defer to seemingly authoritative systems, even when those systems are opaque or error-prone. These patterns suggest that, in AI-mediated academic and financial contexts, the students who could benefit most from high-quality support may also be the most exposed to harmful forms of outsourcing their own thinking.

This raises the possibility of what can be termed metacognitive equity gaps: situations where students with weaker prior skills or less social capital are more prone to over-trust AI outputs, under-estimate their limitations, and under-invest in their own critical engagement (Lodge and Loble, 2026; Hong et al., 2025). In contrast, students from more advantaged backgrounds may be better positioned to treat AI as a controllable tool, using it to extend their capabilities while retaining ownership of key decisions.

AI-mediated cognitive offloading might reduce knowledge retention and weaken critical thinking even when it improves task performance. The Barometer is well positioned to capture these dynamics by combining measures of AI literacy with constructs on self-efficacy, cognitive offloading and trust, identifying students most at risk of uncritical AI reliance — particularly in high-stakes domains such as financial decision-making and public policy. By making these behavioural risks and equity dimensions explicit, Portugal can position itself at the forefront of an international debate that increasingly recognises AI in education as much about human judgment and social justice as about algorithms and infrastructure.

These concerns are consistent with a growing body of research on cognitive offloading (e.g., Lodge and Loble, 2026), which shows that individuals tend to rely on external tools to store and process information, often at the expense of internal memory formation and deeper understanding. Empirical studies demonstrate that when individuals expect information to be externally available, they are less likely to encode and retain it (Sparrow et al., 2011). More recent work suggests that while offloading can improve short-term task efficiency, it may reduce long-term learning and metacognitive engagement when not accompanied by reflective practices (Risko & Gilbert, 2016). In AI-mediated environments, these dynamics may be amplified due to the fluency, authority and accessibility of generative systems.

This equity dimension deserves special attention because AI-related capability gaps are unlikely to be distributed randomly. Students with stronger prior knowledge, better support networks and higher confidence may be better able to use AI as an augmentative tool, while students with weaker prior preparation may be more exposed to passive reliance on fluent but unreliable outputs. In this sense, the Barometer could make a significant contribution by revealing whether AI is functioning as a capability amplifier for some groups and as a dependency trap for others. This interpretation is consistent with recent literature on the implications of AI for equity and inclusion in education, as well as with evidence on the cognitive risks associated with over-reliance on AI dialogue systems (Varsik & Vosberg, 2024; Zhai et al., 2024).

7.5. From “ban or embrace” to evidence-informed AI adoption in higher education

Debates on generative AI in higher education have quickly become polarised, in Portugal as elsewhere. Recent coverage of a manifesto signed by Portuguese university and polytechnic professors calling for a ban on generative AI in teaching and learning – and warning that students are being turned into “digital cretins” by a “factory of banalities” – illustrates the strength of concern among some academics, particularly around plagiarism, cognitive offloading and the erosion of deep reading and independent thought.

Similar anxieties are visible in international faculty surveys, where large majorities report fears that AI will weaken students’ critical thinking, shorten attention spans and undermine academic integrity.

At the same time, other studies point to a more ambivalent but largely pragmatic picture. Surveys of faculty in Europe and beyond find that most academics either already use or expect to use generative AI in their teaching, often seeing it as a way to support personalised learning, feedback and workload management, while also insisting on clear ethical and pedagogical safeguards. Portuguese research on generative AI in higher education similarly highlights both perceived benefits and concerns, emphasising that the real risk lies not in recognising AI as part of academic life, but in failing to equip students and staff with the critical, ethical and digital competences needed to use it well. Rather than a simple split between "pro-AI" and "anti-AI" camps, the emerging evidence suggests a spectrum of positions shaped by discipline, prior experience, institutional support and levels of AI literacy among educators.

In this context, the DiSHE-PT+ Barometer can play a constructive role by moving the debate beyond anecdote and moral panic towards a more granular understanding of how different actors in higher education actually perceive and use AI. By including specific constructs on attitudes to AI, perceived risks and opportunities, acceptable and unacceptable uses in teaching and assessment, and preferred human-AI interaction styles, the Barometer can help distinguish between principled scepticism, cautious experimentation and uncritical enthusiasm. It can also document how institutional clarity, professional development and local governance arrangements shape these attitudes, for example by comparing institutions that provide structured guidance and training with those where staff feel left to navigate AI tools alone.

Crucially, the Barometer is designed not to adjudicate who is "right" in these debates, but to provide policymakers and institutional leaders with a more precise map of where faculty and students stand, and why.

This includes identifying whether categorical prohibitions are primarily concentrated in disciplines or generations, whether they correlate with lower levels of AI literacy, and whether more nuanced positions - such as using AI for formative feedback but restricting it in high-stakes assessment - are already emerging as de facto norms. Over time, repeated waves of data can show whether exposure to AI literacy initiatives, revised assessment strategies and clearer institutional policies shift perceptions away from binary "ban or embrace" narratives towards a more stable culture of critical engagement, human oversight and informed augmentation. In this way, the DiSHE-PT+ Barometer aims to support higher education systems in Portugal not only to react to AI, but to steer its integration in ways that strengthen, rather than dilute, the core educational purposes of universities and polytechnics

The central institutional challenge is therefore not only detection, but validity. If assessment tasks can be completed with opaque and uneven forms of AI assistance, then institutions must ask whether the task still provides valid evidence of the intended learning outcomes, whether disclosure expectations are sufficiently clear, and whether marking criteria remain aligned with the competences that higher education seeks to cultivate. This shifts the policy focus from policing outputs alone to redesigning assessment for transparency, fairness and epistemic responsibility (Hashmi et al., 2024; Luo, 2024; Wang et al., 2024).

8. Policy relevance of the DiSHE-PT+ Barometer

A further step in strengthening the policy relevance of the Barometer lies in its potential to link competence profiles with outcome variables, such as academic performance, employability and the quality of transitions to the labour market. While the primary purpose of the instrument is diagnostic, establishing these connections would significantly enhance its analytical and policy value.

Evidence suggests that digital competences and higher-order cognitive skills are increasingly associated with labour market outcomes, particularly in knowledge-intensive sectors (OECD, 2016). Exploring these relationships in the higher education context would allow the Barometer to move beyond descriptive monitoring towards a more explanatory and forward-looking role, supporting a deeper understanding of how competences translate into individual and societal outcomes.

In this way, the DiSHE-PT+ Barometer reinforces its relevance across multiple levels, from pedagogical design to institutional strategy and public policy.

8.1. Curricular and pedagogical relevance

It can support curricular innovation and pedagogical adaptation by showing where students and teachers face the greatest challenges and where support needs are most urgent.

A further aspect of curricular and pedagogical relevance lies in the Barometer's capacity to move the debate beyond generic calls for "more digital skills" towards a more differentiated understanding of what kinds of competences matter, for whom, and under what educational conditions. Not all gaps in digital competence have the same pedagogical significance, and not all forms of AI use affect learning in the same way across disciplines, cycles of study or student profiles.

A robust evidence base can therefore help institutions identify where curricular adaptation is most needed, whether in foundational digital literacy, critical engagement with AI-generated content, discipline-specific uses of digital tools, or the development of transversal capacities such as judgment, verification and responsible autonomy.

In this sense, the Barometer can support a more precise and pedagogically meaningful alignment between competence diagnosis, curricular design and teaching innovation.

8.2. Ethical and regulatory relevance

It can inform institutional policies on the responsible use of AI, academic integrity, data protection and digital safety.

The Barometer also has strong ethical and regulatory relevance because it can help institutions and policymakers move from abstract principles to evidence-informed governance in areas where norms are still evolving. Debates on AI in higher education frequently invoke transparency, fairness, accountability, privacy and academic integrity, but institutional responses often remain uneven because they are not grounded in sufficiently clear knowledge of actual practices, perceptions and capability gaps.

A recurring monitoring instrument can help clarify where ethical concerns are most acute, which stakeholder groups are most exposed to uncertainty or misuse, and how formal rules interact with everyday institutional behaviour. This is particularly valuable in fast-moving environments, where regulation that is too rigid may quickly become obsolete, while regulation that is too vague may fail to provide meaningful guidance.

The Barometer can therefore contribute to a more adaptive regulatory culture, combining principle-based governance with empirically grounded institutional learning.

8.3. Equity relevance

It can identify inequalities across regions, social groups, types of institution, cycles of study and student profiles.

The Barometer's equity relevance is especially important because digital transformation does not affect all actors in higher education in the same way. Differences in socio-economic background, territorial location, institutional resources, disciplinary culture, disability status, worker-student condition or prior exposure to technology can all shape how individuals access, use and benefit from digital and AI-mediated environments.

Without systematic evidence, these asymmetries may remain partially invisible or be misinterpreted as purely individual differences rather than as structured inequalities in opportunity. A well-designed Barometer can help make such patterns visible and analytically actionable, allowing institutions and policymakers to distinguish between general competence gaps and more persistent forms of disadvantage.

In that sense, its contribution to equity is not merely diagnostic; it is strategic, because it enables more targeted and proportionate interventions aimed at reducing unequal conditions of participation and success across the higher education ecosystem.

8.4. Strategic governance relevance

It can support institutional planning and national debate by creating a stable and comparable reference point for higher education digital transformation.

An additional source of policy relevance lies in the Barometer's capacity to strengthen the interface between institutional self-knowledge and external accountability frameworks.

If methodologically robust and periodically implemented, it could provide higher education institutions with a more credible evidence base for demonstrating how they are responding to emerging challenges in digital competence, AI literacy, responsible technology use and inclusive student support.

This is particularly important in contexts shaped by quality assurance, accreditation, performance dialogue and strategic funding, where institutions are increasingly expected to show not only formal compliance, but also adaptive capacity and evidence-informed improvement.

In this sense, the Barometer could function as an intermediary instrument linking micro-level academic practices with meso- and macro-level processes of institutional evaluation, capacity-building and system steering.

8.5. Public policy relevance

It can connect higher education evidence to wider policy agendas in digital education, AI governance, consumer protection, digital financial literacy and citizenship (OECD, 2016; OECD, 2023a; Campbell, 2011).

The Barometer also has significant anticipatory value for public policy because it is designed to capture forms of change that often emerge earlier in practices than in formal institutional outcomes. In fast-moving domains such as generative AI, digitally mediated financial behaviour and algorithmically shaped information environments, behavioural shifts, trust patterns and capability gaps can evolve well before they become visible in completion rates, quality indicators or regulatory disputes.

A recurrent and modular evidence instrument can therefore serve as an early-warning infrastructure, enabling institutions and policymakers to identify emerging vulnerabilities, unequal patterns of adaptation and areas requiring preventive action.

From a policy perspective, this strengthens the transition from reactive governance to a more anticipatory model based on monitoring, foresight and timely institutional response.

8.6. Contribution to system learning and collective institutional intelligence

Finally, the policy relevance of the DiSHE-PT+ Barometer should be understood in terms of its potential contribution to system learning and collective institutional intelligence.

A national instrument of this kind does more than measure competences at a given point in time; it can help create a cumulative knowledge base on how higher education institutions, stakeholder groups and policy actors are adapting to digitally mediated transformation.

If annual findings are systematically analysed, compared and translated into shared reflection, the Barometer could support a more reflexive policy culture across Portuguese higher education, one in which evidence is used not only to diagnose gaps, but also to identify effective responses, diffuse good practices and refine intervention strategies over time.

Its longer-term value would therefore lie in enabling the sector to learn more coherently about what kinds of policies, pedagogies and governance arrangements are most effective in promoting digitally competent, critically informed and institutionally resilient higher education communities.

A further contribution of the Barometer in this domain lies in its potential to reduce institutional isolation in how digital transformation is understood and managed. In the absence of a shared evidence infrastructure, institutions often interpret emerging challenges through highly local lenses, which may lead to duplicated efforts, uneven responses and limited transfer of learning across the system.

A recurrent national instrument can help overcome this fragmentation by creating a common reference framework through which institutions are able not only to observe their own trajectories, but also to situate them within wider sectoral patterns.

This strengthens the conditions for collective intelligence in a substantive sense: not simply the accumulation of more information, but the development of a more coordinated capacity to interpret change, compare responses and build more coherent institutional and policy learning over time.

8.7. From indicators to action: an evidence-to-policy pathway for higher education

For the DiSHE-PT+ Barometer to fulfil its promise as a strategic evidence infrastructure, it is not enough to produce conceptually robust and comparable indicators. There must also be a clear and realistic pathway through which these indicators inform concrete decisions by institutions, regulators and ministries over time.

International experience with large-scale assessments and barometers suggests that instruments are most influential when they are embedded in existing planning, accreditation and funding cycles, and when their results are translated into tailored, actionable insights for specific audiences rather than remaining at the level of national averages. Without such a pathway, there is a risk that the Barometer's outputs, however sophisticated, will be acknowledged rhetorically but underused in practice.

The DiSHE-PT+ design already anticipates multiple levels of relevance – curricular and pedagogical, ethical and regulatory, equity-oriented and strategic. Building on this, the Policy Paper can more explicitly outline how annual results on digital competence, AI literacy,

AI-mediated digital financial literacy and citizenship and public policy literacy might be integrated into institutional self-assessment, program review and national strategy cycles.

At the institutional level, one pathway could involve inviting universities and polytechnics to prepare periodic "digital and AI literacy action plans" that respond to their specific Barometer profiles – for example, by targeting weak areas in AI literacy among first-year students, or by addressing identified disparities between fields of study or student groups.

At system level, aggregated results could inform the revision of national digital education, AI and financial literacy strategies, as well as the allocation of targeted support for capacity-building, infrastructure and professional development in institutions facing greater challenges.

A second component of this evidence-to-policy pathway concerns dialogue and interpretation. Indicators on sensitive topics such as AI use, financial decision-making or public policy understanding are inevitably value-laden and open to multiple readings. Rather than presenting scores as self-explanatory, the Barometer should be accompanied by structured opportunities for collective interpretation – for example through annual stakeholder workshops, sectoral dialogues and thematic briefs that bring together institutional leaders, student representatives, regulators and experts in digital education, AI ethics, behavioural economics and public policy.

These processes can help avoid the twin risks of complacency ("we are above average, therefore no action is needed") and alarmism ("scores are low, therefore the instrument proves that AI is harmful"), and instead focus attention on feasible, context-sensitive responses.

Finally, the Policy Paper can clarify how the Barometer will support learning over time, rather than one-off judgments. By committing to methodological stability in the core and carefully documented evolution of the modular component, the instrument can track whether specific policy changes, institutional initiatives or regulatory developments are associated with meaningful shifts in competences and attitudes.

For example, future waves could examine whether the introduction of national or institutional AI literacy frameworks, changes in assessment practices, or the implementation of a Digital Financial Literacy Strategy are reflected in improved AI literacy, safer financial behaviour or more informed engagement with public policy.

Making this longitudinal learning function explicit strengthens the case for sustained investment in the Barometer and reinforces its role not only as a diagnostic tool, but as a feedback mechanism that helps Portugal iteratively refine how higher education prepares students and staff for life and work in AI-mediated societies.

To maximise policy uptake, annual Barometer results should be translated into differentiated action formats rather than presented only as national averages. A practical model would combine four outputs: a national report, institution-level profile sheets, thematic briefs on priority risks or inequalities, and a light-touch expectation that participating institutions prepare proportionate digital and AI literacy action responses.

This would help transform measurement into iterative institutional learning rather than one-off diagnosis. This operational model is proposed here as a policy-oriented translation device, consistent with recent work on digital education ecosystems, data-informed governance, and institutional policy development in higher education (OECD, 2023b; O'Sullivan et al., 2025).

9. Proposed indicators and output structure

AI governance, consumer protection, digital financial literacy and citizenship. The Policy Paper proposes that the Barometer should produce a set of simple and communicable indicators, expressed whenever possible in 0-100 scores, in order to facilitate annual comparison and public communication (OECD, 2023b).

The main output dimensions could include:

- Digital competence;
- AI literacy and responsible use;
- Digital safety and protection;
- AI-mediated digital financial literacy;
- Citizenship and public policy literacy;
- Human–AI interaction quality.

These indicators should be complemented by profile-based analysis, allowing comparison by:

- Region;
- Type of institution;
- Cycle of study;
- Field of education and training;
- Socio-economic status;
- Worker-student condition;
- Specific needs;
- Role in the ecosystem.

Annual outputs should include:

1. A full annual report;
2. A one-page infographic;
3. An anonymised dataset with variable dictionary;
4. An online dashboard.

This output architecture is particularly important because it combines analytical depth with communication value. The Barometer should not produce data that remain underused. It should produce data that can be translated into action.

10. Governance and implementation model

For the DiSHE-PT+ Barometer to become a credible national reference, governance will be crucial.

The overall governance and implementation model should be designed not only to protect methodological rigour, but also to ensure that the Barometer remains usable as a long-term policy instrument rather than a one-off research exercise. This requires a structure capable of combining scientific credibility, institutional coordination and operational continuity across annual waves.

In practice, credibility will depend on whether the Barometer can maintain a transparent chain from concept definition to data collection, interpretation, public communication and policy use. A governance model that makes these links explicit is more likely to sustain trust among higher education institutions, respondents and external stakeholders (OECD, 2023b).

A second requirement is that governance should be conceived as an enabling condition for policy learning, not merely as an administrative arrangement. The Barometer is expected to inform institutional strategy, curricular adaptation, AI governance and public policy reflection over time.

For that reason, the implementation model should support recurring interpretation, structured follow-up and feedback loops between evidence production and decision-making. In this sense, governance should be evaluated not only by procedural soundness, but also by its capacity to transform data into cumulative institutional and system learning.

10.1. Institutional anchoring

Institutional anchoring is especially important because the Barometer sits at the intersection of higher education practice, public policy analysis and emerging digital governance challenges.

The joint leadership of UMPP and ISCAL provides a credible starting point precisely because it combines policy-oriented analytical capacity with direct proximity to higher education realities. This dual anchoring increases the likelihood that the instrument will be both academically robust and practically useful, avoiding the common risk of producing evidence that is conceptually strong but institutionally weakly embedded.

A strong institutional anchor also matters for continuity. Monitoring instruments of this kind require more than technical design; they require organisational commitment, reputational stewardship and the capacity to sustain implementation over time. If the Barometer is to become a national reference, it will need a lead structure that is recognisable, trusted and capable of coordinating scientific, operational and communication functions across annual cycles. Stable institutional anchoring therefore enhances both legitimacy and the probability of long-term durability.

10.2. Methodological stability with adaptive capacity

The instrument should be governed through a clear methodological protocol. The stable core should change as little as possible over time, while the modular component should allow selective adaptation to new issues.

Methodological stability is essential if the Barometer is to generate valid longitudinal knowledge. Without a sufficiently stable core, annual comparisons may become analytically weak or misleading, especially in a field where technological practices change quickly and where pressure to add new topics can be constant.

A stable core aligned with recognised competence frameworks provides the minimum continuity required for trend analysis, benchmarking and the identification of meaningful shifts in behaviour, confidence and capability over time.

At the same time, stability must be balanced with adaptive capacity. The challenge is not simply to preserve the instrument, but to preserve what should remain stable while allowing selective evolution where policy relevance requires it. This is particularly important in areas such as generative AI, digital financial behaviour and public policy literacy, where new practices and risks may emerge faster than classic competence frameworks can absorb them.

The modular logic of the Barometer is therefore methodologically valuable because it allows innovation without undermining comparability.

10.3. Advisory and stakeholder involvement

An advisory structure involving higher education institutions, policymakers, digital education specialists, AI experts, financial literacy specialists and public policy experts could strengthen both legitimacy and relevance.

Advisory and stakeholder involvement should be treated as a substantive feature of the implementation model rather than as an optional legitimising layer. Because the Barometer addresses domains that are both technically complex and normatively sensitive, its relevance will depend in part on whether the instrument is informed by multiple perspectives, including those of institutions, students, policymakers, AI specialists, financial literacy experts and public policy actors.

An advisory structure can improve not only legitimacy, but also problem definition, instrument design and the practical interpretability of results.

There is also a strong governance rationale for broad stakeholder involvement. Experience from wider governance and territorial policy debates suggests that meaningful participation is not simply a procedural burden; it can improve ownership, strengthen trust, broaden institutional learning and make policy responses more context-sensitive.

For the DiSHE-PT+ Barometer, this is particularly relevant because stakeholder dialogue can help prevent both excessive technocratisation and excessively narrow institutional interpretation, ensuring that the instrument remains responsive to the diversity of realities within the higher education ecosystem.

10.4. Data governance and trust

Since the Barometer concerns sensitive areas such as AI behaviour, financial literacy and institutional practices, transparent rules for privacy, anonymisation, data handling and access will be essential.

Data governance will be central to the credibility of the Barometer because the instrument touches on areas that respondents may reasonably perceive as sensitive: AI use, institutional practices, confidence in digital systems, financial literacy and policy understanding. In such contexts, trust cannot be assumed; it must be institutionally produced through clear protocols on privacy, anonymisation, storage, access and reuse.

If respondents are uncertain about how their answers may be interpreted or used, data quality may deteriorate and institutional acceptance may weaken.

A transparent and well-communicated data governance model is therefore not only an ethical safeguard, but also a condition of methodological robustness.

10.5. Data governance and trust

The development of the DiSHE-PT+ Barometer should follow a phased approach that balances ambition with methodological caution. In a first phase (2026–2027), a pilot instrument should be developed and tested with a sample of students and teaching staff at ISCAL and partner institutions within the UMPP network, allowing for the validation of the stable core, the calibration of the modular component, and the testing of scenario-based items in the AI-mediated digital financial literacy sub-module.

In a second phase (2027–2028), the validated instrument should be expanded to a broader sample across the polytechnic and university systems, with particular attention to regional diversity, institutional type and field of study. In a third phase (2028 onwards), the Barometer should be established as an annual monitoring instrument with a stable governance structure, a publicly accessible dashboard, and formal connections to institutional planning and accreditation cycles.

Each phase should include a methodological review to ensure that the modular component remains responsive to the evolving AI and digital landscape.

11. Strategic relevance for Portugal

The strategic relevance of the DiSHE-PT+ Barometer for Portugal also lies in its capacity to connect several policy domains that are often addressed separately. In practice, digital competences, AI literacy, financial decision-making, public policy literacy, institutional governance and higher education quality increasingly intersect in the daily life of students and staff.

A national monitoring instrument capable of capturing these intersections would therefore support a more integrated policy understanding of digital transformation, allowing Portugal to move beyond fragmented responses and towards a more coherent strategy for shaping knowledge in higher education.

This strategic value is reinforced by the fact that higher education institutions are becoming key nodes in the country's capacity to adapt to digital and AI-driven change. They are not only training future professionals; they are also shaping the cognitive, ethical and civic infrastructures through which digital societies function.

In that sense, the Barometer should be understood not merely as a tool for the education sector, but as part of a broader national capacity-building agenda concerned with innovation, institutional resilience, informed citizenship and the quality of public decision-making in digitally mediated environments.

The Barometer is especially timely for Portugal for five main reasons.

11.1. It fills a national evidence gap

Portugal still lacks a stable and system-wide monitoring instrument specifically focused on higher education digital competences and AI-mediated literacies.

This evidence gap is particularly significant because Portugal already possesses several relevant but disconnected sources of information on digital competences, financial literacy and digital transformation. What is missing is not the existence of isolated studies, but the presence of a common and recurring framework that can generate system-level comparability across institutions, stakeholder groups and time. The DiSHE-PT+ Barometer addresses precisely this missing layer by creating the conditions for cumulative knowledge rather than isolated diagnosis.

Filling this gap is also important for methodological reasons. Without a stable instrument, Portuguese higher education risks relying on evidence that is episodic, weakly comparable and only partially suited to the new realities created by generative AI and digitally mediated decision-making.

A regular barometer would allow Portugal to move from scattered observation to structured monitoring, thereby improving both the descriptive quality of available evidence and its usefulness for institutional and policy action.

11.2. It aligns with European and international agendas

The Barometer resonates with European digital education priorities, responsible AI frameworks, OECD work on digital financial literacy and current international concern with trustworthy and inclusive digital transformation in education (OECD, 2023a).

The Barometer's alignment with European and international agendas is important not only because it increases conceptual legitimacy, but also because it allows Portugal to position its higher education monitoring efforts within wider policy and methodological developments.

By anchoring the stable core in European digital competence frameworks and by integrating concerns related to responsible AI use, digital financial literacy and public policy literacy, the proposal resonates with current EU and OECD priorities regarding digital readiness, trustworthy digital transformation and the strengthening of citizens' capacity to operate in complex digital environments.

This alignment also creates practical advantages. Instruments that are conceptually connected to recognised international frameworks are more likely to support benchmarking, policy dialogue and future collaboration with European initiatives, comparative projects and technical support instruments.

In that sense, the DiSHE-PT+ Barometer would not only respond to domestic needs; it would also make Portugal more interoperable with wider debates on digital education, AI governance and competence measurement in higher education.

11.3. It supports evidence-informed governance

By transforming dispersed practices and perceptions into structured evidence, the Barometer can improve how institutions and policymakers understand the evolving higher education ecosystem.

The governance relevance of the Barometer becomes particularly visible when considering the speed at which institutions are being asked to respond to digital and AI-related challenges. Universities and polytechnics are increasingly expected to adopt policies on AI use, revise assessment approaches, strengthen digital support, protect data, promote integrity and address capability gaps across different stakeholder groups.

In the absence of structured evidence, these decisions are likely to rely on incomplete perceptions, isolated incidents or uneven institutional assumptions. The Barometer can reduce that uncertainty by providing a more stable basis for prioritisation, sequencing and institutional learning.

Evidence-informed governance also depends on the capacity to connect information with decision cycles. A recurring barometer can support this by feeding into institutional planning, programme review, staff development strategies, digital inclusion measures and broader policy reflection at system level.

Its relevance therefore lies not only in what it measures, but in its potential to organise institutional attention around comparable and interpretable signals, helping decision-makers move from reactive responses to more deliberate and strategic forms of governance.

11.4. It can strengthen Portugal's policy positioning

A stable and innovative instrument of this kind would position Portugal more strongly in European debate on digital competences, higher education transformation and AI-related literacy.

A stable and innovative instrument of this kind could strengthen Portugal's policy positioning by allowing the country to speak with greater authority in European and international debates on digital competences, AI literacy and the transformation of higher education.

Countries that are able to generate robust and policy-relevant evidence are generally better placed to influence conceptual agendas, share institutional models and contribute to the design of future measurement frameworks. In this respect, the DiSHE-PT+ Barometer could help Portugal move from a predominantly reactive position to a more agenda-shaping role.

This positioning effect may be especially valuable in emerging areas where measurement standards are not yet fully stabilised, such as AI-mediated literacy, human–AI interaction quality and digitally mediated public policy understanding. If Portugal is able to develop a credible, annual and analytically robust instrument in these domains, it may become not only a user of international frameworks, but also a contributor to their refinement.

This would increase the visibility of Portuguese institutions and create opportunities for participation in wider European research, technical cooperation and policy experimentation networks.

11.5. It responds to the regulatory demands of the EU AI Act

The EU AI Act, which entered into force in August 1, 2024 with obligations phasing in through 2026–2027, classifies education and vocational training as high-risk domains for AI deployment (Regulation (EU) 2024/1689). AI systems for admission, learning outcome evaluation or student behaviour monitoring will face enhanced requirements on transparency, human oversight, data quality and risk management.

The DiSHE-PT+ Barometer can serve as a readiness monitoring tool, providing structured evidence on AI use patterns, trust levels and interaction quality to support institutional compliance and governance. It also positions Portugal to contribute to international AI literacy measurement efforts.

12. Risks and design challenges

No policy instrument is neutral, and the DiSHE-PT+ Barometer will face important design challenges.

First, there is a risk of conceptual overload if too many dimensions are added without sufficient prioritisation.

Second, there is a risk of survey fatigue if the instrument becomes too demanding for institutions or respondents.

Third, there is a risk of false precision if score-based indicators are communicated without sufficient explanation.

Fourth, there is a risk of technological obsolescence if the modular component is not updated in line with changing AI and digital practices.

These risks are manageable, but they reinforce the need for a clear methodological strategy and strong governance.

13. Policy recommendations

This proposal supports the following policy recommendations:

1. Develop the DiSHE-PT+ Barometer as a stable annual monitoring instrument for the Portuguese higher education ecosystem.
2. Anchor the instrument in European reference frameworks, particularly DigComp, while maintaining modular flexibility.
3. Include AI literacy and responsible use as central dimensions of the Barometer, rather than peripheral add-ons.
4. Integrate digital financial literacy and public policy literacy into the higher education monitoring agenda.
5. Produce indicators that are simple, comparable and policy-relevant, using score-based communication formats.
6. Disaggregate results by relevant social, territorial and institutional profiles to identify inequalities and target interventions.
7. Create a yearly public evidence package combining report, infographic, anonymised dataset and dashboard.
8. Use the Barometer to support curricular, ethical and institutional decisions in higher education.
9. Establish a governance model that combines methodological stability, scientific credibility and stakeholder relevance.
10. Position the DiSHE-PT+ Barometer as a national reference instrument for shaping knowledge in higher education.
11. Promote the use of Barometer results as a basis for institutional experimentation, encouraging HEIs to pilot and evaluate targeted interventions and to share evidence of what works across the system.

14. Conclusion

The DiSHE-PT+ Barometer represents more than a measurement initiative. It is a proposal to build a strategic evidence infrastructure for Portuguese higher education at a time of accelerated digital and AI-driven transformation.

Its added value lies in combining conceptual robustness, annual comparability, policy relevance and responsiveness to emerging challenges. By linking digital competence with AI literacy, digital financial literacy and public policy literacy, the Barometer broadens the meaning of what it means to be prepared for higher education and for citizenship in increasingly digital societies.

For these reasons, the DiSHE-PT+ Barometer should be seen as a relevant and timely contribution to shaping knowledge in higher education in Portugal. If developed carefully, it can become an important reference instrument for institutions, policymakers and researchers seeking to understand how digital transformation is reshaping the higher education ecosystem.

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