AI Literacy Teacher Academy

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Teachers' AI Literacy Competency Framework

A European reference structure for mapping, developing, and assessing teachers' AI literacy

Teacher Academy for AI Literacy

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The TAILiC Framework: Teachers' AI Literacy Competency Framework

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About this publication

This document presents the **TAILiC Framework: Teachers' AI Literacy Competency Framework**, developed as part of the Teacher Academy for AI Literacy project, an Erasmus+ Teacher Academies initiative (Project No. 101249404). The TAILiC Framework defines the competences teachers need to understand, evaluate, and responsibly integrate Artificial Intelligence (AI) in education. It is intended as a practical and research-informed reference for teacher education institutions, policymakers, school leaders, professional development providers, curriculum developers, researchers, and teachers working across primary, secondary, and vocational education. The project brings together higher education institutions, teacher education organisations, public education authorities, schools, and associated partners from Greece, Cyprus, Germany, Italy, Romania, Sweden, and Turkey. This transnational structure supports the framework's European orientation and its focus on classroom realities across diverse educational contexts.

Use of the document

The framework may be used as a reference for competence mapping, training curriculum design, assessment rubrics, school AI policies, professional learning pathways, and comparative research. It provides a shared structure while allowing national, institutional, and school-level adaptation.

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Preface

Artificial Intelligence (AI) is changing how information is generated, evaluated, personalised, and circulated in education. Teachers increasingly encounter AI through generative tools, adaptive platforms, automated feedback systems, recommendation engines, assessment support, translation tools, and administrative systems. Recent research shows that teachers' AI literacy must go beyond operational tool use and include critical, pedagogical, ethical, and professional judgement, especially as teachers navigate the educational limitations and practical demands of generative AI tools (Selwyn et al., 2025; Sperling et al., 2024; Velander et al., 2024). These developments require more than technical proficiency. They require professional judgement about learning, evidence, inclusion, ethics, privacy, and human agency.

The Teacher Academy for AI Literacy project recognises that current AI literacy initiatives are often fragmented, tool-centred, and unevenly available across countries and school systems. It therefore seeks to create a sustainable model for teacher professional development that enables teachers to become confident users, critical evaluators, and pedagogically responsible facilitators of AI-supported learning.

The TAILiC Framework offers a common European structure while allowing national and institutional adaptation. It does not prescribe a single curriculum or list of approved tools. Instead, it identifies the competences teachers need to understand AI, evaluate it critically, integrate it pedagogically, govern it responsibly, and contribute to school-level readiness. This document is based on desk and field research conducted across seven European countries, as well as a comparison with major international and European frameworks. These include UNESCO's teacher and student AI competency frameworks (Miao & Cukurova, 2024; Miao et al., 2024), the AILit Framework for primary and secondary education (OECD & European Commission, 2026), Digital Promise's AI literacy framework (Mills et al., 2024), the European Schools framework for the educational use of generative AI (European Schools, 2025), and recent research on interdisciplinary, project-based, and socio-technical AI literacy (Li et al., 2025; Tadimalla & Maher, 2024).

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Executive Summary

The TAILiC Framework defines the teacher competences required to integrate AI responsibly into European education. In this framework, competences refer to the combination of knowledge, skills, attitudes, ethical judgement, pedagogical practice, and organisational awareness that teachers need to use, evaluate, and govern AI in educational contexts. It positions teachers as critical mediators, pedagogical designers, ethical decision-makers, facilitators of human-AI collaboration, and contributors to institutional AI readiness.

The framework is organised into four categories aligned with the project's research design, and empirical findings:

- AI Knowledge and Awareness
- AI in Pedagogical Practice and Innovation
- Ethics, Governance and Human Agency
- Professional Development and Organisational Readiness

These categories form an integrated system. Knowledge enables professional judgement; professional judgement guides pedagogical use; ethics govern practice, and continuous learning supports ongoing improvement.

Across the four categories, teachers progress through three levels:

- Acquire
- Apply and Evaluate
- Lead and Transform

These three levels provide progression indicators rather than strict certification requirements. They can be adapted by national agencies, teacher education institutions, professional development providers, and schools to support curriculum design, professional learning pathways, self-assessment, portfolio assessment, and quality assurance.

The framework responds directly to the project evidence. The desk research found a clear shift from narrow technical definitions of AI literacy towards multidimensional, human-centred, and socio-technical approaches (Trichina & Konstanti, 2026). The field research showed that many teachers are open to AI and already experiment with it, but their practice remains uneven, often self-directed, and insufficiently supported by institutional guidance. Teachers consistently requested practical, subject-specific, ethically grounded, and sustained professional development (Trichina & Konstanti, 2026).

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Glossary

The glossary provides research-informed working definitions for use within this framework. These definitions are not intended to replace national legal definitions, official policy terminology, or curriculum-specific language. National versions may vary; therefore, it is recommended that the terms be adapted to align with local legal terminology, curriculum language, and teacher professional standards.

Term	Working definition
AI literacy	The capacity to understand, evaluate, use, and critically engage with AI in ways that are informed, ethical, inclusive, and socially responsible.
Teacher AI literacy	The professional capacity of teachers to understand AI systems, evaluate their educational value and limitations, use them pedagogically where appropriate, protect learners' rights and agency, and contribute to responsible AI adoption in their school or educational context.
Competence	The combination of knowledge, skills, attitudes, ethical judgement, pedagogical practice, and organisational awareness needed to act effectively and responsibly in a professional context.
Generative AI	AI systems that generate outputs in response to prompts, such as text, images, audio, code, or video.
AI-supported learning	Learning activities in which AI tools are used to support teaching, learning, feedback, assessment, creativity, inquiry, accessibility, or differentiation, while teachers and learners retain responsibility for goals, interpretation, judgement, and outcomes.
Responsible AI adoption	The planned and context-sensitive integration of AI in education in ways that protect privacy, fairness, transparency,

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	inclusion, academic integrity, learner agency, teacher judgement, and educational purpose.
Algorithmic bias	Systematic unfairness or distortion in AI outputs or decisions that may disadvantage individuals or groups because of the data used, model design, deployment context, or human choices involved in the system.
Hallucination	A result produced by AI that appears plausible but is inaccurate, unsupported, misleading, or fabricated.
Human agency	The capacity of teachers and students to make informed decisions, retain responsibility, and avoid inappropriate delegation of judgement or decision-making to AI systems.
Human–AI collaboration	A learning or professional process in which AI supports human thinking, creativity, feedback, or decision-making, while humans remain responsible for goals, judgement, interpretation, and final decisions.

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1. Rationale and scope

AI literacy has become a professional requirement for teachers because AI systems increasingly mediate knowledge production, learning support, classroom resources, student assessment, and educational decision-making. Teachers' ability to use AI tools is only one part of this requirement. The central professional question is whether teachers can make well-informed, ethically sound, and pedagogically appropriate decisions about the use of AI in specific learning contexts.

The TAILiC Framework adopts a professional understanding of teacher AI literacy. In this framework, teacher AI literacy refers to teachers' capacity to understand AI systems and their limitations, assess their outputs and implications, use them pedagogically where appropriate, protect learners' rights and agency, and contribute to the organisational conditions required for responsible AI adoption (Long & Magerko, 2020; Miao & Cukurova, 2024; Mills et al., 2024).

The framework brings together technical, pedagogical, ethical, and human-centred dimensions of AI literacy discussed in recent European and global frameworks and research (Miao & Cukurova, 2024; OECD & European Commission, 2026; Redecker, 2017). Its scope includes primary, lower-secondary, upper-secondary, and vocational education. Since AI increasingly affects literacy, the humanities, the arts, languages, the social sciences, mathematics, science, vocational education, and school administration, the framework is relevant to both STEM and non-STEM subjects. Pre-service and in-service teacher education can also benefit from this framework. It can be applied to national professional standards, school self-evaluation, induction, continuing professional development, and initial teacher education.

This framework does not depend on any particular tools. Any fixed tool library would quickly become outdated due to the rapid development of AI systems, including but not limited to generative AI, adaptive learning systems, automated feedback tools, recommendation systems, predictive analytics, and administrative AI systems. The framework therefore focuses on durable competences: conceptual understanding, critical evaluation, pedagogical design, ethical judgement, governance awareness, professional learning, and institutional contribution.

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2. Project context and European added value

The Teacher Academy for AI Literacy project addresses a recognised gap in structured professional development for teachers' AI literacy. Across Europe, many AI literacy initiatives remain fragmented, tool-centred, and unevenly connected to teachers' everyday classroom responsibilities. While several existing frameworks provide valuable guidance, teachers still need a practical professional structure that connects AI literacy with pedagogy, ethics, assessment evidence, school readiness, and European regulatory expectations.

The TAILiC Framework addresses this need by providing a teacher-focused European reference framework. It is grounded in the project's desk and field research and is designed to support teachers not only as users of AI tools but also as critical evaluators, pedagogical designers, ethical decision-makers, and contributors to responsible school-level AI adoption (Trichina & Konstanti, 2026). This framework is developed under Work Package 2 (WP2): Development of Teachers' Competences Framework on AI Literacy.

Teacher AI literacy is shaped by common European concerns, including privacy, data protection, inclusion, digital transformation, trustworthy AI, human oversight, and learner agency. At the same time, its implementation depends on national curricula, teacher education systems, infrastructure, school governance, and cultural understandings of professional autonomy (European Commission, 2020, 2022; European Parliament & Council of the European Union, 2016, 2024). The framework therefore offers a common language without eliminating local agency. Its European added value lies in combining national flexibility with a shared professional structure.

The project's transnational character is central to this approach. The consortium includes partners from Greece, Cyprus, Germany, Italy, Romania, Sweden, and Turkey, bringing together policy, school, research, and teacher education perspectives. This diversity strengthens the framework by ensuring that it reflects different levels of infrastructure, regulatory interpretation, training provision, and pedagogical readiness.

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3. Methodological Basis and Empirical Foundations

This section outlines the methodological basis of the TAILiC Framework, synthesises the empirical findings from desk and field research across seven partner countries, and explains the framework's alignment with international and European standards. The section is organised around four elements: the methodological approach, the desk and field research findings, the comparative framework analysis, and the design implications for the competency framework.

3.1 Methodological Approach and Framework Logic

This framework was developed by synthesising three distinct evidence streams:

1. **Desk Research**: Mapping AI definitions, policy contexts, ethical challenges, and pedagogical approaches in school education.
2. **Field Research**: Examining teachers' self-reported knowledge, practices, concerns, and training needs via surveys, interviews, and focus groups.
3. **Comparative Framework Analysis**: Reviewing global and European frameworks for AI literacy, digital competence, and generative AI.

The desk and field research followed a common transnational research logic across the seven partner countries. The desk research examined national policy contexts, existing educational initiatives, AI-related priorities, and relevant challenges in school education, while the field research gathered teachers' perspectives through surveys, interviews, and focus groups, with a focus on their AI knowledge, current practices, perceived opportunities and risks, ethical concerns, institutional conditions, and professional development needs. National findings were first analysed at the country level and then synthesised transnationally to identify recurring patterns and framework-relevant implications. A comprehensive overview of the desk and field research is available in the Transnational Report on AI Literacy Education (Trichina & Konstanti, 2026).

Building on this transnational synthesis, the evidence was then organised around the project's aims and the framework's intended use. As shown in Figure 1, recurrent themes were translated into framework competency elements through three guiding validation checks: (1) connection with current academic scholarship and policy; (2) clear emergence within the national or transnational field data; and (3) potential to be translated into observable teacher performance and classroom artefacts, such as reflective portfolios. These checks were used to ensure coherence and practical relevance, without limiting the framework to already established definitions of AI

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literacy. This balance among research, policy, and field evidence ensures the framework remains relevant as technology evolves, while also creating a flexible professional reference structure that can support future cross-country validation.

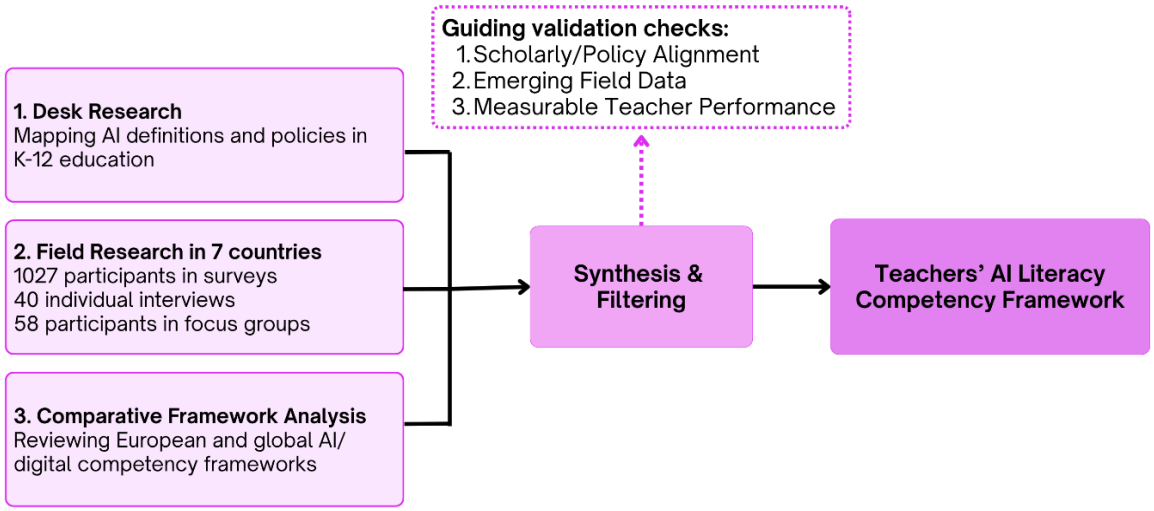

Figure 1. Evidence Streams and Validation Process for the TAILiC Framework Development

3.2 Summary of Desk and Field Research Results

The comprehensive desk and field research presented by Trichina and Konstanti (2026), which includes the comparative analysis across Greece, Cyprus, Germany, Italy, Romania, Sweden, and Turkey, revealed four primary socio-technical and pedagogical patterns that justify a unified European framework:

- **Uneven Readiness vs Receptivity:** Teachers were generally receptive to AI, but their readiness was fragmented. Conceptual awareness did not always result in ethically sound or pedagogically strong practice. Teachers were often familiar with operational tools, yet their understanding of data, model behaviour, probabilistic outputs, and AI limitations remained uneven.
- **The Institutional Implementation Gap:** A clear tension was identified between high-level policy ambition and classroom reality. AI integration was often driven by teachers' independent and self-directed experimentation rather than by coherent institutional strategies. This finding supports the inclusion of organisational readiness as an active competency category, rather than as a background condition.
- **Instrumental vs. Transformative Pedagogy:** AI was mostly used as an instrumental tool for lesson preparation, translation, resource generation, personalisation, and administrative efficiency. More transformative applications,

such as AI-supported inquiry, dialogic learning, adaptive support, project-based learning, assessment redesign, and student AI literacy activities, were less common. This pattern suggests the need for sustained, subject-specific, and practice-oriented professional development.

- **Unoperationalised Ethical Concerns:** Teachers consistently identified ethical risks, including algorithmic bias, data privacy, misinformation, hallucinations, surveillance, academic integrity, and student overreliance. However, these concerns were not always translated into classroom routines or school-level protocols. Teachers need practical guidance for data minimisation, output verification, disclosure, attribution, tool selection, human oversight, and responsible student use.

3.3 Comparative Framework Analysis

The comparative framework analysis reviewed selected international and European frameworks on AI literacy, digital competence, and generative AI in education, including UNESCO's teacher and student AI competency frameworks, Digital Promise's AI literacy framework, the AILit Framework for primary and secondary education, DigCompEdu, and the European Schools framework for generative AI in education (European Schools, 2025; Miao & Cukurova, 2024; Miao et al., 2024; Mills et al., 2024; OECD & European Commission, 2026; Redecker, 2017).

The reviewed frameworks point to a multidimensional understanding of AI literacy that goes beyond technical tool use and encompasses conceptual understanding, critical evaluation, ethical judgement, pedagogical application, human agency, inclusion, and responsible participation in AI-mediated environments. At the same time, each framework brings a different emphasis: UNESCO provides global competency structures for teachers and students; DigCompEdu offers a recognised progression model for educators' digital competence; Digital Promise focuses on understanding, evaluating, and using AI; the AILit Framework defines learner-centred AI literacy for primary and secondary education; and the European Schools framework provides system-level guidance for generative AI use.

This comparison clarified the distinctive contribution of the TAILiC Framework. The framework builds on these international and European foundations, but responds to a more specific need: a European teacher-focused structure that links AI literacy with classroom practice, professional development, assessment evidence, GDPR-aligned safeguards, and school-level readiness.

This analysis informed the framework's four-layer structure: core competency categories, horizontal dimensions, progression levels, and assessment evidence. It

supported a model that separates but connects conceptual, pedagogical, ethical, and organisational competences, uses progression levels for professional growth, and translates teacher AI literacy into observable evidence such as lesson plans, AI-output critiques, ethical-risk audits, reflective portfolios, and school policy contributions.

3.4 Design Implications for the Competency Framework

The empirical findings and comparative framework analysis directly informed the structure of the TAILiC Framework. The field research showed that teachers require support in four interconnected areas: understanding AI systems and their limitations; integrating AI into meaningful pedagogical practice; applying ethical, legal, and professional judgement; and contributing to professional learning and organisational readiness (Trichina & Konstanti, 2026).

The comparative framework analysis confirmed that these areas are consistent with international and European approaches to AI literacy, digital competence, and generative AI governance. Existing frameworks emphasise that AI literacy should include conceptual knowledge, critical evaluation, ethical awareness, pedagogical application, human agency, inclusion, and responsible participation in AI-mediated environments (European Schools, 2025; Long & Magerko, 2020; Miao & Cukurova, 2024; Miao et al., 2024; Mills et al., 2024; OECD & European Commission, 2026; Redecker, 2017).

The final framework, therefore, organises teacher AI literacy into four core competency categories:

1. **AI Knowledge and Awareness**
2. **AI in Pedagogical Practice and Innovation**
3. **Ethics, Governance and Human Agency**
4. **Professional Development and Organisational Readiness**.

These categories are supported by horizontal dimensions, progression levels, and an evidence-based assessment model. This structure allows the framework to respond to teachers' practical needs while remaining aligned with broader policy and research developments.

The design of the TAILiC Framework also recognises that teacher AI literacy cannot be reduced to individual tool use. It develops through knowledge, practice, ethical judgement, collaboration, and institutional support. For this reason, the framework treats teacher AI literacy as a professional and organisational competence, not only as a technical skill.

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4. The TAILiC Framework

The TAILiC Framework is organised into a dynamic, integrated competency system. It connects what teachers need to develop, how these competences are expressed, how they progress over time, and how they can be demonstrated through professional evidence. The framework moves beyond tool-based AI training and positions teacher AI literacy as a combination of conceptual understanding, pedagogical practice, ethical judgement, professional learning, and organisational readiness.

4.1 Overview of the Four-Layer Model

The framework begins with **four core competency categories** that define the main areas of teacher AI literacy. These are then strengthened by **horizontal dimensions** that ensure each category includes knowledge, practical skills, professional attitudes, and ethical judgement. In this way, ethics is not treated only as a separate topic but also as a dimension that informs knowledge, skills, attitudes, and decision-making across the framework. The **progression model** shows how teachers may move from foundational understanding to critical application and professional leadership. Finally, the **assessment and evidence model** explains how competence can be demonstrated through authentic artefacts, such as AI-supported lesson plans, tool evaluation reports, ethical-risk audits, reflective portfolios, and school policy contributions. Together, the four layers present teacher AI literacy as an integrated professional competence rather than a set of isolated technical skills.

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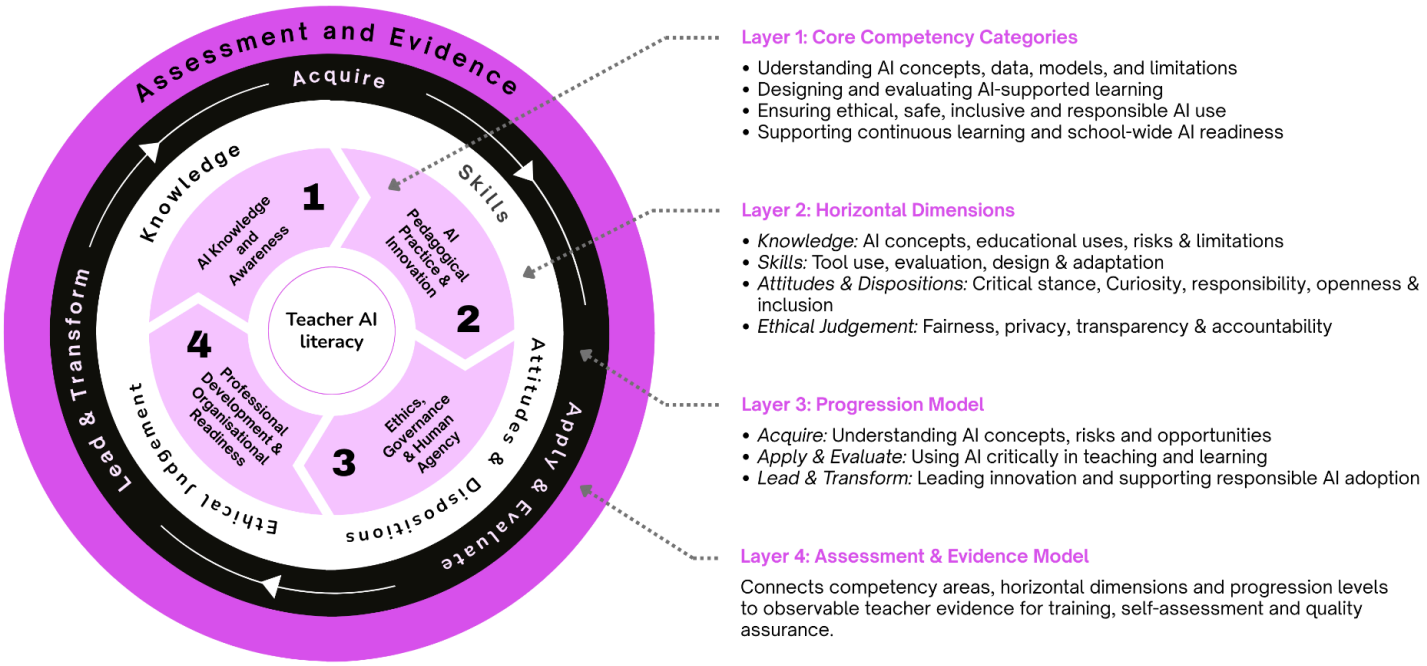

Figure 2. The TAILiC Four-Layer Competency System

4.2 Layer 1: Core Competency Categories

The framework is organised around four core competency categories, which are aligned with the project's research design, desk and field research findings, and comparative analysis of relevant AI literacy and digital competence frameworks. These categories provide the framework's vertical structure by defining the main areas in which teachers' AI literacy needs to be developed. They also organise the competency elements, training content, assessment evidence, and implementation actions.

Although the categories are presented in a logical order, they should not be read as separate stages. They form a connected professional system. Foundational AI understanding supports pedagogical integration, ethical and governance responsibilities shape practice, and continuous professional learning sustains responsible AI adoption. In practice, teachers may develop competences across several categories at the same time.

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💡 **Examples of Core Competency Categories in Action**

A teacher who designs an AI-supported lesson in Category 2: AI in Pedagogical Practice and Innovation also needs conceptual understanding from Category 1: AI Knowledge and Awareness, ethical judgement from Category 3: Ethics, Governance and Human Agency, and support from Category 4: Professional Development and Organisational Readiness. Similarly, a school that develops an AI policy under Category 4 must draw on technical understanding, pedagogical purpose, and ethical safeguards.

4.3 Layer 2: Horizontal Dimensions

The horizontal dimensions explain how each competency category should be developed and assessed. They apply across all four core categories and ensure that teacher AI literacy is treated as a multidimensional professional competence, not only as technical tool use. Inclusion, accessibility, and digital equity are embedded across these dimensions, reflecting their importance for responsible AI use in European education. The horizontal dimensions should be read together with the four competency categories. While the competency categories define the main areas of teacher AI literacy, the horizontal dimensions define the types of professional capacity required within each area. In this way, the categories provide the vertical structure of the framework, and the dimensions show how competence is expressed in practice.

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Knowledge

Teachers design, facilitate, and evaluate AI-supported learning experiences that are meaningful, inclusive, and aligned with the curriculum.

Skills

Practical abilities to evaluate, adapt, design, and problem-solve; specifically, the capacity to identify discriminatory outputs, audit tools for equity, and teach students to critically evaluate AI outcomes.

Attitudes and Dispositions

Critical engagement with AI, professional caution, accountability, and an active commitment to inclusion, digital equity, and the preservation of human agency over automated sorting.

Ethical Judgement

Capacity to weigh pedagogical benefits against socio-technical risks, protect user rights, mitigate discriminatory algorithmic impacts, and make context-sensitive deployment decisions.

Figure 3: Horizontal Dimensions of Teacher AI Literacy

The horizontal dimensions also support the design of training and assessment. They help training providers, schools, and evaluators look for evidence of conceptual understanding, practical application, professional attitudes, and ethical judgement across all competency areas.

💡 **Example of Horizontal Dimensions in Action**

- A teacher working within **Category 2: AI in Pedagogical Practice and Innovation** does not only need the skill to create an AI-supported lesson. The teacher also needs knowledge of how the tool works, the attitude to question whether the tool genuinely supports learning, and the ethical judgement to check issues such as bias, data protection, accessibility, and student agency.

4.4 Layer 3: Progression Model

The progression model describes how teachers' AI literacy can develop over time, from foundational understanding and safe initial use to critical application, pedagogical integration, professional leadership, and institutional contribution. Progression is not

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necessarily linear, and teachers may develop at different rates across different competency categories depending on their role, experience, subject area, school context, and access to support. The three levels in this model are developmental indicators that help teachers, schools, and training providers identify current competence, plan targeted support, and collect relevant evidence of practice. This model supports the design of professional learning pathways, differentiated training, reflective self-assessment, and portfolio evaluation. It also recognises that progression requires time, practice, feedback, peer collaboration, and opportunities to apply AI literacy in real educational contexts.

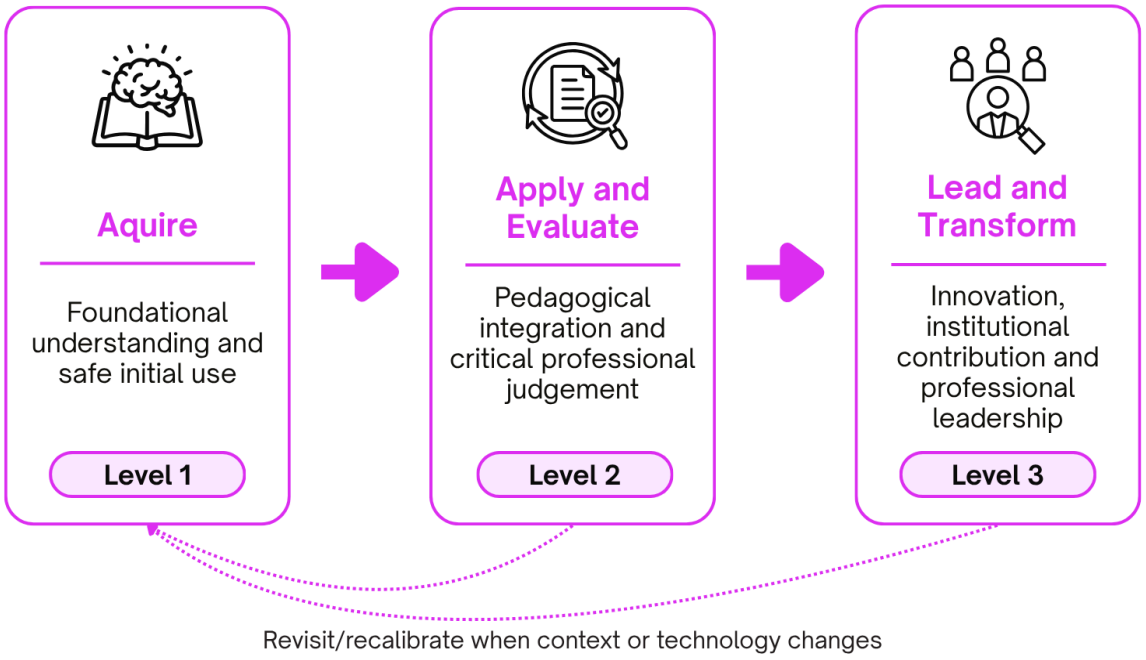

Figure 4: Progression Levels of Teacher AI Literacy

Table 1. Progression Levels and Teacher Capabilities.

Level	Teacher Capability
Level 1 Acquire	The teacher can explain basic AI concepts, recognise common risks and overt instances of algorithmic bias (e.g., gender or cultural stereotypes in outputs), utilise approved tools cautiously, verify system outputs, and identify personal professional learning needs.
Level 2 Apply and Evaluate	The teacher can design AI-supported learning activities, adapt AI outputs to curriculum and learner needs, apply privacy and inclusion safeguards, support students' AI literacy, and evaluate the educational value and risks of AI use.

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Level 3 Lead and Transform	The teacher can mentor colleagues, contribute to school AI policies and protocols, support responsible tool selection, evaluate systemic impact, lead AI literacy initiatives, and promote a human-centred culture of AI use. Leadership may be exercised through formal roles, such as coordinators or school leaders, or through informal peer influence, such as sharing practice and supporting colleagues.

The progression model should be read across the four core competency categories and through the four horizontal dimensions. A teacher may progress at different rates across the framework. For this reason, the model supports diagnostic use rather than one-size-fits-all training. It helps identify where a teacher is ready to apply or lead, and where further foundational learning is still needed.

💡 **Example of Progression Levels in Action**

A teacher may be at **Level 2: Apply and Evaluate** in **Category 2: AI Pedagogical Practice and Innovation** because they can design an AI-supported writing activity where students compare AI feedback with peer feedback and justify their revisions. The same teacher may still be at **Level 1: Acquire** in **Category 3: Ethics, Governance and Human Agency** because they need further guidance on student data protection, tool approval, and disclosure.

4.5 Layer 4: Assessment and Evidence Model

Layer 4 explains how the competences described in the previous layers can be demonstrated through authentic professional evidence. It connects the competency categories, horizontal dimensions, and progression levels to assessment, portfolio development, certification, and quality assurance. The assessment model is based on the principle that teacher AI literacy cannot be assessed only through knowledge tests or self-reported confidence. Teachers need to demonstrate how they understand AI, use it critically in context, make ethical decisions, and contribute to responsible practice in their school or professional community. For this reason, assessment should be performance-based and evidence-informed. Competence can be demonstrated through practical artefacts such as AI-supported lesson plans, tool evaluation reports, classroom AI use protocols, assessment redesign tasks, reflective portfolios, peer learning records, and school policy contributions.

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Layer 4 connects directly to the previous layers. Assessment should therefore examine the quality of the teacher's reasoning, the pedagogical purpose of AI use, the safeguards applied, attention to inclusion and student agency, and reflection on impact. It supports the design of assessment rubrics, portfolio tasks, certification criteria, and quality assurance processes.

Table 2. Functional Relationships and Assessment Implications

System Relationship	Meaning within the framework	Evidence of Practice
Knowledge enables judgement	Teachers need to understand AI concepts, data, model behaviour, limitations, and risks before they can make informed decisions about classroom use.	AI output critique with teachers' proposals for tool improvements; a brief analysis of hallucinations, bias, data use, or limitations.
Judgement guides pedagogy	Teachers use AI only when it supports clear learning goals, inclusion, student agency, and meaningful curriculum alignment.	Discipline-specific AI-supported lesson plan; pedagogical rationale; redesigned student task; reflection on learning value.
Ethics governs usage	Privacy, fairness, transparency, accountability, academic integrity, and human agency shape all decisions about AI use.	Classroom AI-use protocol; ethical-risk audit; consent or disclosure template; assessment redesign that protects academic integrity.
Professional learning sustains change	Teacher AI literacy develops through continuous learning, peer collaboration, school guidance, safe infrastructure, and evidence-informed improvement.	Reflective portfolio; professional learning plan; peer learning log; school policy contribution; shared prompt bank with safeguards.

Assessment validates competence	Teacher competence is demonstrated through authentic professional evidence rather than tool use alone.	Portfolio evidence mapped against categories, horizontal dimensions, and progression levels.

The same artefact may provide evidence for more than one category or dimension. For example, a tool evaluation report may show technical understanding, practical evaluation skills, ethical judgement, and professional responsibility. Assessment should therefore consider the quality, coherence, and maturity of the evidence rather than mechanically count artefacts.

💡 **Examples of Portfolio Evidence in Action**

- **AI output critique:** The teacher reviews an AI-generated text and identifies hallucinations, factual errors, bias, omissions, or weak reasoning. This shows whether the teacher can critically evaluate AI outputs rather than accepting them as reliable.
- **AI-supported lesson plan:** The teacher submits a lesson plan where AI use is linked to clear learning objectives and a clear pedagogical approach, includes student reflection, and explains how privacy, bias, and student agency are protected.

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5. Competency Categories

This section presents the four competency categories of the TAILiC framework. Each category includes a definition, a core outcome, key competency elements, short progression indicators, and indicative examples of evidence. These components clarify what teacher AI literacy may look like in practice and provide a reference point for competence mapping, training curriculum design, self-assessment and school-level planning. The section does not prescribe a full training curriculum, portfolio process or assessment rubric. Instead, it provides a foundation to inform the development of learning modules, open educational resources, training curricula, self-evaluation tools, and implementation materials for student teachers, in-service teachers, and other educational stakeholders.

5.1 Category 1: AI Knowledge and Awareness

Definition

This category focuses on teachers' understanding of AI concepts, data, model behaviour, limitations, and socio-technical implications. It helps teachers move beyond tool use and recognise that AI outputs are probabilistic, context-dependent, and shaped by data, design choices, deployment contexts, and human decisions. Teachers develop the capacity to explain AI clearly, correct common misconceptions, and evaluate AI outputs critically.

Core outcome

Teachers can explain what AI is, how common AI systems work, their limitations, and why AI outputs require verification and contextual interpretation.

Category 1 competency elements

The following elements define the core conceptual knowledge required to understand AI systems, evaluate their systemic impacts, and correct misconceptions.

Table 3. Category 1 Competency Elements: AI Knowledge and Awareness

Code	Element	Teacher competence
1.1	AI concepts and terminology	Accurately distinguishes among concepts such as machine learning, deep learning, generative AI, predictive analytics, natural language processing, and computer vision.
1.2	Data & Model Behaviour	Explains that AI produces outputs using patterns in data, showing how training data, model design, and deployment choices can reproduce or amplify bias.
1.3	AI lifecycle awareness	Describes the phases of AI development from data collection and labelling to model training, deployment, monitoring, and classroom or institutional adoption.
1.4	Affordances and limitations	Identifies tasks where AI can effectively help and where it fails, ensuring human judgment remains primary.
1.5	Critical evaluation of outputs	Scans AI outputs to detect hallucinations, structural bias, omissions, and inaccurate reasoning.
1.6	Societal and educational implications	Explains how AI affects work, democracy, media, sustainability, environmental impact, inclusion, surveillance, access, and student development.
1.7	Misconception correction	Helps understand that AI tools do not think, know, or feel in human terms.

Category 1 progression indicators

Acquire	Apply and Evaluate	Lead and Transform
Defines common AI terms; identifies hallucinations, bias and privacy risks; recognises that AI outputs require verification.	Explains why AI outputs may be unreliable; compares outputs with reliable sources; teaches students to question AI-generated information.	Designs learning activities that develop students' conceptual, critical and civic understanding of AI; supports colleagues in interpreting AI systems beyond tool use.

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Category 1 indicative evidence examples

Suggested evidence may include:

- a visual diagram showing how prompts, data, models, outputs and human interpretation interact;
- an annotated AI-generated text identifying factual errors, bias, omissions or weak reasoning;
- a short review of a classroom AI tool, including its limitations, data use, accessibility features and possible environmental or societal implications.

5.2 Category 2: AI in Pedagogical Practice and Innovation

Definition

This category focuses on teachers' ability to design meaningful AI-supported learning. It emphasises the connection between AI use, curriculum goals, subject-specific learning, student agency, inclusion, accessibility, and active learning. Teachers develop the capacity to use AI not only for preparation but also to support critical thinking, inquiry, creativity, feedback, assessment redesign, and students' AI literacy. This category also recognises students' perspectives and experiences with AI as valuable inputs for designing relevant, reflective, and participatory AI-supported learning. Students should not be treated only as recipients of teachers' AI literacy but also as active participants in shaping responsible AI use in learning contexts.

Core outcome

Teachers can design subject-specific AI-supported learning in which students develop operational, situated and critical AI literacy through learning with AI, learning about AI, and critically engaging with AI in context.

Category 2 competency elements

The following elements outline the pedagogical skills needed to design curriculum-aligned lessons, implement fair assessments, and create equitable learning spaces.

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Table 4. Category 2 Competency Elements: AI in Pedagogical Practice and Innovation

Code	Element	Teacher competence
2.1	Pedagogical alignment	Integrates AI tools only when they clearly support curriculum goals, pedagogical purpose, student agency, and critical thinking.
2.2	Subject-specific alignment	Adapts AI-supported learning to the concepts, methods, evidence practices and forms of expression used in different subject areas, such as STEM, humanities, languages, arts and vocational education.
2.3	Lesson and resource design	Uses AI to develop lesson resources, while systematically checking them for accuracy, cultural bias, accessibility gaps and curriculum relevance.
2.4	Human–AI collaboration	Designs learning tasks that require students to question, compare, revise and justify their use of AI outputs rather than accept them uncritically.
2.5	AI problem-solving and PBL	Guides students through authentic problem definition, data needs, output testing, limitation analysis and improvement proposals.
2.6	Differentiation and accessibility	Uses AI features to support diverse, multilingual or additional learning needs while ensuring fair access, inclusion and appropriate teacher judgment.
2.7	Assessment redesign	Creates assessment approaches that value students' thinking process, original reasoning, source use, reflection, and oral or written justification.
2.8	Feedback and formative learning	Uses AI to support formative feedback while protecting students from automated profiling, unfair grading, overreliance or reduced teacher judgement.
2.9	Student AI literacy integration	Designs learning experiences where students understand AI concepts, evaluate AI outputs, use AI responsibly, consider ethical and social implications, and make informed decisions about when and how AI should be used.
2.10	Creativity and inquiry	Uses AI systems to support student exploration, creative production, design thinking, interdisciplinary inquiry and complex problem-solving.

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Category 2 progression indicators

Acquire	Apply and Evaluate	Lead and Transform
Uses AI for low-risk preparation tasks; checks outputs before use; identifies basic classroom applications; recognises the need to align AI use with curriculum goals and learner needs.	Designs AI-supported learning activities that include verification, reflection, student agency, accessibility, and subject-specific relevance; adapts AI outputs to curriculum and learner needs.	Redesigns units, assessments and collaborative inquiry tasks for AI-rich learning environments; supports colleagues in developing subject-sensitive and pedagogically sound AI-supported learning.

Category 2 indicative evidence examples

Suggested evidence may include:

- a subject-specific AI-supported lesson plan with learning objectives, pedagogical approach, AI-use rationale, safeguards and student reflection prompts;
- a short student feedback or reflection activity showing how students experience, question, and evaluate AI-supported learning;
- an assessment redesign task that reduces automated copying and requires evidence of student reasoning, process, originality and justification;
- a project-based learning unit where students use AI to investigate an authentic problem, evaluate outputs, consider ethical implications and justify their decisions.

5.3 Category 3: Ethics, Governance and Human Agency

Definition[1]

This category focuses on the ethical, legal, and professional responsibilities associated with the use of AI in education. It supports teachers in applying privacy, fairness, transparency, accountability, academic integrity, and human agency principles in classroom and school contexts. Teachers develop practical routines for critical and

[1] In European contexts, regulatory awareness should include attention to the GDPR and relevant provisions of the EU AI Act, especially where AI tools may affect assessment, access, progression, biometric or emotion-related processing, or decisions that influence learners' opportunities. This framework does not provide legal advice. Schools and institutions should consult current national and European guidance before approving or deploying AI tools.

responsible AI use while retaining professional responsibility for decisions that affect students.

Core outcome

Teachers can apply ethical, legal, and professional judgement to protect student data, prevent discrimination, preserve academic integrity, and support human agency in AI-supported education.

Category 3 competency elements

The following elements identify the regulatory awareness, ethical judgement, professional routines, and safeguards required to govern AI use and maintain human accountability in educational settings.

Table 5. Category 3 Competency Elements: Ethics, Governance and Human Agency

Code	Element	Teacher competence
3.1	Human-centred professional judgement	Retains final human accountability for high-stakes decisions, grading, feedback, pastoral care, and decisions that may affect students' opportunities or well-being.
3.2	Data protection and privacy	Applies data protection routines and avoids uploading student data, sensitive information, or identifiable classroom materials to unauthorised platforms.
3.3	Regulatory awareness	Understands key responsibilities related to privacy, transparency, safety, risk, accountability, and relevant European and national rules.
3.4	Bias, fairness and inclusion	Identifies, questions and addresses AI outputs or tools that may disadvantage students based on gender, race, language, disability, socio-economic background, or other personal and contextual factors.
3.5	Transparency and disclosure	Makes AI use visible and understandable when it affects lesson materials, student feedback, assessment, communication, or administrative decisions.
3.6	Accountability and auditability	Keeps clear, human-readable records of how AI systems were used to inform key educational decisions.

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3.7	Academic integrity	Sets transparent rules for acceptable AI use and teaches students how to acknowledge, reference, and critically reflect on AI-supported work.
3.8	Student autonomy and agency	Helps students decide when to use AI, when to question it, and when to switch it off to protect independent thinking. Builds learning strategies that combine AI-supported tasks with offline cognitive exercises.
3.9	Well-being and relational safeguards	Monitors risks linked to digital overreliance, reduced peer interaction, social isolation, surveillance, and excessive dependence on automated feedback.

Category 3 progression indicators

Acquire	Apply and Evaluate	Lead and Transform
Recognises privacy, bias, plagiarism, misinformation, and replacement risks; follows school rules for tool use.	Applies GDPR-compliant practices; explains AI use decisions to students; redesigns tasks to preserve integrity and student agency.	Contributes to school AI policies, consent protocols, tool-selection criteria, and ethical review processes where appropriate; supports colleagues in responsible governance.

Category 3 indicative evidence examples

Suggested evidence may include:

- an ethical-risk audit of a proposed classroom AI activity, identifying privacy, bias, transparency, accessibility, academic integrity, and student agency risks;
- a tool evaluation report addressing data protection, accessibility, transparency, bias risks and pedagogical value;
- a classroom AI-use protocol written for students, outlining rules for disclosure, attribution, data safety, acceptable use, independent work, and critical engagement with AI;
- an assessment redesign task showing how AI-supported work is balanced with student reasoning, oral explanation, offline thinking, or process-based evidence.

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5.4 Category 4: Professional Development and Organisational Readiness

Definition

This category focuses on teachers' professional learning and their contribution to school-wide readiness for critical and responsible AI adoption. It recognises that teacher AI literacy develops through sustained training, reflection, peer collaboration, safe infrastructure, clear school guidance, and open communication with the school community. Teachers develop the capacity to identify their own learning needs, participate in communities of practice, support colleagues, and contribute to local policies and implementation processes.

Some elements in this category refer to individual teacher competences, while others depend on institutional conditions, such as school leadership, infrastructure, policy, procurement, and access. The framework should therefore be used to support shared responsibility, not to place all implementation duties on individual teachers.

Core outcome

Teachers can guide their own professional growth in AI literacy while helping build the school-wide conditions, infrastructure and guidelines needed for safe, fair and pedagogically meaningful AI integration.

Category 4 competency elements

The following elements explain the reflective, collaborative, organisational and leadership practices needed to sustain critical and responsible AI integration across a school.

Table 6. Category 4 Competency Elements: Professional Development and Organisational Readiness

Code	Element	Teacher competence
4.1	Reflective self-assessment	Identifies personal gaps in AI knowledge, pedagogical use, technical confidence, ethics and governance, and uses these to plan further professional learning.
4.2	Practice-oriented professional learning	Participates in applied training that connects AI concepts, ethical issues and classroom practice.

4.3	Context-sensitive implementation	Adapts AI guidance to the school context, subject area, learner needs, infrastructure, language, culture and available support.
4.4	Peer collaboration	Shares tested prompts, lesson ideas, tool evaluations, practical safeguards and ethical dilemmas within school or professional learning networks.
4.5	Professional autonomy and critical agency	Exercises professional judgement to adapt, reject or restrict AI tools when they do not serve students' learning, rights, inclusion or well-being.
4.6	School-level policy participation	Contributes, where appropriate, to school acceptable-use policies, tool approval processes, data consent guidance, disclosure procedures, and assessment guidelines.
4.7	Infrastructure and safe access	Works with school leaders and relevant staff, where possible, to support safe platforms, equitable access, accessibility, and protection for students who may face digital or social disadvantage.
4.8	Evidence-informed improvement	Uses evidence to reflect on how AI use affects learning, inclusion, student agency, teacher workload and school practice.
4.9	Professional learning leadership	Mentors colleagues and helps translate national or school guidance into practical classroom routines, shared resources and peer-learning activities.
4.10	School community communication	Communicates clearly with parents/carers and the wider school community about the educational benefits, limitations, risks and safeguards related to AI use.

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Category 4 progression indicators

Acquire	Apply and Evaluate	Lead and Transform
Attends introductory training; identifies personal learning needs; follows approved school procedures; recognises the importance of safe and equitable AI use.	Participates in peer-learning groups; adapts training to classroom practice; documents what works and what does not; contributes to shared resources or practical guidance.	Facilitates professional learning; contributes, where appropriate, to school policy; supports ethical tool selection and evaluation; communicates with colleagues and the school community about critical and responsible AI use.

Category 4 indicative evidence examples

Suggested evidence may include:

- a professional learning plan outlining current gaps, target competences, learning actions and milestones;
- a peer-learning or community-of-practice resource, such as a shared prompt bank with safeguards, reflective teaching note, tool review or risk case study;
- a school AI policy contribution, such as tool approval criteria, consent guidance, disclosure procedures or assessment rules;
- a short communication resource for colleagues, parents, carers, or school leaders explaining the benefits, limits and risks of AI use in education.

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6. Implementation Guidance

This section provides illustrative guidance on how the TAILiC Framework may be used in practice. As shown in Figure 5, the framework can support three main implementation routes: training pathways, assessment planning, and institutional implementation. These routes are connected and may be adapted according to national priorities, institutional needs, school contexts, and target groups.

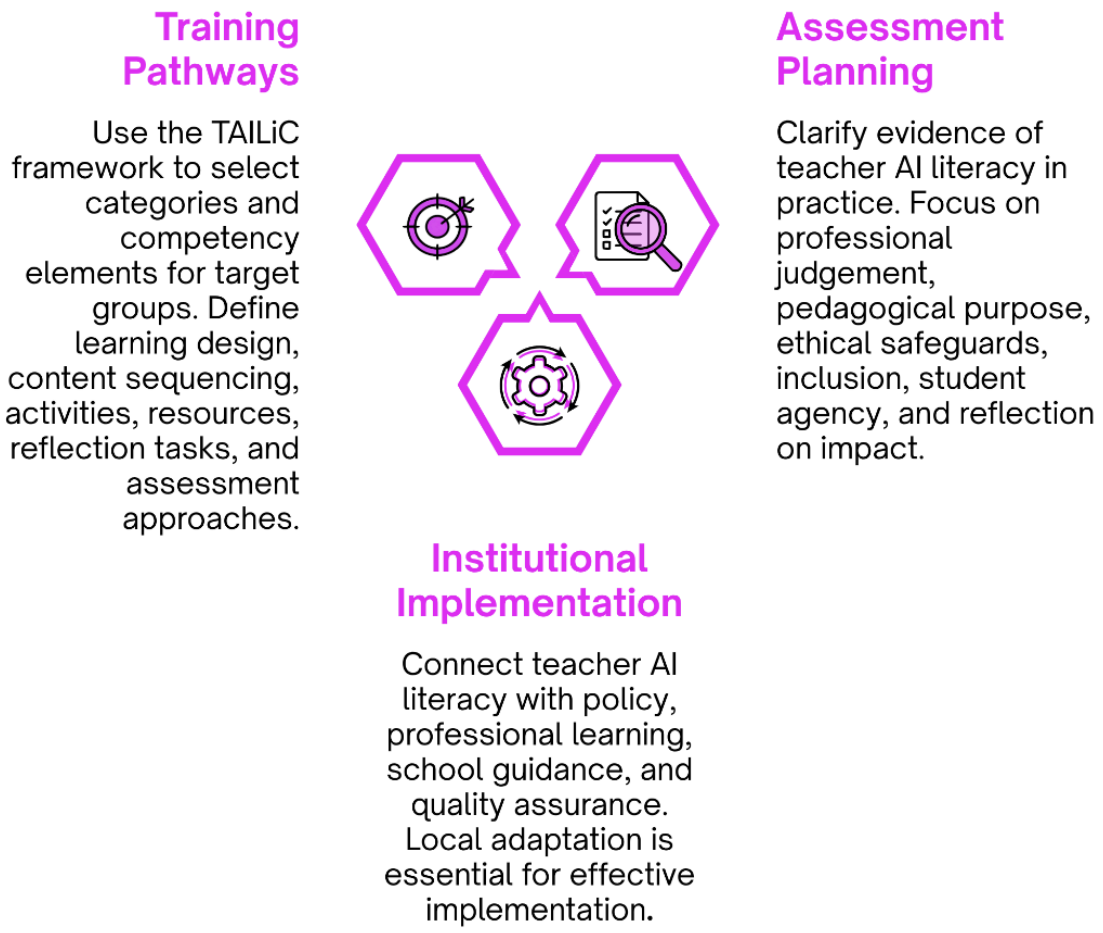

Figure 5. TAILiC Framework Implementation Routes

The framework does not prescribe a full curriculum, portfolio process, or assessment rubric. Instead, it provides a competence reference structure that teacher education institutions, professional development providers, schools, and policymakers can use to design learning activities, assess professional evidence, and support responsible AI adoption. It should be treated as a living reference and reviewed periodically in

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response to evolving AI technologies, educational practices, school needs, implementation evidence, and regulatory developments.

6.1 Training Pathways

Training providers may use the framework to select relevant categories and competency elements according to the target group, course duration, and intended learning outcomes. It can support introductory training on AI knowledge and safe initial use, pedagogical integration training focused on lesson design and assessment redesign, and leadership-oriented training focused on organisational readiness, ethical governance, and professional learning.

6.2 Assessment Planning

The framework can support assessment planning by clarifying what evidence of teacher AI literacy may look like in practice. Assessment should focus on the quality of professional judgement, pedagogical purpose, ethical safeguards, inclusion, student agency, and reflection on impact. The aim is not to measure how often teachers use AI, but how critically, responsibly, and meaningfully they use it in educational contexts.

Assessment should consider the overall quality of the evidence and identify areas where further professional learning may be needed. Examples of evidence may include AI output critiques, AI-supported lesson plans, tool evaluation reports, ethical-risk audits, assessment redesign tasks, peer-learning records, and school-level contributions.

6.3 Institutional Implementation

The framework can support institutional planning by helping organisations connect teacher AI literacy with policy, professional learning, school guidance, and quality assurance:

- Ministries and regional authorities may use it to align AI literacy with teacher professional standards, curriculum reform, continuing professional development, and quality assurance.
- Teacher education institutions and professional development providers may use it to design modular training, self-assessment tools, mentoring models, and practice-based learning activities.
- Schools and school leaders may use the framework to identify staff development needs, guide acceptable-use procedures, review AI tools, and create shared routines for safe and meaningful AI use.

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- Teacher teams and communities of practice may use it to develop shared lesson examples, prompt banks with safeguards, tool reviews, ethical-risk cases, and peer feedback processes.
- Parents, carers, and the wider school community may also be engaged through clear communication about how AI is used, what safeguards are in place, and how student rights, learning, and agency are protected.

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7. Conclusion

As AI technologies continue to evolve, teacher AI literacy must remain adaptive, critical, and grounded in educational purpose. The TAILiC Framework provides a European reference structure for developing teachers' AI literacy as a professional competence. It responds to the need for guidance that goes beyond tool use and connects AI knowledge with pedagogy, ethics, human agency, inclusion, assessment evidence, and organisational readiness.

The framework is designed to support practical use across teacher education, professional development, school planning, and policy alignment. Its four-layer structure helps educators and institutions identify what teachers need to know, how these competences can be developed, how progression may be recognised, and how evidence of practice can be collected. TAILiC should be used as a living reference framework that supports informed professional judgement, responsible AI adoption, and meaningful learning for students across diverse European educational contexts.

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