5.4 Full Roadmap for Teacher Education Institutions

Who this section is for

Deans, programme directors, teacher educators and those responsible for quality assurance in institutions that prepare teachers. This roadmap was written primarily for you, and this section assumes you have read the nine stages in 5.1. Unlike school readers, teacher education institutions need to consider the roadmap as a whole, because the stages address different parts of institutional change that depend on one another.

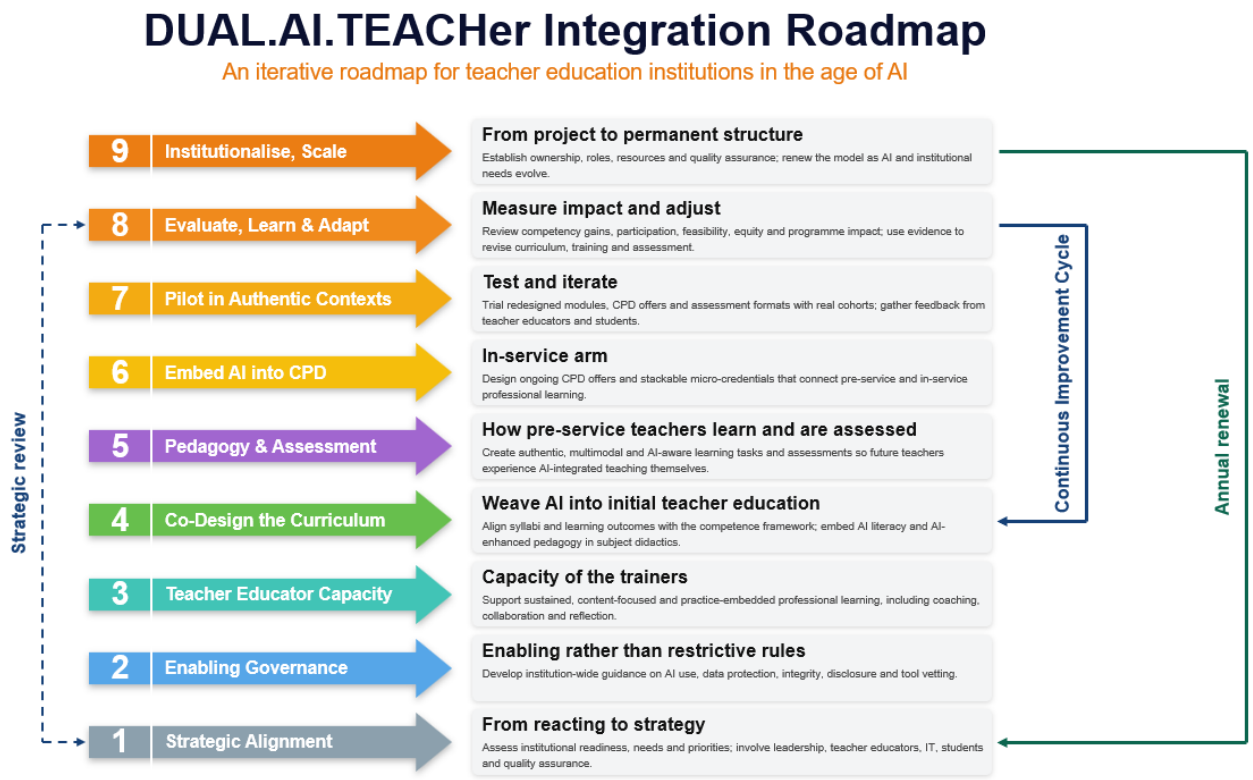


Fig. 1: "DUAL.AI.TEACHer Integration Roadmap: Nine stages for the institutional integration of AI in teacher education"

1. Strategic Alignment

From reacting to strategy Most institutions do not start from zero. They start from a patchwork of individual initiatives, informal tool use and unresolved concerns. The first stage makes that starting position visible and turns it into a shared strategic direction. Leadership opens the process rather than delegating it, because later stages require decisions about staffing, resources and curriculum that need institutional support. The institution assesses its readiness, needs and priorities, and establishes a cross-functional steering team that includes teacher educators, IT, students and quality assurance. Involving students is not symbolic: they experience the curriculum directly and, in teacher education, are also members of the future profession.

The stage is complete when the institution can state, in writing, where it stands, what it wants to achieve and who is responsible for taking the work forward.

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2. Enabling Governance

Guidance comes early because uncertainty can become a major barrier to adoption. Staff who do not know what is permitted may either avoid AI altogether or use it without shared expectations. The institution develops institution-wide guidance covering AI use, data protection, academic integrity, disclosure expectations and a process for reviewing and approving tools. The decisive design choice is the framing: guidance should explain what is possible and under which conditions, rather than consist mainly of prohibitions. Draft guidance is circulated for feedback before adoption, improving both its practical usefulness and its legitimacy.

The stage is complete when staff can readily find a clear answer to the question "Am I allowed to do this?" and know where to turn when a case falls outside the guidance.

3. Teacher Educator Capacity

Teacher educators cannot model practices they have not had the opportunity to explore themselves. This stage builds their capacity through professional learning that is sustained rather than one-off, connected to content and subject didactics rather than focused mainly on tools, and embedded in practice through collaboration, coaching and structured reflection. These are features consistently associated with effective teacher professional development (Lipowsky & Rzejak, 2021). Competences are mapped against the DUAL.AI.TEACHer Competency Framework and the UNESCO AI Competency Framework for Teachers so that development has both a direction and a reference point. AI integration should build on teacher

educators' existing professional expertise rather than treat AI as a separate technical competence. A single workshop does not complete this stage. The stage is complete when teacher educators have sustained opportunities to develop, apply and reflect on AI-related practice in their own teaching contexts.

4. Co-Design the Curriculum

Here AI moves from extracurricular activity into the formal programme. Course and module documentation is reviewed, and learning outcomes are aligned with the competency framework so that what is taught, practised and assessed points in the same direction. A central design principle of this roadmap is that AI literacy and AI-enhanced pedagogy should be embedded within subject didactics rather than confined to a standalone module. A dedicated AI course may be useful as a transitional step, but it risks signalling that AI is a separate topic rather than part of everyday subject teaching. Co-design with teacher educators matters because those who will teach the revised programme need to have shaped it.

The stage is complete when AI-related learning outcomes are visible in the regular documentation of multiple subjects or modules and are connected to the wider programme rather than isolated in a single course.

5. Pedagogy & Assessment

Changing the curriculum on paper is not enough if teaching and assessment remain unchanged. This stage redesigns learning tasks and assessment formats so that they are authentic, multimodal and AI-aware, and so that assessment focuses on what future teachers can understand, justify, create and apply rather than on outputs that a generative system can produce on request. Equally important is the modelling effect: pre-service teachers should experience thoughtful AI-integrated teaching as learners before they are expected to use it as professionals. Teacher education has a distinctive opportunity here because students experience teaching practices while simultaneously developing their own professional practice.

The stage is complete when AI-related learning outcomes are reflected in actual teaching and assessment practice, not merely added to module descriptions or disclosure requirements.

6. Embed AI into CPD

Teacher education institutions do not only prepare future teachers; they also support those already working in schools. This stage develops continuing professional development into a structured offer rather than a series of isolated events. The same quality conditions as in Stage 3 apply: sustained engagement, a clear content focus, opportunities to practise, and follow-up through collaboration, feedback or coaching. In the DUAL.AI.TEACHer model, this work can be

linked to the certification pathway developed in T2.6, allowing professional learning to build over time. Stage 6 also creates a two-way connection with schools: institutions contribute professional learning, while in-service teachers bring current classroom experience back into teacher education.

The stage is complete when in-service professional learning forms a coherent and sustained offer with clear progression, rather than a calendar of unrelated single events.

7. Pilot in Authentic Contexts

Redesigned modules, CPD offers and assessment formats are trialled with real cohorts under realistic conditions, and feedback from teacher educators, students and other participants is gathered systematically. Piloting reduces the risk of scaling an approach before it has been tested in practice. It also makes implementation visible: colleagues can see how an approach works in a context similar to their own, discuss the results and adapt it before wider adoption. The purpose of the pilot is therefore not to demonstrate that the design was correct, but to discover what needs to change.

The stage is complete when documented feedback from authentic implementation has led to identifiable revisions.

8. Evaluate, Learn & Adapt

Evaluation asks whether the changes achieved what they were intended to achieve. Depending on the intervention, this may include competency development, participation, feasibility, equity, staff and student experience, and wider programme effects. Equity is considered explicitly because AI integration may reduce some inequalities while creating or reinforcing others, for example across subjects, staff groups or students with different levels of access and support. Evidence is then used to revise curriculum, professional development, assessment and implementation.

This stage also establishes a regular review cycle for the guidance developed in Stage 2, which will need to evolve as technologies, practices and regulatory conditions change.

9. Institutionalise and Scale

The final stage moves successful work from project status into the regular structures of the institution. This means clear ownership, defined responsibilities, appropriate resources and integration into existing processes such as programme development and quality assurance. Scaling should follow the institution's own context, capacity and profile rather than a single generic model. Institutionalisation also means creating mechanisms for renewal: AI

technologies, educational practices and institutional needs will continue to change, so the model itself cannot remain fixed.

The stage is complete when the work continues after the people who started it have moved on.

Your specific position

Teacher education institutions carry two mandates at once. You transform your own teaching, and you prepare future teachers for classrooms you do not control, under conditions you cannot fully predict, using technology that may have changed by the time your graduates arrive there. The two mandates are closely connected. Focusing only on internal transformation risks producing AI-related curricula without sufficient connection to future classroom practice. Focusing only on future classroom practice risks modernising the programme without changing the institution that delivers it. The roadmap therefore treats both dimensions together.

Stage 3 enables what follows. Much of the later work depends on the capacity of teacher educators. Their expertise lies in their disciplines and subject didactics, so integrating AI is not simply a matter of adding another tool. Professional development needs to connect AI use to subject-specific teaching, learning and assessment rather than treating it as a generic technical competence. For this reason, Stage 3 deserves particular focus when resources are limited.

Where Stage 4 becomes difficult. The principle that AI literacy should be embedded within subject didactics rather than treated only in a standalone module is easy to state but a lot harder to implement. A standalone module can be assigned to one person, while distributed integration requires many colleagues to reconsider parts of their own teaching. Where a standalone module is useful as a transitional step, it should ideally be connected to a longer-term plan for integration across the programme.

Your distinctive lever in Stage 5. Stage 5 highlights a particular feature of teacher education: your students are learners now and teachers later. How you teach them therefore becomes part of what they learn about teaching. If pre-service teachers experience thoughtful, AI-integrated teaching as learners, they encounter concrete models they can later reflect on and adapt in their own practice. Teaching about AI without modelling its pedagogical use provides a very different experience. This is why Stage 5 goes beyond assessment reform alone.

Stage 6 is your interface with schools. Your continuing professional development provision is the entry point. It extends your institution's reach beyond future teachers to those who are already working in classrooms. At the same time, collaboration with in-service teachers can bring current classroom experience back into teacher education. CPD can therefore function not only as a service provided to schools, but also as a channel for reciprocal learning between schools and teacher education institutions.

What you can do that schools cannot

Teacher education institutions often have greater scope to revise programmes and assessment, access to research capacity, and a mandate to work across multiple schools. This gives Stages 7 and 8 particular value: what is learned through pilots and evaluation can inform not only your own institution but also partner schools and the wider system. Making those experiences visible can also support the uptake of new practices elsewhere.

Where to begin if everything is urgent. Start with Stage 2 and Stage 3. Governance reduces uncertainty, while staff capacity creates the conditions for meaningful work in Stages 4 to 6. Beginning with curriculum revision before staff have the capacity to implement it risks producing changes on paper that are difficult to realise in practice.

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