

Beyond retraining

Lifelong education in the age of superhuman labour

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The education challenge

As AI performs more professional tasks, adults need repeated opportunities to rebuild expertise and test their judgment in changing work.

The institutional response

Higher education, TVET and employers must make continued learning a normal part of working life.

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Lifelong education as a continuing institution

AI changes the content of work repeatedly. A single retraining episode cannot cover a moving target.

Change in professional work	Consequence for workers	Education response
AI produces more first drafts and routine analyses	The ability to judge output becomes more important, while opportunities to practise basic work can shrink.	Retain domain foundations and require learners to verify, correct and explain AI-assisted work.
Models and workflows change after a course ends	A credential can outlast the capability it originally assessed. Familiar methods can become unreliable.	Offer recurrent modules and reassessment tied to actual tasks, model changes and professional standards.
Learning opportunities differ across workplaces	Experienced, well-supported workers can accumulate an advantage that unsupported learners struggle to match.	Provide coached practice, protected time and routes that remain available after a person changes employer.

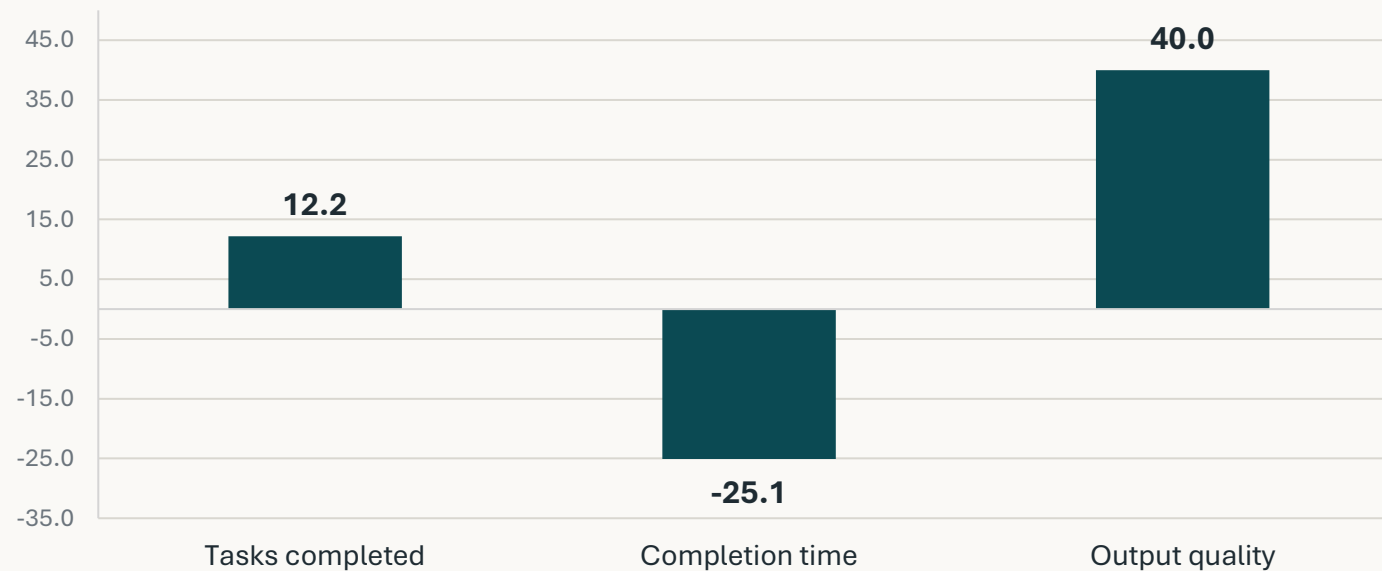
The objective is sustained professional capability across successive changes in technology.

Sources: Keith Lee, Beyond the Prompt; The AI Retraining Illusion; AI Lifelong Learning Must Arrive Before the Skill Gap Hardens (2026).

AI gains depend on the task

The consultant experiment shows why course completion and access to a model are weak measures of readiness.

Within the tested capability frontier



758 consultants

Participants with GPT-4 completed more tasks and worked faster on tasks within the model's tested capabilities.

Outside that frontier

On a task beyond the frontier, AI users were 19 percentage points less likely to reach the correct solution.

Change relative to the control group (%). Quality gain exceeded 40%.

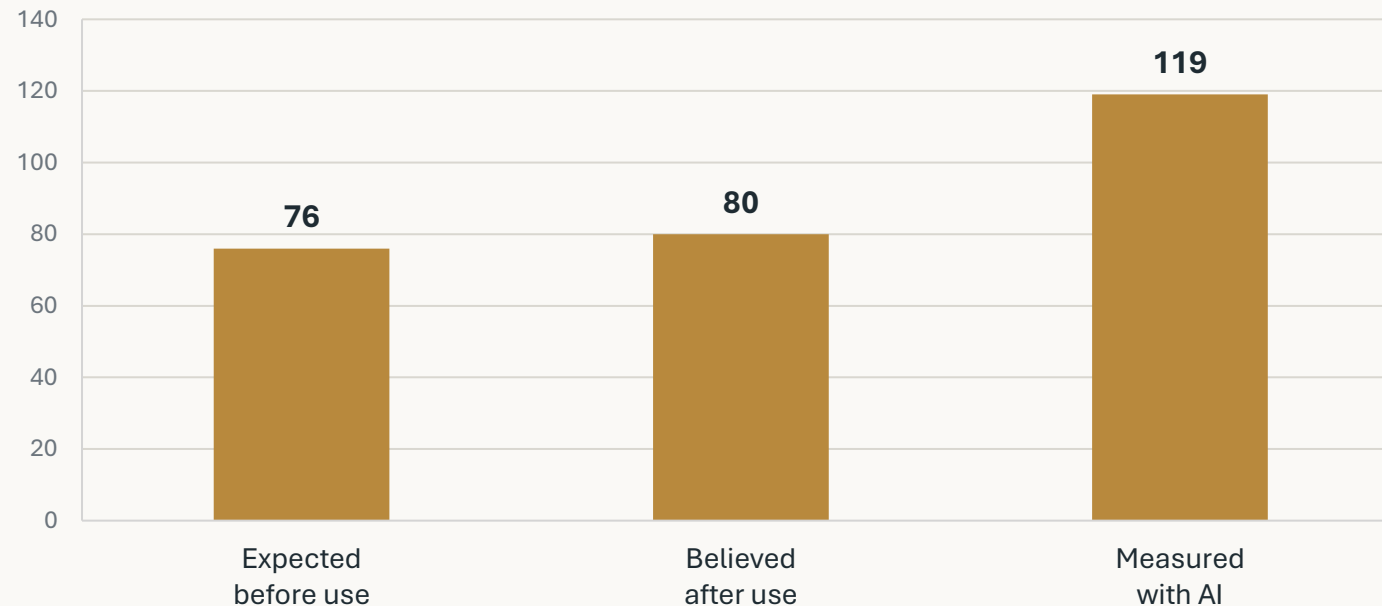
Training must teach when AI is suitable, what evidence to check and when human work should take over.

Source: Dell'Acqua et al. (2023), Navigating the Jagged Technological Frontier, HBS Working Paper 24-013.

Experts can misjudge the effect of AI

Experienced developers believed the tool helped even when measured completion time increased.

Completion-time index: unaided work = 100



Scope of the finding

16 experienced developers completed 246 tasks in familiar open-source repositories. The study concerns early-2025 tools and this particular work setting.

Assessment implication

Require a prediction before use, record time and rework, then compare with an unaided baseline. Confidence alone cannot demonstrate competence.

Expected time saving: 24%. Perceived saving afterwards: 20%. Actual completion time: 19% longer.

Source: Becker et al., METR (2025), early-2025 randomized study. Index calculated as $100 \times (1 + \text{reported time change})$.

Domain knowledge changes what AI use can achieve

Superhuman labour describes a combination of expertise and effective AI use, with continued responsibility for results.

Capability	What the worker must do	What education must test
Domain understanding	Recognise the assumptions, constraints and standards that make an answer useful in a particular field.	Explain why a plausible output is wrong or incomplete. Solve a related problem without AI assistance.
AI competence	Select a suitable tool, structure the task, use relevant evidence and recognise uncertainty or failure.	Compare outputs against a benchmark and document errors. Identify tasks that require a different method.
Professional judgment	Decide which trade-offs are acceptable and when an exception needs escalation.	Defend a decision under incomplete evidence. State limits and identify the person accountable for the outcome.
Workflow control	Integrate AI into a repeatable process with review, handover and feedback.	Measure quality, elapsed time and rework across the whole process, including the cost of human checking.

The same AI access can produce very different results when these capabilities differ.

Source: Keith Lee (2026), Beyond the Prompt: Domain Knowledge, AI Competence, and the Rise of Super-Human Labor. Conceptual framework.

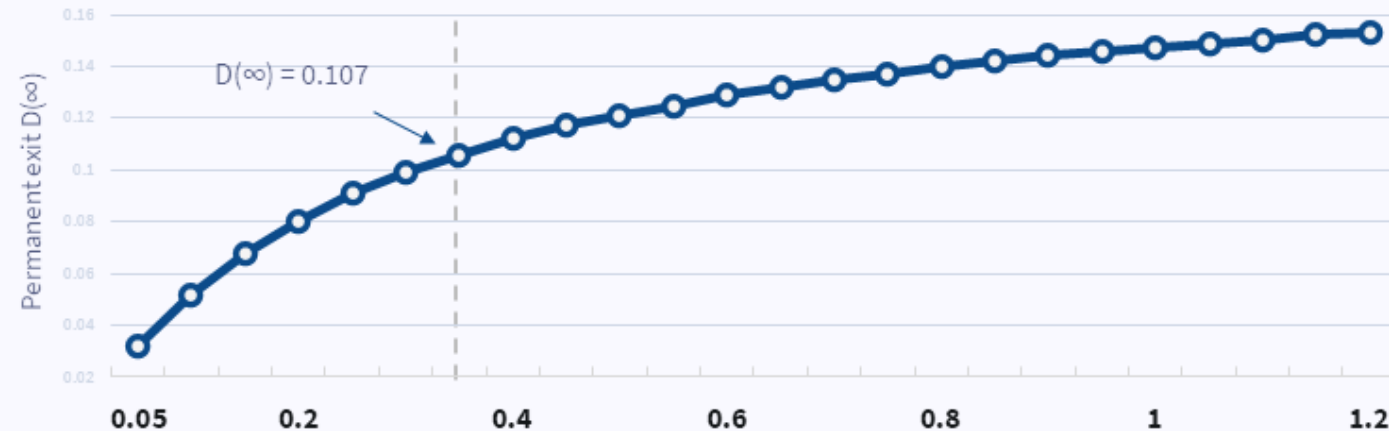
The cost of adapting too slowly

A supplied model illustrates how rapid adoption can leave a lasting employment cost.

Permanent exit as a function of adoption speed



Source: Adapted from Eduardo Levy Yeyati, Too fast to adjust: Adoption speed and the permanent cost of AI transitions, CEPR VoxEU



Note: Under the baseline calibration, permanent exit, $D(\infty)$, ranges from 3% at $\kappa = 0.05$ to 15% at $\kappa = 1.20$ — a fivefold increase. The dashed line marks the socially optimal $\kappa^* = 0.36$; the dotted line marks an illustrative market speed $\kappa_{\text{mkt}} = 0.90$. The gap between them is excess permanent exit from market over-adoption.

These are model outcomes under a calibration, not observed unemployment rates or a forecast.

Source: user-supplied The Economy chart, adapted from Eduardo Levy Yeyati, Too Fast to Adjust, CEPR VoxEU.

What the model shows

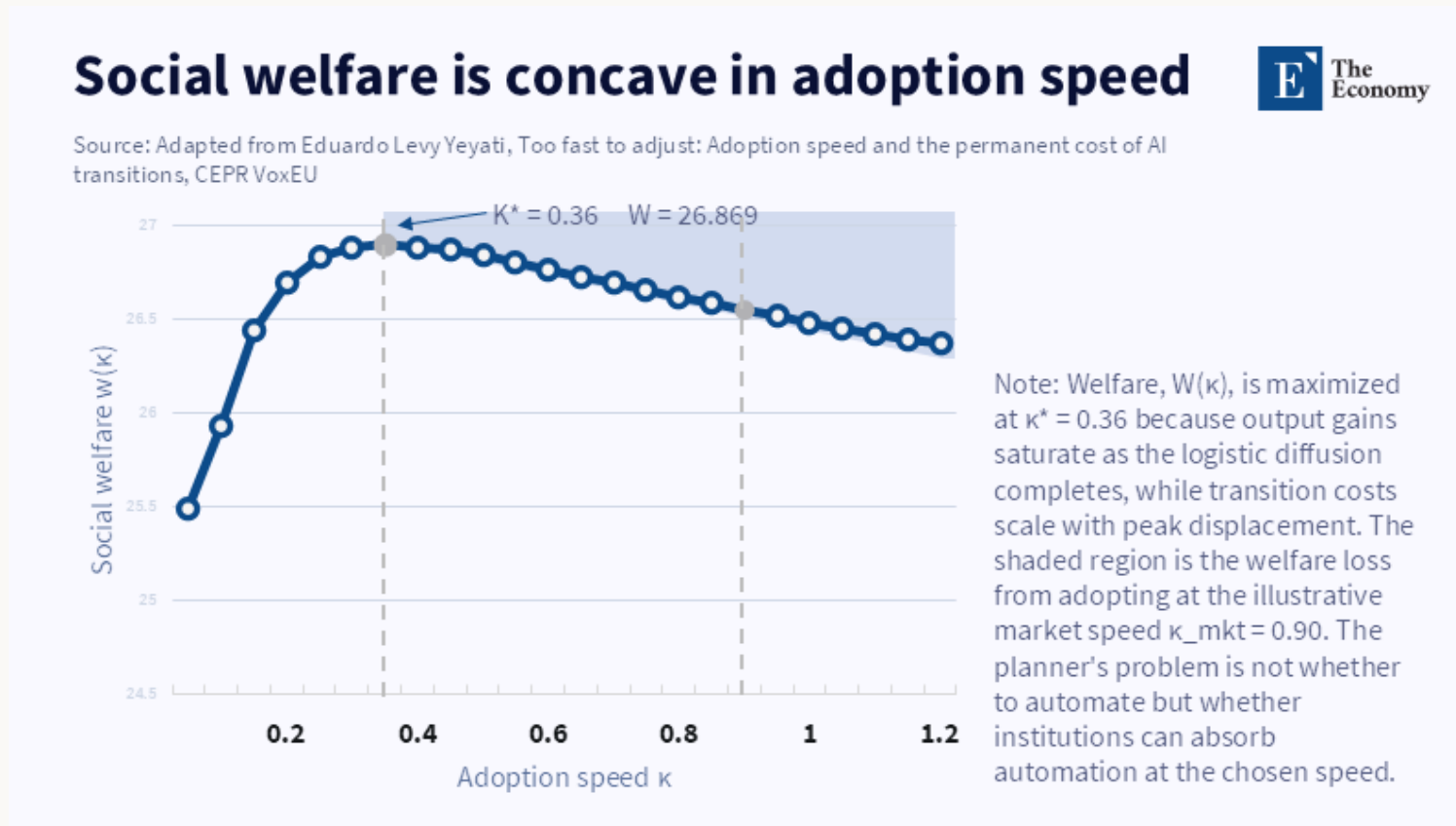
Permanent exit rises from about 3% to 15% as adoption speed κ moves from 0.05 to 1.20 in the baseline calibration.

Education implication

Learning capacity needs to expand before displacement becomes persistent. Support that arrives only after job loss may miss the useful adjustment window.

Adoption speed and institutional capacity

The same model separates the gains from diffusion from the costs of workforce adjustment.



The illustrated trade-off

Welfare peaks near $\kappa^* = 0.36$. The illustrative market speed of 0.90 lies beyond that peak because transition costs rise.

Education implication

Build the capacity to absorb change: accessible learning, recognised assessment and credible routes into redesigned work. This model does not identify a universal adoption limit.

The policy question is how to improve adjustment capacity while capturing the benefits of AI.

Source: user-supplied The Economy chart, adapted from Eduardo Levy Yeyati, Too Fast to Adjust, CEPR VoxEU.

Why one-off retraining is an incomplete response

A training programme can help an individual while still leaving the wider employment transition unresolved.

Assumption behind retraining	Why it can fail under advanced AI	A continuing education response
A stable new occupation awaits	AI can change the destination role while learners are still completing the programme.	Teach transferable domain reasoning, then renew the task-specific component as work changes.
More qualifications create more jobs	Employers may use higher productivity to restrain hiring or combine responsibilities. Training alone cannot ensure labour demand.	Connect instruction to actual work redesign and track employment outcomes as well as qualifications.
Workers can retrain independently	Time, confidence and employer support vary. Displaced and informal workers may have the weakest access.	Offer supported entry, protected learning time and provision outside large employers.
A certificate demonstrates lasting readiness	A learner may pass a fixed exercise yet struggle with unfamiliar cases or a changed model.	Assess transfer to new tasks and revisit competence when systems or responsibilities change.

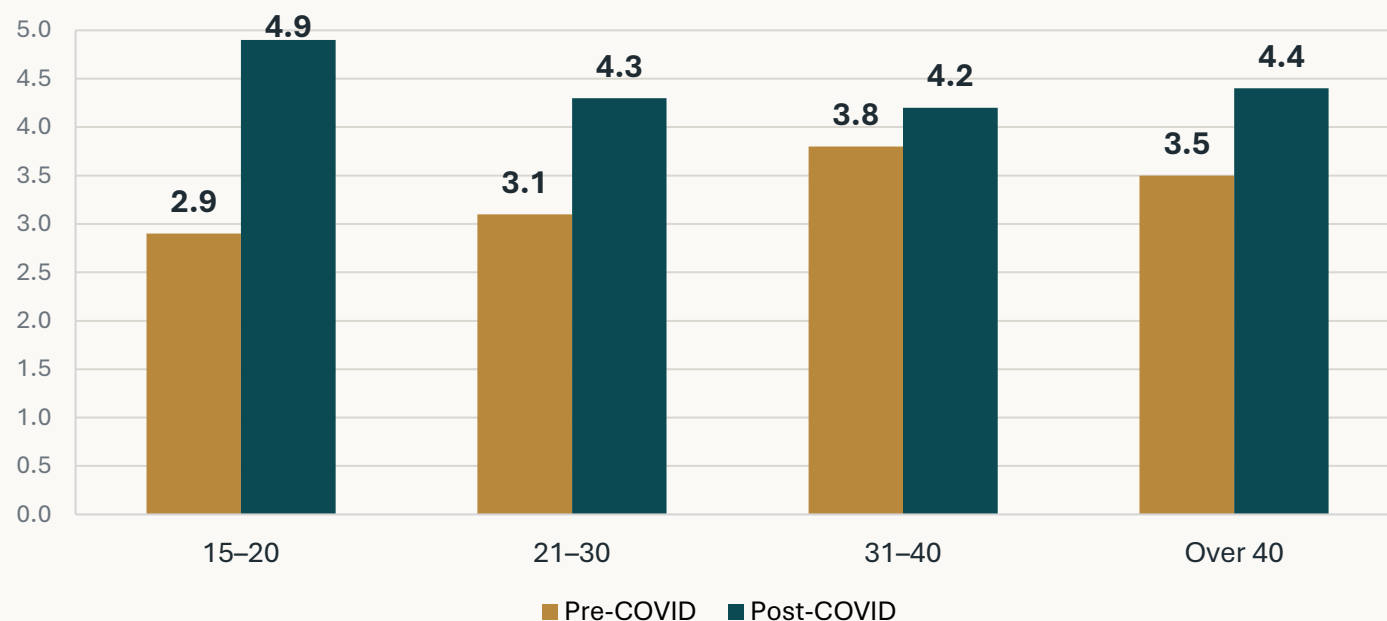
Education needs an ongoing relationship with working adults, alongside employment and transition policy.

Source: Keith Lee (2026), The AI Retraining Illusion. Framework and institutional implications, not a forecast of job losses.

Digital learning gained relevance across age groups

The increase varies by age, which supports differentiated delivery rather than a single adult-learning format.

Mean reported relevance score, five-point scale



Largest increase

The 15–20 group rises by 2.0 points. The over-40 group rises by 0.9 points, from 3.5 to 4.4.

Delivery implication

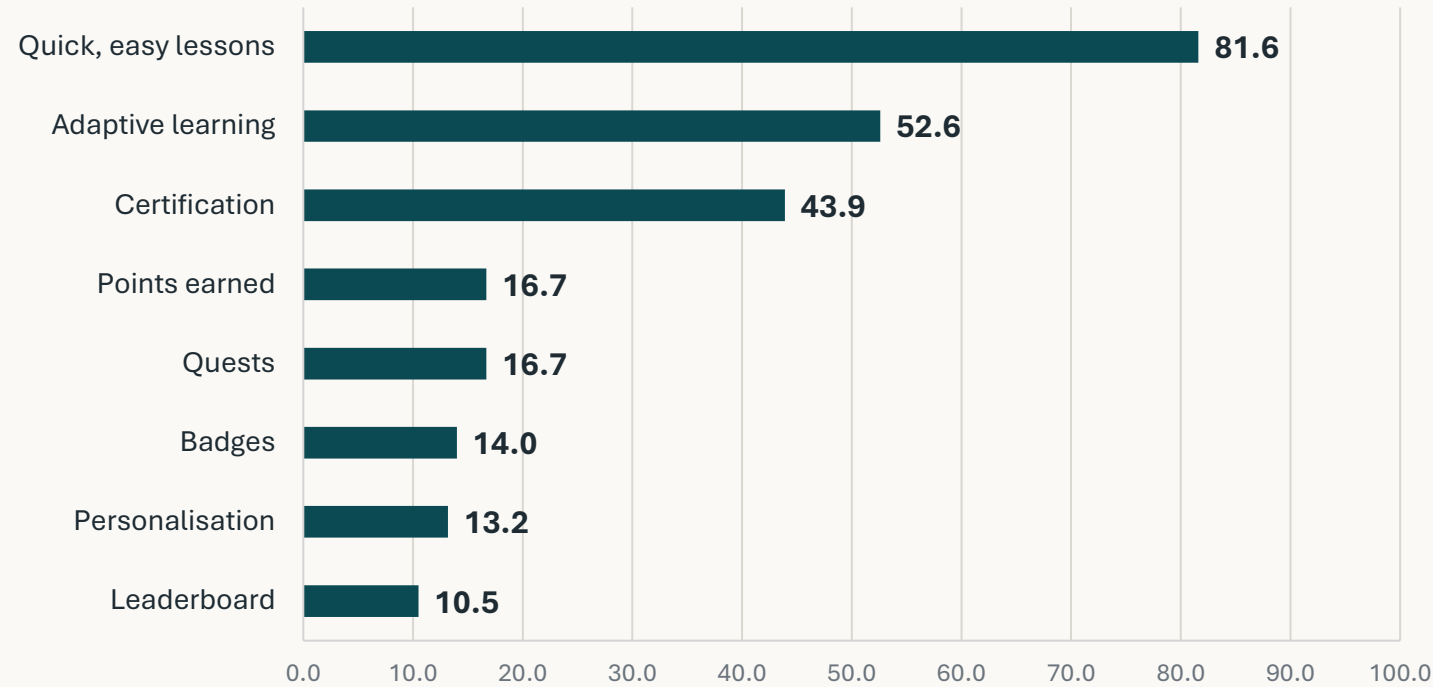
Offer varied entry routes and support. Higher perceived relevance indicates interest in digital learning, but does not establish learning gains or AI readiness.

Descriptive survey evidence. The sample is not nationally representative and the comparison is self-reported.

Source: supplied SIAI chart, adapted from Puri, Socklingam & Herremans (2026), Digital lifelong learning in the age of AI, arXiv preprint.

Convenient lessons lead learner preferences

Adaptive learning and certification also matter. Engagement features attract fewer selections in this sample.



Respondents selecting each feature (%)

What respondents selected

Quick and easy lessons: 93 (81.6%)

Adaptive learning: 60 (52.6%)

Certification: 50 (43.9%)

Design implication

Make participation manageable for working adults while preserving demanding exercises. Short modules can still require verification, explanation and unaided practice.

Preferences describe what learners value. They do not establish which features improve competence.

Source: supplied SIAI chart, Puri, Socklingam & Herremans (2026). Multiple responses allowed. Shares use the chart's 114-response denominator.

A recurrent learning cycle around real work

Each module should produce evidence that a professional can perform and supervise a defined task.

Stage	Learner activity	Evidence retained
Establish a baseline	Complete an authentic task unaided. Predict where AI will help and identify the main risks.	Initial quality, time and confidence. A record of the assumptions used.
Practise with AI	Use a selected model on comparable tasks. Check sources and correct outputs against domain standards.	Drafts, verified evidence, recurrent errors and the time spent reviewing.
Demonstrate judgment	Handle an unfamiliar case. Explain when to accept, revise, reject or escalate the AI output.	Assessed decision, reasons for the choice and clear ownership of the final result.
Reassess after change	Repeat selected tasks when the tool, workflow or professional requirement changes.	Updated performance against the baseline and an explicit decision on what needs further learning.

A successful module improves demonstrated performance and preserves the knowledge needed to check it.

Source: proposed programme design based on the supplied SIAI article and the task-specific evidence discussed earlier.

A lifelong relationship with professional learners

Institutions can combine stable disciplinary foundations with shorter provision that follows changes in work.

Institutional function	Higher education contribution	TVET and professional learning contribution	What to assess
Foundations	Maintain disciplinary theory, quantitative reasoning and the ability to question assumptions.	Connect concepts to equipment, processes, customer needs and workplace standards.	Unaided understanding and transfer to unfamiliar problems.
Applied learning	Offer supervised cases and continuing modules built around professional decisions.	Provide repeated practice in real or simulated workflows with visible quality criteria.	Quality, time, rework and safe handling of exceptions.
Assessment	Use faculty and domain experts to judge reasoning and evidence.	Use workplace assessors to test performance in context.	Independent demonstration, beyond attendance or tool familiarity.
Continued access	Keep a route back into learning after graduation and career changes.	Allow accumulation of recognised modules as responsibilities evolve.	Participation and capability over time, including less-supported learners.

A degree provides a foundation. Continuing provision helps graduates and other adults keep that foundation useful.

Source: speaker's proposed institutional response, informed by the three supplied articles.

Access needs funding, time and recognised assessment

A university course cannot supply every part of the infrastructure required for working adults to participate.

Actor	Responsibility	Delivery commitment	Evidence of progress
Universities and TVET	Define domain standards and offer continuing instruction.	Modular provision, qualified teaching and independent assessment of applied work.	Transfer of learning to unfamiliar tasks and repeated participation.
Employers	Make learning possible inside actual work.	Protected time, suitable tools, supervised practice and genuine opportunities to use new capabilities.	Quality and rework, internal mobility and outcomes after job redesign.
Public institutions	Reach adults outside well-resourced employers.	Support fees and access, connect provision to transition services and make recognition portable.	Participation by underserved workers and employment outcomes after support.
EdTech providers	Make delivery accessible and progress visible.	Usable platforms, transparent feedback and records that institutions can review.	Learning and retained competence, alongside completion and engagement.

Course supply, employer time and credible assessment have to reach the same learner.

Source: proposed allocation of responsibilities. Implementation should reflect local qualification systems and labour-market institutions.

A first-year institutional programme

Begin with a small set of professional tasks and expand only after observing learning and workplace results.

Period	Work to complete	Decision evidence
Months 1–3 Define the starting point	Choose two or three professional task families. Agree domain standards with employers and faculty. Establish unaided and AI-assisted baselines.	Task difficulty, error patterns, access barriers and the review burden.
Months 4–6 Run coached modules	Provide protected learning time, supervised practice and unfamiliar assessment cases. Include adults who lack employer support.	Improvement in quality and judgment. Time and rework measured together. Participation and withdrawal reasons.
Months 7–12 Reassess and extend	Reassess a sample after a model or workflow change. Revise weak modules and offer recognised progression into further learning.	Retention of capability, transfer to work and the cost of continued support.
Ongoing Evaluate distribution	Compare who enters, completes and benefits. Check whether the programme reaches those most exposed to job change.	Outcomes by initial skill and employment situation, with clear limits on causal interpretation.

The test is whether people can sustain capable work as technology and responsibilities change.

Note: illustrative implementation proposal. Timing and measures require adaptation to the participating institutions and employers.

Beyond retraining

Lifelong education becomes more valuable when professional capability must be renewed repeatedly.

For working adults

The central capability is to understand a domain well enough to direct AI, question its output and take responsibility for the result.

For the labour market

Training can improve readiness, but employment outcomes also depend on the jobs and transition opportunities that institutions and employers create.

For education institutions

Build a continuing relationship with learners through accessible modules, supported practice and assessment that follows changes in work.

The Bett Asia question

How can higher education and TVET make this continuing capability available to adults whose employers cannot provide it?

Background readings

Beyond the Prompt (The Economy, April 2026)

The AI Retraining Illusion (The Economy, March 2026)

AI Lifelong Learning Must Arrive Before the Skill Gap Hardens (SIAI, July 2026)