

Approach to AI integration at programme level (Curriculum design)

Guide 2

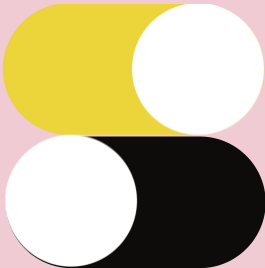
**Approach to AI integration at programme level
(Curriculum design)**
Guide 2

By: K. Beekman (Fontys), S. Draaijer (VU), J. Beckers (Fontys), E. Schagen (VU), I. Hofman (MBO)
(with contributions from the writing team, institutions and other stakeholders)

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1. Introduction

The rise of generative artificial intelligence (hereinafter AI), which includes tools like ChatGPT, Gemini or DALL-E, is shaking up the field of education. This groundbreaking development is compelling higher education institutions to fundamentally reconsider their assessment practices and develop AI-aware assessment practices, as described in the national vision on assessment and examinations on which this guide is based.

Whereas previously a written final product (essay, design, report) or a traditional exam was sufficient to assess students, it is now often unclear to what extent AI contributed to that result; moreover, recent studies show that approximately 80% of students use AI tools during their studies (Ma, 2025). It is not only the authenticity but also the validity, reliability and inclusivity of assessments that come under pressure as the use of AI becomes more widespread (Bearman et al., 2024; Bakker et al., 2024). At the same time, AI offers unprecedented opportunities for personalised feedback, adaptive learning environments and authentic simulations (Lim et al., 2025; Mollick & Mollick, 2023). This presents a dual challenge for higher education institutions. On the one hand, there is a need to prepare students for an AI-driven labour market by equipping them with knowledge about, skills in and insights into AI applications and, on the other, a need to safeguard the quality and value of diplomas (Bearman et al., 2024). These challenges require a systematic approach in which constructive alignment – aligning learning objectives, learning activities and assessment – is the foundation (Biggs & Tang, 2011).

Moreover, society demands AI-literate graduates – professionals who can use AI in a responsible, critical and ethical manner in their field of expertise. AI literacy has become a critical competence, with students expected not only to develop technical skills but also critical thinking and ethical awareness (Promma et al., 2025; Tsai et al., 2023). This includes the ability to critically evaluate AI output, recognise bias, consider ethical implications and make responsible choices about when and how to use AI (Ng et al., 2021; Sperling et al., 2024).

AI is and remains a technological tool that can be used to optimise learning processes – not to replace them. Developing a solid foundation of knowledge remains as important as ever – including in AI-driven learning environments – to enable critical reasoning about output or the ability to make connections (Fawns & Schuwirth, 2024). For assessments and examinations, this requires striking a balance between harnessing AI opportunities and safeguarding individual competence.

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Purpose of this guide

Rapid developments in AI require a fundamental rethinking of what constitutes valuable learning and how we can assess it in an authentic way. This guide builds on the (Dutch) national vision document on assessment and examinations and translates the Two-Lane approach described in that document into concrete guidelines for curriculum design at programme level. This guide aims to provide educational professionals in tertiary higher education with practical tools for developing AI-aware curricula. The focus lies specifically on:

1. Designing or redesigning curricula into which AI is consciously and justifiably integrated;
2. Ensuring constructive alignment between learning objectives, educational activities and assessment;
3. Implementing the Two-Lane approach at programme level;
4. Maintaining the value of a degree while preparing students for an AI-driven labour market.

In this guide, we have drawn on recent scientific insights and case studies and aim to present approaches that can be shared across educational sectors. We acknowledge that implementation will differ according to sector (vocational education and training, higher professional education, research-oriented education) and discipline, but the underlying principles apply universally.

Key principles

This guide uses the same core principles as set out in the national vision document, translated here into curriculum design:

- **Human-centred and transparent:** AI applications can support educational and assessment practices, but human agency remains crucial. This means that curriculum designers must explicitly record where, when and how AI is used and what role it plays in achieving learning objectives.
- **Fairness and inclusion:** AI should not create new barriers or exacerbate existing inequalities. Curriculum design should consider differences in access to AI tools, language barriers and digital skills. All students should have equal opportunities to develop AI literacy (Bakker et al., 2024).
- **Validity and reliability are paramount:** Curricula must be designed in a way that ensures assessments remain valid and reliable, regardless of AI use. This requires a considered mix of assessment methods, with AI use sometimes permitted or even required (Lane 2) and sometimes excluded to allow for assessment of individual competence (Lane 1), as set out in the Two-Lane approach.
- **Constructive alignment as a compass:** Learning objectives, educational activities and assessments must be designed (or redesigned) in concert, with AI integration as a means to reach learning objectives, not an end in itself (Biggs & Tang, 2011).

- **Flexibility and agility:** Curricula must be able to evolve in sync with technological developments without losing sight of the essential core of education. This requires a flexible structure that allows for adjustments (Liu et al., 2023; Lodge et al., 2023).

2. Curriculum design

The essence is clear – integrate AI wherever it adds value to education and assessment, but never at the expense of fairness and quality. Is it possible to limit, prohibit or even fully exclude AI from education and assessment? No, certainly not in settings where there is no control over what students are doing and with whom or which tools they are working. As highlighted in the national vision document: “AI should not completely take over students’ learning or facilitate dependency on it,” but at the same time, students must be prepared for a labour market where AI use is a reality.

Redesigning assessment at curriculum level, with the knowledge that AI can be used by both teaching staff and students, begins with constructive alignment of learning objectives, educational activities and assessment. Constructively aligning assessment to learning objectives and activities requires reasoned choices about the assessment approaches and the desired implementation. Research (Black & Wiliam, 1998; 2009) shows that assessment based on different assessment functions contributes to steering, supporting and achieving quality in teaching and learning, on the basis of careful alignment with intended learning objectives and activities:

- **Assessment for learning** (assessment as a means of learning) aims to support the learning process through formative assessment: learners and teaching staff receive feedback that gives insight into progress and learning needs, which allows the learning process to be adjusted accordingly. In vocational education and training, this is often through practice-based feedback during workplace learning. In higher professional education it is through project-based interim evaluations and in research-oriented education it is through peer review and academic discussions (Crocco, 2025).
- **Assessment as learning** (assessment as the starting point for learning) emphasises the active role of the learner, using assessment as a tool for self-reflection and self-regulation. This helps learners to understand and take responsibility for their own learning process.
- **Assessment of learning** (assessment of learning outcomes) is decisive and intended to establish what learners have learnt, for instance in terms of reports, certification, graduation or marking).

These proven educational concepts for assessment – as a means of learning, as the starting point for learning or to determine the quality of learning – remain unchanged and highly relevant, irrespective of technological developments and possibilities. The aim is not to revise assessment programmes with a view to deploying AI, but to implement AI-aware assessment practices where we integrate AI in a controlled manner wherever it enriches the learning process, while at the same time preventing AI from undermining learning and providing evidence of learning.

This holistic approach ensures coherence and continuity in learning pathways instead of isolated components, and provides a consistent learning experience and education quality (Boud et al., 2023; Whitfield & Harvey, 2019), even when AI is fully integrated in the curriculum. After all, AI interfaces with all three components (learning objectives, activities, assessments).

Constructive alignment

This does not make the design and configuration of contemporary, future-oriented assessment practices less complex. Ideally, assessment serves two aims. On the one hand, process-oriented assessment supports, fosters and strengthens learning and learning outcomes for students. On the other, it determines quality and level of proficiency through valid, transparent and reliable assessments of the student's actual performance. AI brings a new dimension to this (Perkins et al., 2023). AI must be integrated into assessment and examination processes consciously and responsibly – both by providing the necessary support for learning processes in AI-driven environments and by critically reviewing decisions about learning outcomes.

Recent insights into AI integration in educational and assessment practice offer concrete points of reference (Crocco, 2025). By analysing educational provision according to learning phases, more targeted choices can be made based on assessment functions and in line with these learning objectives: acquisition (knowledge acquisition), retention (consolidation in comparable contexts) and transfer (application in new contexts). The integration of AI in education and assessment also calls for a review of cognitive levels. The revised Bloom's Taxonomy (Oregon State University, 2024) offers the following concrete guidelines:

- At **lower cognitive levels** (remembering, understanding), AI can assist by supplying factual information and explaining concepts;
- At **intermediate levels** (applying, analysing), AI can act as a problem-solving sparring partner;
- At **higher levels** (evaluating, creating), human skills such as ethical reflection, creativity and judgement are central.

This division helps curriculum designers make well-considered choices about where AI integration is valuable and where human competence must remain central.

The educational principle of "constructive alignment" remains fully relevant and foundational to designing (or redesigning) education and assessment towards an AI-aware educational practice.

In vocational education and training, this often means coordinating core assignments and work processes with how AI is used in professional practice, with examination boards ensuring the quality of examination according to the Dutch Adult and Vocational Education Act (*WEB*). In higher professional education, this requires redesigning competence-based curricula with explicit inclusion of AI literacy in learning outcomes. Research-oriented education requires particular attention to academic integrity and the balance between AI-assisted knowledge creation and individual research skills.

These principles make it possible to design a coherent curriculum, with learning objectives, educational activities and assessment carefully and consistently aligned so as to reflect the vision on education and assessment. They also allow for innovative and technological developments to be integrated from the outset in the design and implementation of the three core components.

3. Two-Lane approach

Designing assessment in an educational environment where AI is available to everyone calls for a precise balance between innovation and safeguarding the quality of education. Constructive alignment is always the core principle, with learning objectives, educational activities and assessment types designed coherently (Boud et al., 2023).

Educational designers often employ backward design as an effective approach to integrated education provision, with the intended final level serving as the starting point; they then determine which information and proof of learning are needed to demonstrate or achieve that level (Wiggins & McTighe, 2005). This holistic approach to educational design ensures coherence in continuous learning pathways, a consistent learning experience and educational quality (Boud et al., 2023). This is essential when AI integration is necessary as a means of support rather than a replacement for learning or providing evidence of learning.

AI influences the intended final level due to changing job profiles and forces educational programmes to expand their learning objectives. Moreover, educational and assessment activities must be aligned accordingly (Mollick & Mollick, 2023). The inevitable integration of AI into teaching and assessment brings new dimensions to assessment and examinations (Bearman et al., 2024; Perkins et al., 2024; Vargas-Murillo et al., 2023). The most pertinent question for every educational provider is: “What are we preparing students for now that AI is permeating professional and personal life, what does this mean for the required knowledge, skills and competencies and how do these translate into assessment practice?”

Designing and structuring a well-considered assessment programme is complex, and the impact of AI as an additional factor has made existing challenges even more explicit. Ideally, assessment contributes to two objectives – supporting and strengthening the student’s learning process (developmental assessment) and taking valid, transparent and reliable decisions about the student’s learning outcomes (summative assessment) (Black & Wiliam, 2009).

The Two-Lane Approach as a framework

A promising approach for integrating AI into existing assessment programmes is the Two-Lane approach. This framework, based on international educational practices and research (Liu et al., 2023; TEQSA, 2023; Lodge et al., 2023) and established assessment theories (Black & Wiliam, 2009), provides a foundation for purposeful, appropriate and ethically responsible integration of AI into assessment.

The Two-Lane approach rests on two fundamental principles. The first principle is that AI has become part and parcel of society, which means that our aim should be to teach students to use AI consciously, correctly and responsibly to prepare them for this societal reality. The second principle is that this may not be at the expense of the quality of education and assessment, and hence on diploma value and skills-readiness for practice. Drawing on these principles, the Two-Lane approach sets out two pathways with approaches proposed to support, improve and/or design AI integration in assessment in a well-considered and reasoned manner. All this based on assessment functions, aligned with intended learning outcomes and with retention of education and assessment quality.

Lane 1: Assessment of learning: Assessment in Lane 1 focuses on determining the quality of student learning and outcomes in relation to the learning objectives, based on valid and reliable data-informed decision-making. This type of assessment takes place under controlled conditions and supervision, and AI use is either not permitted or only permitted to a limited degree. In vocational education, this often means practical examinations and proficiency assessments in accordance with the qualification file; in higher professional education, for example, supervised written examinations or oral presentations to account for learning outcomes achieved; and in research-oriented education, closed book examinations or oral examinations that focus on in-depth understanding (Willemse & Van der Neut, 2020).

AI may only be used if the learning objectives require it **and** the student's individual contribution is directly verifiable and traceable. For example, if an intended learning outcome at the "transfer" level has to be demonstrated – application of knowledge in new contexts – assessment in line with Lane 1 requirements ensures that the student has acquired this proficiency independently (Crocco, 2025). This ensures that reliable, valid decisions can be made regarding the demonstrated performance and the student's individual efforts. But also that it can be determined with sufficient certainty whether, and to what extent, the student has independently mastered certain critical knowledge and skills – either without direct or indirect interference from AI or with conscious and directly traceable use of AI aligned with the learning objectives. Consider assessment methods designed so that AI has no influence on the performance being measured, such as classroom-based exams with proctoring, oral examinations, practical skills tests or observations.

If AI is permitted in this decision-making assessment of the quality of learning and/or results of a student, it must be clear in advance how and under what conditions AI will be used. It must also be established how validity, reliability and measurability of the results will be safeguarded. Examples of AI application in Lane 1 include: AI-driven simulations in which an examiner determines, in a semi-authentic context based on observations, whether and to what extent the student has the desired proficiency in the intended knowledge and skills. For example, performing complex medical procedures or complex skills/competencies in simulated challenging contexts or exceptional circumstances, such as demonstrating customer care in the hotel industry when dealing with a demanding guest.

Another example is adaptive assessment, where AI analyses the student's responses during the assessment and dynamically adjusts the difficulty of subsequent questions. Irrespective of permitted or prohibited AI use in Lane 1 assessment: this assessment requires validity and reliability in controlled settings so that the quality of the achieved results in relation to the intended learning objectives, and the effort made by the student in this regard, can be determined objectively and with integrity.

Lane 2: Assessment for & as Learning: Assessment in Lane 2 focuses on making student learning visible and optimising it throughout the learning process, as well as on the outcomes in relation to the learning objectives. This form of assessment serves as a starting point and a means of steering the learning process. Assessment in Lane 2 focuses on data-informed support, adjustment and reinforcement of learning processes and providing direction in achieving the intended learning outcomes. In this lane, the use of AI is permitted, desirable, or even mandatory (depending on the learning objectives, and within legal frameworks and possibilities). The emphasis is on learning with, through and in collaboration with AI. This type of assessment focuses explicitly on the skills and insights needed for critical, ethical and correct use of AI. In this approach, students must demonstrate when and how they used AI, and how it contributed to their learning process and results. The quality of this AI-integrated learning approach is taken into account in the final assessment. Assessment in Lane 2 has an open character, since assessment assignments do not necessarily take place under supervision or are not fully controllable. Consider, for instance, the use of AI in writing assignments, design assignments or gathering evidence for portfolios. Assessment in this lane prepares students for situations where AI use is desirable or unavoidable and encourages them to work with AI in a proper and responsible manner. AI is used to support and enhance processes and outcomes. Critical reflection and accountability of the learning process weigh heavily in this type of assessment. For instance, it must be made transparent which AI tools have been used and how AI-generated output and feedback have been processed. This makes learning visible and optimally develops critical reasoning, problem-solving ability, creativity and AI literacy in authentic contexts.

Approach for effective, responsible and appropriate AI integration in assessment practices		
	Lane 1	Lane 2
Function of assessment	Valid, reliable quality measurement to determine whether and to what extent the individual student has achieved the intended learning outcomes, on the basis of demonstrated output, with consequences for student progress.	Cyclical, development-oriented assessment in which evidence is gathered (during or at the start of the process) about the student's development in relation to the learning objectives; teaching staff, students and peers use this information to support, adjust and reinforce their own learning process and ownership of the intended learning outcomes.
Degree of supervision and control	Assessment takes place under direct supervision of an examiner. In principle, this is individual and verifiable. The student's work is authentic and was produced by the student themselves.	Assessment takes place without direct supervision of an examiner. It may be carried out individually and/or collaboratively, and the outcome is not fully verifiable at the level of the individual student.
Role of AI	Depending on the intended learning outcomes, AI use may be limited or excluded (for example, deliberately excluded in tasks where the student must demonstrate skills without AI, or limited in cases where correct AI use itself is being assessed).	Depending on the intended learning outcomes, AI use may be permitted or even required (for example, to teach students responsible AI use and encourage it where it adds value).
Examples	Personal, interactive oral assessments; viva voce assessments; simultaneous assessments and skills development in class; tests and examinations. Vocational education: AI-driven simulations in healthcare involving a student who, under observation by an examiner, performs complex care-related tasks, where the AI generates different patient scenarios but the actions themselves are performed by the student. Higher professional education: Adaptive knowledge assessments where AI adjusts the level of the questions but all answers are given directly by the student. Research-oriented education: Oral defences where students explain and defend their thesis. AI detection can be used for screening, but the final assessment is always by the examiner.	AI to prompt reflection, perform critical analyses of output, suggest structure, brainstorm ideas, summarise literature, create content, propose counterarguments, improve clarity, provide formative feedback, and so on. Vocational education: Workplace assignments where students use AI tools as professionals would in practice – for example, an administrative assistant learning to work with AI-assisted invoicing systems. Higher professional education: Project assignments in which teams use AI for research and development, with mandatory process reports on AI use. Research-oriented education: Research projects where AI is used for literature or data analysis, with critical reflection on methodological implications.

Coherence & demarcation: The strength of the Two-Lane Approach lies in the deliberate and reasoned integration of AI applications, and in students' (acquired) responsible and correct use of these applications throughout their studies. It contributes to an AI-aware assessment practice that is aligned with educational activities and learning objectives. Students do not need to explicitly experience this two-lane division; it is the responsibility of the design team to ensure coherence and continuity in the approach. Every assessment programme should ideally include both Lane 1 and Lane 2 forms of assessment for each learning pathway, educational unit or course (Liu et al., 2023), in a logical sequence and alternation. The two lanes complement each other and ensure constructive alignment within the overall educational offerings (Curtis, 2025). Critical learning objectives are safeguarded in the first lane, thus ensuring the value of the diploma, while assessment in the second lane ensures that students are prepared for professional practice where AI use is a reality.

In fact, existing assessment programme already incorporate various assessment functions – balanced and well-founded – that are aligned with educational activities and learning objectives. The Two-Lane approach supports the integration of AI into this already well-considered range of assessments, while making clear where assessment requires adjustment or revision when an existing assessment method is no longer suited to the intended function.

CASE STUDY

Vocational Education - Legal, Insurance and HR Specialist

The following example from the Legal, Insurance and HR Specialist qualification file illustrates how the Two-Lane approach works in practice:

Description: The novice professional provides management information relating to business processes on behalf of line management or the manager/advisor. He/she identifies noteworthy issues and alerts management to these where necessary. He/she prepares periodic reports on request and compiles key figures and/or other management information as required: the key performance indicators.

AI integration in development-focused assessment (Lane 2): Students learn to generate management information themselves and to use AI for this purpose, as is customary in professional practice. For example, students use ChatGPT or Microsoft Copilot to write reports and learn to critically evaluate which noteworthy issues AI does and does not identify. This critical evaluation is always part of the learning process and is documented in a reflective report.

AI integration in quality measurement (Lane 1): Students prepare a management report based on a dataset provided by teaching staff in a controlled environment, under supervision and without access to AI tools. Additionally, students demonstrate proficiency by means of an assessment that includes critical evaluation of AI-generated management information in realistic cases.

Design principles: When redesigning assessment programmes that intentionally integrate AI according to this approach, teaching teams and curriculum developers consider, for each learning objective: “Can or may the student demonstrate learning objectives and outputs achieved in collaboration with AI, or should the student also be able to do so without AI?” Where the learning objective focuses on acquiring knowledge or skills, or consolidation, AI support can be valuable (Lane 2).

For transfer or application of knowledge, skills or competencies in new contexts, this can be developed through assessment in Lane 2. To guarantee and determine individual proficiency, controlled assessment is often necessary (Lane 1) (Crocco, 2025). A useful guideline here is: If a learning objective can be assessed fairly, transparently and reliably with AI, design a robust assessment using the Lane 2 approach. If the use of AI should **not** influence reliable decisions about quality and control, an assessment method that is either AI-restricted or AI-free must be designed for that learning objective. This assessment must be administered in a controlled environment and under supervision. In situations where weighty decisions are to be made about a student’s level of attainment and performance in relation to multiple learning objectives based on a holistic assessment, for example in portfolio assessment, it is crucial to ensure that the compiled set of evidence consists of information and data (where AI has been permitted and/or excluded) from both lanes, with clarity about the assessment criteria and the method of assessment. Only in this way can valid and reliable assessment decisions be made.

A key consideration is to prevent “grey areas”: it should be crystal clear for every assessment or examination whether and how AI may be used. Uncertainty on this point leads to unfair situations and potentially to cases of fraud, which examination boards then have to deal with. An assessment matrix or blueprint helps to systematically ensure that all essential learning objectives are assessed appropriately. The Two-Lane approach can be implemented in every educational sector, although its content and execution will vary between domains, disciplines and sectors.

Vocational Education and Training: sectoral agreements on valid examination instruments

In vocational education and training, sectoral agreements regarding valid assessment tools have been in place since 2016. The core agreement here is that assessment tools are, in principle, procured from certified assessment suppliers.

Deviations are permitted in individual cases, with assessments and examinations created in-house. In both cases, the product requirements managed by the Valide Examens mbo (VEMBO) foundation are the standard for creating assessments. These sectoral agreements mean that certified exam providers play a crucial role in the constructive coordination of validating (VET: qualifying) assessment with qualification files and professional practice in a world with AI. Examination boards in VET should therefore actively engage in dialogue with exam providers about AI integration.

Higher professional education: Learning outcomes and flexibility

In higher professional education, working with learning outcomes creates opportunities for AI integration. Flexible education makes it possible to design various pathways to the same final level, where some pathways are AI-intensive (preparing students for AI-rich work environments) and others are more traditional (for contexts where fundamental skills without technology remain crucial).

Research-oriented education: Academic integrity and research skills

In research-oriented education, academic integrity is paramount. Here, the Two-Lane approach must pay extra attention to distinguishing AI as a research tool (allowed in Lane 2) from AI as a substitute for critical thinking (not allowed). Universities are trialling AI statements where students explicitly document how AI has been used in their research.

Why is this approach valuable? The Two-Lane approach ensures that integrity and innovation go hand in hand. Students learn to make optimal use of AI applications based on responsible, appropriate use, while the reliability and quality of assessment and final level are assured. Rather than ignoring or prohibiting AI, the technology is embraced in a controlled way wherever it enhances the learning process. At the same time, inappropriate or unauthorised use is minimised wherever AI threatens to undermine learning or evidence of learning. In this way, students acquire professional competence but also greater understanding of how to use AI tools responsibly. This framework is thus in line with widely held international views that assessment should be both AI-aware (ensuring the quality and robustness of assessment despite and thanks to AI) and encourage students to develop relevant knowledge and skills using AI collaboratively (TEQSA, 2023). This approach requires careful communication to all parties:

- **Students** must understand why some assessments exclude AI, while others require integration of AI;
- **Teaching staff** need professional development to design AI-aware assessments;
- **Examination boards** must set clear guidelines for permitted AI use;
- **External stakeholders** (employers, accreditation bodies) must have confidence in the value of qualifications.

In brief, the Two-Lane approach embraces the maxim: *“Learn with and about AI, but assess essential understanding”*. In practical terms, this means excluding AI where necessary and integrating AI in learning and assessment wherever possible or desirable. Not only does this keep the focus on student development, it also maintains the quality of education and assessment and teaches students to navigate an AI-driven world rather than circumvent it.

4. Designing (or redesigning) the assessment programme

In nearly every curriculum it is necessary to redesign (or partly redesign) assessment – both to control the risks of AI and to leverage opportunities for learning and assessment while also enabling students to use AI ethically and responsibly.

The Two-Lane approach focuses on finding a balance between assessment in supervised, controlled environments and assessment where this is neither feasible nor necessary. The aim is to develop students who are well prepared and able to contribute effectively and take leadership roles in authentic, contemporary environments (in which AI is inevitably present), while monitoring and supporting their development in an appropriate manner and ensuring the desired quality of outcomes. When implementing the Two-Lane approach, the premise is that restricting AI is pointless at times when supervision cannot be enforced. It is therefore proposed that certain assessment activities should be conducted under supervision in controllable environments wherever learning quality and outcomes must be established and where insight into the individual’s input is required. AI may be permitted where it is appropriate for the learning objectives. There are also assessment practices where the use of AI is allowed or even required, often in non-controllable settings without supervision. Both types of assessment – serving different purposes – contribute to gathering information, developmental support and decision-making about student learning and performance, depending on the intended learning objectives.

When designing educational programmes, there are three key considerations (Crocco, 2025):

1. What level of learning (acquisition, retention, transfer) are students at for each learning objective?
2. What degree of AI integration is appropriate to that level?
3. How do we ensure that it is the students who have attained the required level of proficiency, essential knowledge and/or competencies?

When designing (or redesigning) an assessment programme that reflects the learning objectives, the following questions should be discussed:

- How do we ensure that it is the learner who is learning?
- How do we ensure reliable assessments and decisions about learning processes and that learning outcomes are actually about the student themselves or about collaboration with AI?
- How do we ensure students can use AI to support their learning and development processes without undermining or endangering these processes or their learning outcomes?
- How do we ensure that AI use is conscious, ethical and responsible?

STEP-BY-STEP APPROACH

1. Starting point: Identify all assessment moments and make an overview

Identify all current assessment moments by phase/component (for example, first-year foundation stage in higher professional education, Level 3 core tasks in vocational education and training, or the bachelor's thesis track in research-oriented education):

- Gather all assessment tasks, assignments, portfolio elements and examinations for each component, phase or programme;
- For the current assessment activities, make a general note of: the level (e.g. first/second/third year), weighting, current assessment moments and learning phase;
- Identify, for that component/phase, the learning objectives and preferences for AI integration (not, limited/in collaboration with AI, or mandatory), and link this information to the current assessment methods (e.g. in an Excel overview).

Tip: Use an assessment matrix with learning objectives on the horizontal axis and assessment moments on the vertical axis. In each cell, enter: (1) the assessment method, (2) Lane 1 or Lane 2, (3) permitted AI use. This immediately reveals any gaps or inconsistencies.

2. Analysing current methods of assessing learning objectives

Describe which learning objectives are linked to the assessments/assessment methods in the relevant component:

- Briefly state the current assessment method/methods, assessment types and assessment function:
 - Assessing learning by determining the quality and level of outcomes:
 - *Focused on objective, traceable, transparent, reliable and valid assessment of learning results and outcomes.*
 - *Conducted in a directly observable environment under supervision, e.g. exams, oral assessments, skills assessments.*
 - *AI may be excluded, permitted to a limited degree or fully allowed, depending on the learning objectives.*

– Development-oriented assessment:

- *To support and/or enhance learning processes and/or intended outcomes, whether or not with lawful AI use (permitted or mandatory).*
- *Implementation in environments that are not directly observable or controllable.*
- *AI use is encouraged or required to facilitate progress towards the intended learning outcomes and to foster knowledge and insight into efficient and responsible AI use.*
- When are the assessment methods used to assess the learning objectives?
- What weight does the assessment/assessment method carry?

Tip: Use an assessment matrix with learning objectives on the horizontal axis and assessment moments on the vertical axis. In each cell, enter: (1) the assessment method, (2) Lane 1 or Lane 2, (3) permitted AI use. This immediately shows where there are any gaps or inconsistencies.

3. Diagnosis and interpretation

Diagnosis distinguishes the two lanes of the Two-Lane approach.

Lane 1: Controlled assessment under supervision: Determine which learning processes, outcomes or student performances **must** take place under the supervision of the examiner or assessor in a controllable learning environment. Essential aspects here are:

- Transparency regarding whose performance is being assessed;
- Objective determination of the individual student's effort;
- Reliable quality measurement of outcomes;
- Determine whether the current assessment method allows for reliable, objective and valid assessment of student performance, where the effort made by the individual student is transparent and traceable;
- Determine whether the use of AI is desirable or permissible (or permissible to a limited extent) in assessing the quality of student performance and/or proficiency;
- Does the examiner, when determining the quality and/or level of the learning outcome, have sufficient insight into the individual student's contribution?
- Is the assessment performed in a controlled setting under any form of supervision?
- Is AI use permitted, and if so, to what extent is this feasible, controllable and/or acceptable?
- To what extent can it be determined what influence AI use had on the quality of the outcome and/or on the student's effort? Assess whether this is acceptable or problematic.

Lane 2: Open assessment with AI: Determine which learning processes and outcomes are best served by AI integration, where development towards the intended learning objectives in collaboration with AI is permitted or required. Essential questions here are:

- Determine whether AI integration in this assessment method contributes to the intended learning objectives and/or to AI literacy;
- Determine whether AI use is permitted, permitted to a limited extent or not permitted at all, and how, where, when and why;
- Determine, in the case of permitted AI use, which student effort or performance must, can or may be shown by the student herself/himself;
- Determine whether it is acceptable if permitted AI use is not directly controllable and/or takes place without supervision (or limited supervision);
- Does this assessment approach sufficiently enable students to use (and learn how to use) AI applications ethically, effectively, appropriately and responsibly?
- Is it clear how students document their AI use?
- Is critical reflection on AI output assessed?
- Are students developing AI literacy according to the learning objectives?

Sector-specific considerations for diagnosis:

- Vocational education and training: Are the assessment methods aligned to work processes in the qualification file? Are VEMBO-certified examinations AI-aware?
- Higher professional education: Are learning outcomes assessed at the right level (Dublin descriptors) with suitable AI integration?
- Research-oriented education: Is academic integrity maintained in the use of AI in research activities?

4. Conclusion and revision:

Development-oriented assessment: Are there high and/or unacceptable risks?

Do the learning activities and feedback processes sufficiently foster critical reflection and the development of independent knowledge and knowledge application, or does AI use undermine learning processes?

Concrete measures:

- Design assessment and learning activities where students not only copy AI output but explicitly contribute their own activities, analysis and reflection;
- Implement “prompt logging”, where students document their interaction with AI;
- Add interim peer review s for students to critically evaluate each other’s AI use;
- If necessary, adjust or add assessment methods if AI use does not appropriately support the student’s learning experience or is not ethically responsible.

Determining the quality of learning through assessment: Are there high and/or unacceptable risks? If there is insufficient transparency regarding individual student performance, additional action is needed:

- Take additional measures to ensure that the assessment genuinely reflects the student’s competencies.
 - Additional verification: Oral defence or criterion-based interviews in accordance with the vision document so that the student can explain how and why AI was or was not used.
 - Documentation of AI use: Showing AI statements, prompt history and feedback iterations.
 - Direct observation: Live demonstration of skills in a controlled setting.
 - Phased assessment: Multiple checkpoints where progress is monitored.
 - Portfolio assessment: Combination of AI-free and AI-assisted evidence.
- Define permitted, limited and prohibited AI use and communicate this clearly. Clarify which AI tools are allowed, for what purpose (reflection, structure, spell check), and what is not (generating and submitting a complete text).
- Adjust learning objectives if the field, discipline or competencies require this.
- Adjust or add assessment methods as needed where there is uncertainty about the reliability of decisions.

5. Cohesion and consistency

- Review, evaluate and refine the AI-integrated assessment design. Apply the principle of constructive alignment: are learning objectives, educational activities and assessment methods still aligned after AI integration?
- Does the assessment programme offer sufficient opportunities to develop AI literacy and to use AI applications in a reasoned, ethically responsible and effective manner in future professional practices?
- Bring coherence to the assessment programme by using the various assessment functions in a balanced way appropriate to the learning objectives, and maintain that balance with AI integration in assessment and examination at programme level.
- Keep an eye on prerequisites for the assessment organisation, costs and scalability.
- NOTE: avoid a patchwork of different AI rules for each subject. Students need consistency and clarity about when AI may or may not be used.

Acknowledgement of AI use

When, if and how students may or must acknowledge their use of AI depends on the intended use and assessment context. In some cases a simple acknowledgement suffices; in others – when AI use is integral to the learning objective – a different approach may be needed. For example: Students document their prompts, use, actions/processing and application of AI output throughout the learning process, as well as their activities, efforts, and performance improvements in applying, integrating, adjusting and improving outputs based on AI-generated results during the learning process and in achieving the desired outcomes. An example of a minimal acknowledgement: “At the end of your work, add: ‘[AI tool] was used to create this work. The tool was used for [purpose]. All content has been critically evaluated and adjusted where necessary.’” Extensive documentation could take the form of a document in which students record their prompts and iterations, screenshots of AI interactions, reflection on the quality of AI output and a description of their own adjustments and inputs.

Risk assessment:

1. Low risk (high AI-trust/AI-receptiveness)

- Clear institutional AI policy
- Teaching staff with training in AI competencies
- Transparent communication with students
- Adequate technology infrastructure

2. Moderate risk

- AI policy in development
- Varied competencies/assessment skills of teaching staff
- A wide range of digital teaching skills
- Uncertainty over permitted use
- Limited technical support

3. High risk (low AI-trust/AI-receptiveness)

- No clear AI policy
- Resistance to AI integration
- Outdated assessment methods vulnerable to AI
- No professional development available

Examples of applications

The following table provides examples of responsible AI use in different educational contexts:

Purpose of use	AI-driven activities
Generating assessment ideas	You can use AI tools such as ChatGPT, Bing Chat and other generative AI as partners for brainstorming and finding the best approaches for completing your assignment.
Creating assessment media	You can use AI tools such as DALL-E, Midjourney, Stable Diffusion, Adobe Firefly and other image-generating AI to create images or videos for your submission.
Suggesting a structure or outline	You can use AI tools such as ChatGPT, Claude4, and other generative AI to assist you in writing or designing.
Providing feedback at work	You can use AI tools, such as ChatGPT, Bing Chat, and other text-to-text generative AI to get feedback on your written work.
Improving written language	You can use AI tools such as Grammarly, Notion AI, ChatGPT, etc., to make direct suggestions to improve the readability, grammar and expression in your text.
Searching in literature	You can use AI tools such as Elicit.org, Perplexity.ai and ResearchRabbit.ai to discover and summarise research articles. You must then process the academic articles yourself for your submission.
Writing a draft which you improve yourself	You can use AI tools such as ChatGPT, Bing Chat and other generative AI to generate a draft artefact.

NOTE: In all these use cases, the responsibility remains with the student and AI use must be made transparent.

5. Sector-specific recommendations and examples

The impact and application of AI in assessment differs by educational sector. While the general principles (as described above) apply to everyone, vocational education and training, higher professional education and research-oriented education each have their own context, rules and challenges. Below are some specific recommendations and examples for each educational sector.

Vocational education and training

Context: In vocational education and training, the focus is on occupational competencies. Assessment mainly consists of practical exams, skill demonstrations and knowledge assessments, often according to national qualification files. In vocational education and training, the examination board focuses solely on monitoring assessment quality and the legality of examinations as defined in the Dutch Adult and Vocational Education Act (WEB). Sectoral agreements from 2016 stipulate that assessment tools must be procured from certified assessment suppliers in accordance with the product requirements of the Valide Examens mbo (VEMBO) foundation.

Recommendations for Vocational Education and Training:

- Discuss AI implementation with examination boards and assessment suppliers: Certified assessment suppliers play a key role in aligning qualifying assessment with the qualification file and professional practice in a world with AI. This means that examination boards must actively engage suppliers in dialogue about AI-aware assessments. When establishing examinations, the committee must assess whether a particular assessment method is susceptible to fraud by AI and whether adjustments are necessary. MBO Digitaal reports that SintLucas has already introduced a policy where students in creative programmes use Adobe Firefly for design inspiration but final evaluation focuses on the originality of their own contribution (MBO Digitaal, 2024).
- Emphasise professional authenticity: When administering assessments, focus on situations drawn directly from professional practice, where students must demonstrate their skills in person. Performing medical procedures or demonstrating customer care in the hotel industry can be a component of AI-driven simulations, but the actions themselves must be performed by the student.

Encourage the use of AI in development-oriented formative activities and assessment by promoting AI use as a learning tool in classes and practice tests. Research shows that prompt engineering as a skill is essential for AI literacy (Ng et al., 2021). Have students ask AI questions in their subject field and evaluate the usefulness of the answers, or have them practice a scenario generated by AI.

This way, students learn the limitations and possibilities of AI. Clearly communicate that stricter or different rules may apply in the actual examination, but that this serves as preparation for them.

Higher professional education

Context: In higher professional education, programmes combine theoretical knowledge with applications in complex professional contexts. Students at universities of applied sciences are prepared for a professional environment in which digital skills are increasingly pertinent. Assessment ranges from written knowledge tests to project reports, presentations, portfolio assessment and internship evaluations. Examination boards in higher professional education monitor and safeguard the quality of assessment and certification on the basis of the Dutch Higher Education and Scientific Research Act (WHW).

Recommendations for higher professional education:

- Develop an institution-wide AI assessment policy, as universities of applied sciences have considerable autonomy for each study programme. Guidelines for AI in assessment can be drawn up in the assessment policy as part of the examination regulations. For example: a policy document that provides rules and guidelines (“AI may not be the author of submitted work, but may serve as a tool provided it is properly acknowledged”) and examples of good practices. Examination boards can ensure this is implemented in the programmes.
- Foster authenticity and professionalism by drawing on the reality that professionals in practice will also use AI tools. AI is already used daily in many fields, from marketing to journalism and logistics to HR. This offers opportunities to prepare students for this reality, for example through assignments where AI is deliberately used, combined with critical reflection.
- Use portfolio assessments, with extra attention to process assessment. Assessment in higher professional education should not focus solely on the level and quality of the end product, but also take into account the entire process. This ties in with the updated Bloom’s taxonomy, where higher cognitive levels like evaluating and creating require uniquely human skills that AI cannot replace (Oregon State University, 2024).

Research-oriented education

Context: In research-oriented education, the emphasis is on knowledge development and creation and on academic integrity. Students are trained to be critical thinkers who are able to independently process complex information. Assessment often consists of essays, exams, research papers, theses and oral exams. Academic integrity is a cornerstone in this educational sector: originality, correct referencing and independent work are all highly emphasised.

Recommendations for research-oriented education:

- Revise assessment methods by repositioning assignments to higher cognitive levels. Evangelista (2025) advocates for “rethinking exam design,” replacing traditional recall questions with tasks that require critical thinking and creativity.
- Integrity and ethics require explicit attention in the curriculum. There are concerns about maintaining writing skills and that AI could lead to scientific inaccuracies or fraud – for example, fictitious sources or students having a thesis written by AI. Universities must therefore not only develop policies but also actively educate students about the ethical implications of AI use in an academic context.
- Use oral assessment strategically as a verification instrument. A centuries-old tradition in academia (colloquia, oral examinations), oral assessment remains a highly effective way to verify that the student genuinely understands the submitted work.

6. Recommendations and conclusions

In addition to addressing assessment and assignment levels, successful and sustainable integration of AI into assessment practice also requires action at the institutional and teaching levels. Some practical recommendations in this regard are set out below.

At the institutional level: Policy and infrastructure

Develop clear institutional policy: Ensure there is an institutional or faculty-level policy/document that summarises the approach to AI use. This should include definitions (what constitutes AI support), guiding principles (e.g. “AI use is permitted, provided it is transparent, and final work must always originate from the student”) and procedural arrangements (how to deal with suspicion of AI misuse; how to register this in the education and examination regulations). This policy must be consistent with the EU AI Act (2025), which classifies AI applications in education as “high risk” and requires transparency, human oversight and auditability. Provide secure AI tools and infrastructure by offering AI tools centrally in a secure environment. This avoids the situation where staff and students use random third-party tools which might not comply with GDPR requirements. SURF and Kennisnet can provide support for this with national agreements on secure AI environments.

At teaching staff level: Professional development and support

Invest in professional development for teaching staff and examination board members in the area of AI. As Chiu et al. (2024) point out, “training and knowledge sharing are essential for teaching staff to use AI tools responsibly in teaching.” Many educators and teachers are still exploring what AI can do, how reliable it is and how to recognise AI-generated work. Training and/or learning communities on “assessment and AI” help to increase knowledge and share good examples, such as training courses on prompt engineering, workshops on designing AI-aware assessment practices or peer review meetings to exchange experiences.

It is essential that this professional development is tailored to the relevant sector:

- Vocational education and training: Focus on practical application in occupational contexts and collaboration with assessment suppliers
- Higher professional education: Emphasise project-based work and portfolio assessment with AI
- Research-oriented education: Pay attention to academic integrity and research methods with AI

Have experts or early adopters present their experiences, as this increases support and prevents teams from reinventing the wheel.

Student level: Developing AI literacy

Students must also be trained in AI literacy. AI literacy is the ability to critically evaluate AI output, recognise bias, consider ethical implications and make responsible choices about when and how to use AI. Introduce AI competence as part of academic and/or study skills. Crocco (2025) describes how the University of Sydney organises workshops for students on documenting and critically evaluating their use of AI. Dutch institutions can develop comparable initiatives.

Ethics and quality assurance

Establish an ethics committee or working group to address new AI applications in education. This group can assess whether the intended use of an AI tool is didactically meaningful and supports the learning objectives. It can also check whether tools comply with privacy requirements (GDPR) and the EU AI Act, are free from bias against specific student groups and are transparent to all stakeholders.

Intersectoral collaboration

Because this issue affects everyone, there is much to gain from collaboration between vocational education and training, higher professional education and research-oriented education (and also with secondary education). Specific forms of collaboration include:

- Joint development of AI policies that can be adapted to sector-specific contexts;
- Sharing of assessment examples via the Two-Lane approach;
- Joint procurement of secure AI tools with an educational discount;
- National professional development through, for example, the Npuls AI community.

Conclusions

AI in assessment and examinations is no longer a vision of the future but a reality today. As the Dutch government states, generative AI must serve to enhance human wellbeing, prosperity, sustainability, justice and security (Ministry of the Interior and Kingdom Relations, 2024). For educational institutions, this represents a fundamental mission. This guide aims to provide educational professionals in tertiary higher education with practical tools for developing AI-aware curricula. The Two-Lane approach provides a practical framework that:

1. **Combines innovation and integrity:** AI is embraced where it enriches learning processes (Lane 2), while individual competence remains assured (Lane 1);
2. **Balances flexibility and structure:** The framework can be applied across all sectors but leaves room for context-specific implementation;
3. **Is future-proof:** By allowing students to work with but also without AI, we prepare them for a wide range of professional contexts.

The essence here is to learn with and about AI, but to assess essential understanding. AI technology is constantly evolving. What is state-of-the-art today may be obsolete tomorrow, which is why it is vital for educational institutions to develop flexible curricula and assessment programmes that can adapt alongside technological developments. This calls for a culture of continuous improvement, where teaching staff and students learn together to navigate an AI-driven world. In this way, we can guarantee the quality of education and assessment and optimally prepare students for a professional field in which humans and AI work side by side.

Reference list

- Bakker, T. C., De Kraker, C. C., Eegdeman, I. M., Saçan, E., & Van Leeuwen, A. (2024). *AI en kansengelijkheid: Visie op de impact van AI op kansengelijkheid in het vervolgonderwijs*. Npuls.
- Bearman, M., Tai, J., Dawson, P., Boud, D., & Ajjawi, R. (2024). Developing evaluative judgement for a time of generative artificial intelligence. *Assessment & Evaluation in Higher Education*, 49(6), 893-905. doi.org/10.1080/02602938.2024.2335321
- Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, 32(3), 347-364.
- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). Open University Press.
- Black, P., & Wiliam, D. (1998). Assessment and class-room learning. *Assessment in Education*, 5(1), 7-74.
- Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, 21(1), 5-31.
- Boud, D., & Dawson, P. (2023). What feedback literate teachers do: An empirically-derived competency framework. *Assessment & Evaluation in Higher Education*, 48(2), 158-171.
- Chan, C. K. Y., & Colloton, T. (2024). *Generative AI in higher education: The ChatGPT effect*. Routledge. doi.org/10.4324/9781003459026
- Chiu, T. K. F., et al. (2024). Teacher AI literacy and AI-enhanced teaching practices. *Computers & Education*, 201, 104932.
- Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2024). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, 61(2), 228-239. doi.org/10.1080/14703297.2023.2190148
- Crocco, L. (2025). Guide to curriculum mapping: A systematic process for program redesign. *Teaching@Sydney*, University of Sydney.
- Curtis, G. J. (2025). The two-lane road to hell is paved with good intentions: Why an all-or-none approach to generative AI, integrity, and assessment is insupportable. *Higher Education Research & Development*, 1-8.
- EU AI Act. (2025). *Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence*. European Parliament and Council.
- Evangelista, E. D. L. (2025). Ensuring academic integrity in the age of ChatGPT: Rethinking exam design, assessment strategies, and ethical AI policies in higher education. *Contemporary Educational Technology*, 17(1), ep559. doi.org/10.30935/cedtech/15775
- Fawns, T., & Schuwirth, L. (2024). Rethinking the value proposition of assessment at a time of rapid development in generative artificial intelligence. *Medical Education*, 58(1), 14-16.
- Liu, D., Fawns, T., Cowling, M., & Bridgeman, A. (2023). *Responding to generative AI in Australian higher education*. dx.doi.org/10.35542/osf.io/9wa8p
- Lodge, J. M., Thompson, K., & Corrin, L. (2023). Mapping out a research agenda for generative artificial intelligence in tertiary education. *Australasian Journal of Educational Technology*, 39(1), 1-8.
- MBO Digitaal. (2024, 17 april). *Datadinsdag bij Sint-Lucas: Hoe maak je beleid rond AI en examinering, toetsing en afsluiting?* mbodigitaal.nl/2024/04/datadinsdag-hoe-maak-je-beleid-rond-ai-en-exa-minering-toetsing-en-afsluiting/
- Ministerie van BZK. (2024). *Overheidsbrede visie generatieve AI*. Rijksoverheid.
- Mollick, E., & Mollick, L. (2023). Assigning AI: Seven approaches for students, with prompts. *arXiv preprint arXiv:2306.10052*.
- Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, 2, 100041.
- Oregon State University. (2024). *Bloom's taxonomy revisited* (Version 2.0). CC BY-NC 4.0.
- Perkins, M., Furze, L., Roe, J., & MacVaugh, J. (2024). The Artificial Intelligence Assessment Scale (AIAS): A framework for ethical integration of generative AI in educational assessment. *Journal of University Teaching and Learning Practice*, 21. doi.org/10.53761/q3azde36
- Shi, J., Liu, W., & Hu, K. (2025). Exploring how AI literacy and self-regulated learning relate to student writing performance and well-being in generative AI-supported higher education. *Education Sciences*, 13(5), 459.
- Sperling, K., Stenberg, C.-J., McGrath, C., Akerfeldt, A., Heintz, F., & Stenliden, L. (2024). In search of artificial intelligence (AI) literacy in teacher education: A scoping review. *Computers and Education Open*, 6, 100169. doi.org/10.1016/j.caeo.2024.100169
- TEQSA. (2023). *Standards for ethical AI in higher education: A consultation paper*. Tertiary Education Quality and Standards Agency.
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO.
- Van Toor-van Essen, C., & Den Heijer, J. (2024). *Handreiking (G)AI voor examencommissies en examinatoren*. De Haagse Hogeschool.
- Vereniging Hogescholen. (2021). *Handreiking examencommissies*. verenighoghocholen.nl/system/knowledge_base/attachments/files/000/001/197/original/Handreiking_examen-commissies_-_editie_2021_-_webversie.pdf
- Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2nd ed.). ASCD.
- Willemse, P., & Van der Neut, I. (2020). *Anders verantwoord van de diplomabeslissing in het mbo*. IVA Onderwijs

Annex 1 Matrix

The following matrix can be used to decide for each programme (or programme part) how assessment should be organised (validating/development-oriented) and what role AI can play.

Component/ phase/subject	Learning objectives	Assessment function	AI-use (permitted, mandatory, prohibited)	Form & setting (controllability and supervision)	Why this choice?

