AI-Supported Adaptive Assessment for Learning

Author: Mária Hartyányi, iTStudy Hungary Computer Training and Research Centre

Reviewer: Ildikó Balassa, Számalk-Szalézi Technikum és Szakgimnázium

Learning objective

Performance assessment is one of the most sensitive areas of teaching and learning. Teachers, parents and students have been debating its purpose and methods for decades. This material shows how AI can help teachers plan assessment and identify common mistakes. It also shows how to choose next steps that match learners' different starting points. Practical examples show how generative AI can help teachers improve assessment.

The role of assessment in the learning process

Modern teaching focuses on assessment linked to learning outcomes. Learning outcomes, or learning goals, describe what learners should know and be able to do at the end of a learning period. They include the skills needed to use this knowledge to solve problems and complete tasks. Assessment must follow these outcomes, which are set in advance. The outcomes must be observable and measurable.

For a trainee electrician, one learning outcome could be:

"The learner can independently build and check a simple lighting circuit using a circuit diagram. They follow workplace safety rules and can explain how the circuit works."

Adaptive assessment goes one step further. The next question, task or learning path depends on the learner's current result. Experienced vocational teachers do this naturally. For example, they watch a learner wire a socket. They then decide whether to explain again, set a new task or let the learner continue.

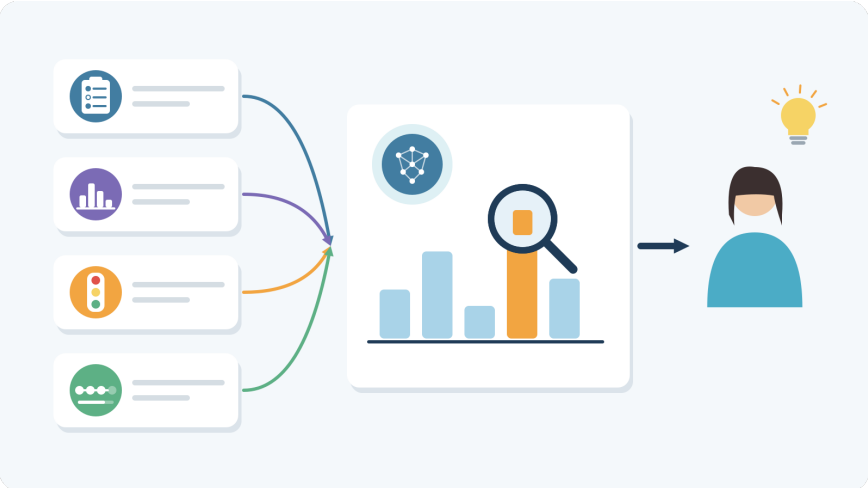
AI can help teachers do this with a whole class. It quickly analyses responses, identifies patterns and suggests different next steps.

This is especially important in vocational education. Knowing how a machine works is not enough. Learners must also operate it safely, recognise faults and make sound decisions in real working conditions.

Why do we need to update traditional assessment?

In vocational education, assessment usually takes place at the end of a learning period. Tests and grades come at the end of a topic, semester or school year. Summative assessment mainly shows the learner's level of knowledge at that point. A grade alone gives little guidance on what to improve or how to make progress.

How do we know how learners are doing?



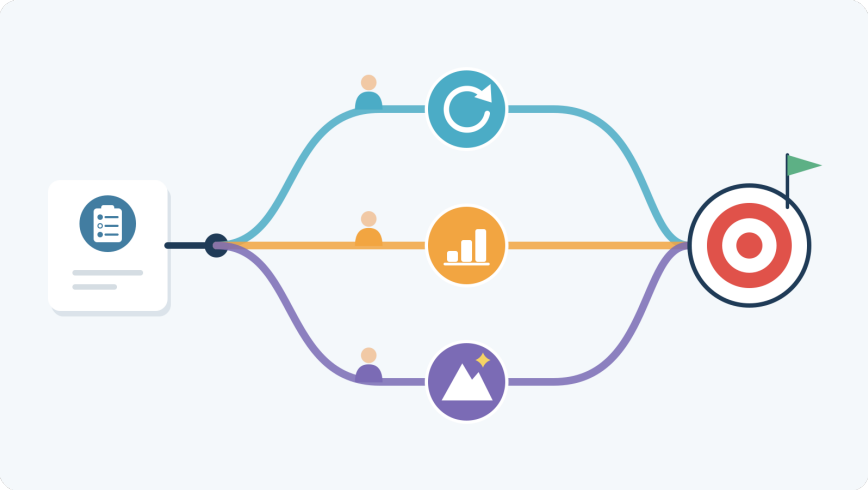
Diagnostic checks, response summaries, self-assessment and progress indicators provide evidence that AI can help teachers interpret

- **Short diagnostic checks:** ask a few well-planned questions at the start of a topic. During a lesson, use a "hinge question". At the end, use an exit ticket. Good questions include **diagnostic distractors**. These are wrong answer options that represent common mistakes. The option a learner chooses helps explain why they got the answer wrong.
- **Anonymised or summarised responses:** use summaries showing how many learners chose each answer. Include the most common wrong answers and short written explanations. Replace names with codes, such as Learner A or T07. Group patterns often tell us more than individual scores.
- **Self-assessment:** confidence ratings ("I am sure / I am not sure"), traffic lights or "I can..." statements. Compare confidence with correct and incorrect answers. A confident learner who makes a mistake needs different support from a learner who is unsure but answers correctly.
- **Progress indicators:** completed workshop tasks, number of attempts, items ticked off on a practical checklist, or progress in an online module.

None of these signals is a grade. They are snapshots that help answer three questions: Who is ready to move on? Who needs more support? Which misunderstanding is common enough to discuss with the whole group?

Differentiated questions and next steps

AI can help us create test questions at different levels of difficulty for a topic. It can also create short practical tasks and problem-solving situations. We can then use the results to give learners different tasks that match their level of knowledge and skills.



One diagnostic check, several paths – all leading to the same learning goal

Quiz tools such as Microsoft Forms, Google Forms, Moodle and Kahoot can export results to a spreadsheet. AI assistants such as Copilot, ChatGPT, Gemini and Claude can summarise the results and group similar written explanations. They can link common wrong answers to likely misconceptions. They can also highlight wrong answers marked “sure”. Use a school-approved account where possible.

Once the teacher sees the pattern, AI can suggest different next steps. These may include questions that target a specific mistake, a worked example or a practical task. Three learning paths are usually enough. They all lead to **the same learning goal**. One explains the concept in a new way. Another provides practice and helps learners strengthen their knowledge. The third increases the difficulty of the task.

Worked example: series and parallel circuits

A teacher gives 24 second-year trainee electricians a six-question check on series and parallel circuits in Microsoft Forms. Learners use codes instead of names. After each question, they mark how sure they are of their answer. The teacher exports the results and deletes the column linking codes to names. The teacher then shares the data with the AI assistant.

Example: interpreting a diagnostic check
I teach second-year trainee electricians. The table gives an anonymised summary of a six-question diagnostic check on series and parallel circuits (learners T01–T24). The learning goal: “calculate current, voltage and resistance in simple series and parallel circuits and explain the result”.
1. Identify the most common mistakes and which answers point to them.
2. Based on the answers, suggest three flexible groups for the next lesson.
3. For each group, suggest two more challenging questions and one short activity. Include a practical measurement using a multimeter.
4. Explain where there is not enough information to draw conclusions. Do not grade or label learners.
[pasted table]

Nine learners chose “the first lamp uses up the current”. Eleven thought that resistances in parallel add up. Most of these learners marked “sure”. AI

suggests measuring the current before and after each lamp. It also suggests targeted questions about equivalent resistance. For the eight learners who answered almost everything correctly, it suggests a mixed-circuit task. The teacher checks the suggestions against workshop observations. Two learners had misread the circuit diagram, so the teacher moves them to a different group. Everyone starts the next lesson with the measurement task. At the end, two hinge questions show whether the error rate has changed.

Closing the feedback loop



Check, interpret, adapt, learn – and check again: assessment as a continuous loop

Adaptive assessment follows a cycle: check, interpret, adapt, learn, then check again. Effective feedback answers three questions:

Where am I going? Where am I now? What is the next step?

AI can help write feedback and suggest next steps. Learners need to understand this feedback. Show the class an anonymous summary, for example: “Many of you think the current gets used up. Let’s test it!” Let learners compare their self-assessment with the results. Where possible, let them choose their own next learning path. This strengthens self-regulation: the ability to manage their own learning. This skill is also essential for lifelong learning alongside work.

Keep groups flexible
Groups formed after a diagnostic check are **temporary**. A learner who needs more support today may join the advanced group tomorrow. Change groups regularly. Avoid names such as “weak group”. Use colours or task names instead.

Creating assessment rubrics

Assessment based on learning outcomes needs clear criteria set in advance. AI can then help create a rubric. The rubric describes what performance looks like at each level.

Example: assessing the preparation of a three-course menu

The teacher describes the expected learning outcomes and asks AI to create a four-level rubric. The criteria cover ingredient preparation, correct use of cooking methods, food safety, time management and presentation:

Level	Correct use of cooking methods
Excellent	Follows the required cooking method correctly and independently.
Satisfactory	Makes minor mistakes that do not affect the final result.
Needs improvement	Needs the teacher's help several times to follow the steps of the cooking method.
Unsatisfactory	Makes basic mistakes in the cooking method and cannot complete the task correctly.

The teacher must check the criteria suggested by AI, especially the requirements for correct and safe practice. The teacher must also check the weighting of each criterion. Share the completed rubric with learners so they understand the expected performance.

Example – Mechanical engineering

At the start of a CNC programming module, the teacher uses AI to create a short diagnostic check. It covers coordinate systems, reading technical drawings and basic machining operations. AI can identify recurring errors in the answers. It can then suggest tasks for extra support and more advanced practice.

Personalised, formative feedback

One of the most promising uses of AI is supporting formative assessment. As teachers, we provide the assessment criteria and our observations of the learner's work. We then ask AI to write short, clear and constructive feedback.

Example – IT

Learners create a simple web application. The teacher can use AI to analyse the code and identify possible errors. AI can also suggest improvements that match the learner's knowledge level. Rather than asking AI to fix the program, the teacher can ask:

"Do not give the complete solution. Write three guiding questions to help the learner find the error in the program on their own."

Assessing practical performance and project work

Vocational teachers often need to assess complex work processes. AI can help organise assessment records, summarise the teacher's observations and identify patterns in learners' progress.

Example – Construction

Trainee bricklayers are building a wall. The teacher notes how accurate the measurements are and whether the wall is vertical. The teacher also records how learners use materials and organise their work, and takes photos.

AI can use these notes and photos to summarise each learner's strengths and areas for improvement.

Supporting self-assessment and peer assessment

Assessment supports learning best when learners can identify the strengths and weaknesses of their own work. AI can help by asking questions, providing checklists and discussing the work with learners.

Example – Commerce and marketing

Learners design an advertising campaign for a local business. AI uses agreed assessment criteria to ask questions. How well does the message match the target audience? What data supports the chosen solution? Which alternatives did you consider?

Learners first assess their own work. They then compare their views with AI's suggestions and feedback from their peers.

The prompt below can be used in a variety of vocational fields. Fill in the parts in square brackets to match the specific task.

> I am a vocational teacher. Create an assessment rubric for the following learning outcome: [Learning outcome]
> The learners' task: [Description of the practical task]
>
> Create a four-level rubric with 4–5 assessment criteria that can be observed. Describe each level in specific terms that a vocational teacher can check. List critical safety requirements separately. Then suggest three feedback questions to help learners assess their own work. Do not invent requirements from laws or standards. Mark anything that is uncertain.

Limits, risks and data protection

Using AI for assessment requires care. Language models may misunderstand a learner's answer. They may reach incorrect technical conclusions or sound too confident in their assessment. Even small changes in a task's wording or the information provided may lead to different assessments of the same performance.



AI suggests, the teacher decides – protecting learners' data

- **Support, not judgement:** use AI to plan learning. Do not use it to grade or rank learners, or decide whether they can move on.
- **Errors and overconfidence:** AI may make mistakes, find patterns that are not there or suggest tasks with technical errors. Check the technical content of every question, especially any workplace safety rules.
- **Fairness and labelling:** watch for suggestions that lower expectations for some learners. Differentiation changes the learning path and the support, but keeps the same goal.
- **Data protection (GDPR):** enter only the data you need. Replace names with codes and keep the code key separately – pseudonymised data is still personal data.
- **EU AI Act:** AI systems intended to evaluate learning outcomes are classified as high-risk (Regulation (EU) 2024/1689, Annex III, point 3).
- **Transparency:** tell learners what data you collect and how you use AI. Make clear that AI never makes the decision.

Takeaways for teachers

Effective learning depends on trust, mutual respect and a shared learning goal between teachers and learners. When cheating is suspected, learners may feel they must prove their innocence with every piece of work they submit. Constant suspicion can easily damage this trust. It also weakens learners' motivation, which is already becoming harder to sustain.

AI can generate content. This makes traditional assessments, such as essays and take-home exams, more vulnerable to misuse. Future approaches may include projects, portfolios, oral presentations and interactive simulations. In these tasks, learners show their understanding by applying what they know, rather than only recalling information or producing written answers.

AI can help teachers move beyond traditional tests. It can help them develop up-to-date assessment criteria linked to learning outcomes. It can also support personalised feedback and make learners' progress easier to track.

The goal is to strengthen assessment for learning, rather than automate assessment. AI can free up time for teachers to focus more on each learner's development. Teachers still make the professional and educational decisions.

Bibliography

- Regulation (EU) 2024/1689 of the European Parliament and of the Council (Artificial Intelligence Act), Article 5(1)(f) and Annex III, point 3; Regulation (EU) 2016/679 (General Data Protection Regulation, GDPR).

Useful links

- The Disturbing Secret Behind AI in Education: How It's Crushing Student Trust
- DigCompEdu (area 4: Assessment): joint-research-centre.ec.europa.eu/digcompedu_en
- EU AI Act, Annex III: artificialintelligenceact.eu/annex/3
- UNESCO guidance on generative AI in education and research: unesco.org

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