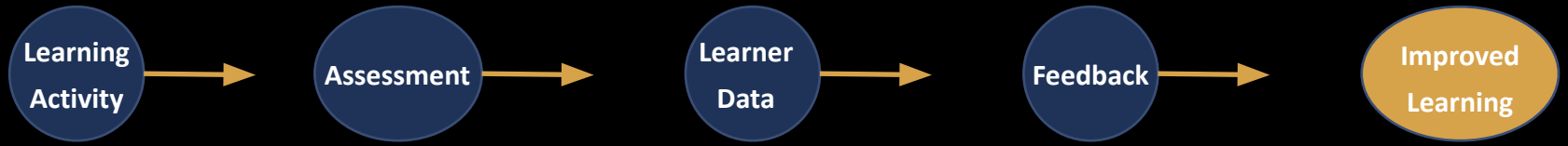
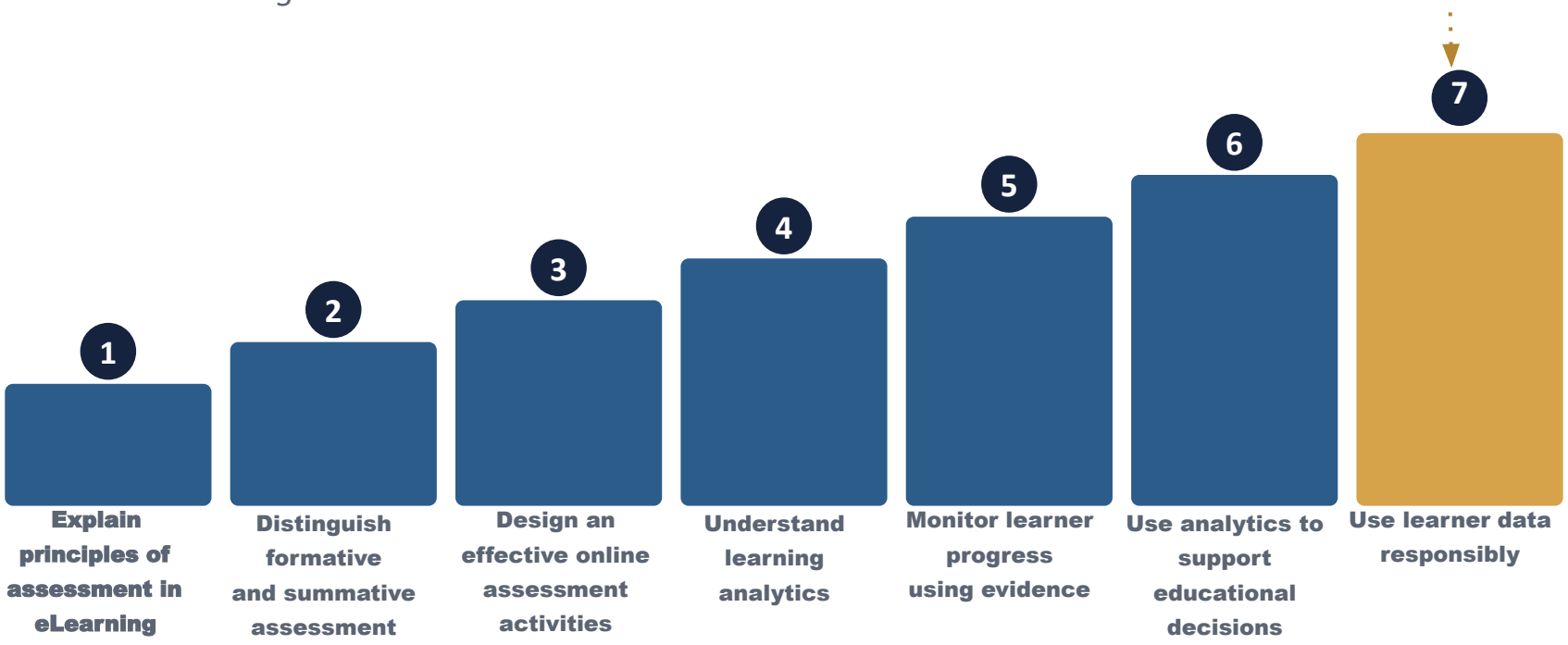
Assessment and Learning Analytics in eLearning

Principles, Assessment Approaches, Online Assessment and Data-Informed Learning



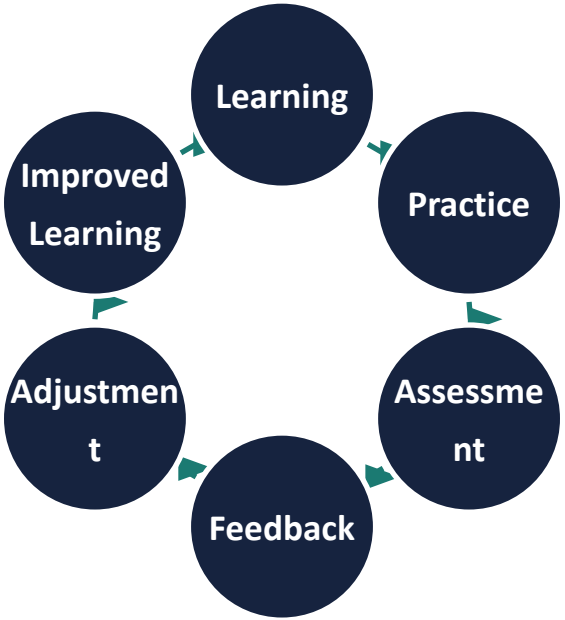
Learning Objectives

By the end of this session, participants will be able to design, apply and interpret assessment and analytics practices in eLearning.



Why Does Assessment Matter in eLearning?

Assessment is evidence that shapes teaching and learning- it is not simply the act of assigning marks.



EXAMPLE

In an online research-methods module, a formative quiz on sampling techniques shows that most learners choose the wrong method for a given scenario. The instructor adds a short worked example before the graded assignment.

Assessment is evidence for decisions- not just a score.

Grounded in OECD research on formative assessment and feedback.

Assessment in a Digital Learning Environment

eLearning changes how assessment is delivered and what data it produces, but it does not automatically improve assessment.

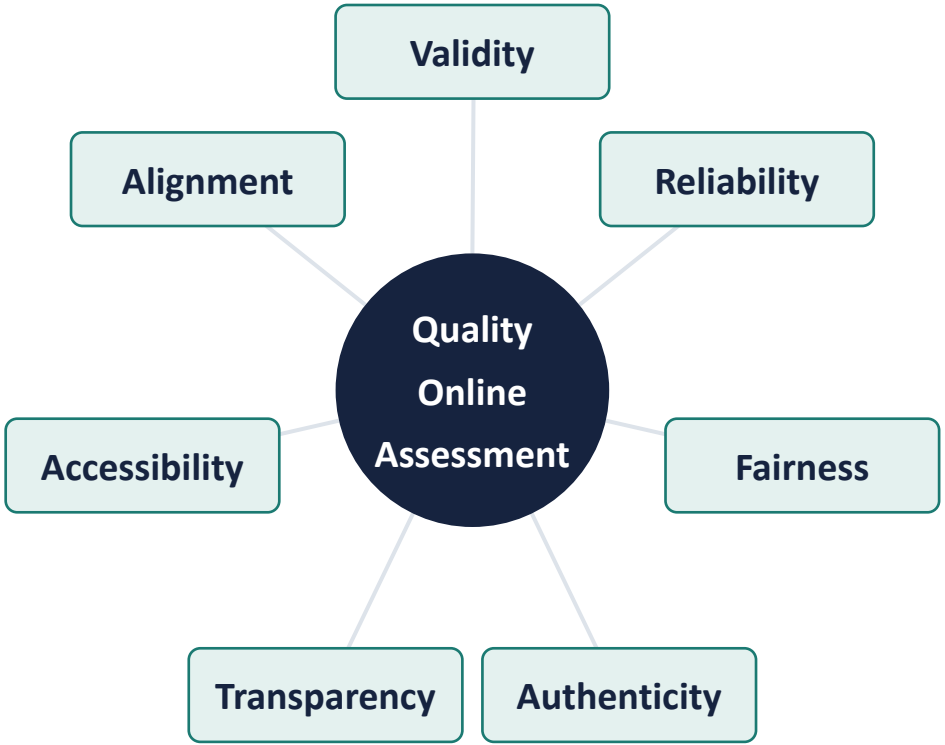
Dimension	Traditional	eLearning
Delivery	In-person, paper-based	Platform-based, remote-capable
Timing	Fixed session	Flexible, often asynchronous
Feedback	Often delayed	Can be immediate, but not always personal
Learner interaction	Face-to-face	Text, video, forum-based
Data generated	Attendance register	Detailed activity logs (if configured)
Flexibility	Limited by schedule	Higher, but needs self-discipline
Accessibility	Depends on venue	Depends on device and connectivity
Scalability	Limited by room size	Higher, but quality can be diluted

More data does not automatically mean better teaching decisions.

UNESCO, Guidance on Distance Learning

Principles of Assessment in eLearning

Sound online assessment rests on seven interconnected principles, not on any single design choice.



AERA, APA & NCME, Standards for Educational and Psychological Testing

Validity and Reliability

An assessment must measure the right thing and do so consistently before its results can be trusted.

VALIDITY
Does the assessment measure what it is intended to measure?

RELIABILITY
Are results reasonably consistent under comparable conditions?

EXAMPLE An online coding test that only checks whether the final output runs, without evaluating the learner's logic, has low validity for an outcome about problem-solving. If two markers using the same rubric on a case-study submission arrive at similar scores, the assessment shows good reliability.

Valid & Reliable | **Reliable, not Valid** | **Valid, not Reliable** | **Neither**

AERA, APA & NCME, Standards for Educational and Psychological Testing (2014)

Fairness, Accessibility and Inclusion

Fair online assessment anticipates differences in access, language and ability rather than assuming one design works for everyone.

EXAMPLE

A timed, video-based case-study quiz can unintentionally disadvantage a learner with an unstable internet connection or a hearing impairment if no transcript or extended-time option is offered.

- ☐ **Accessibility**
  Usable regardless of device or ability
- ☐ **Different Learner Needs**
  Designs anticipate variation, not one profile
- ☐ **Language**
  Clear wording; translation where feasible
- ☐ **Digital Access**
  Works on low bandwidth and older devices
- ☐ **Assistive Technologies**
  Compatible with screen readers, captions
- ☐ **Universal Design (UDL)**
  Multiple ways to access and respond
- ☐ **Reasonable Flexibility**
  Extended time or alternate formats offered

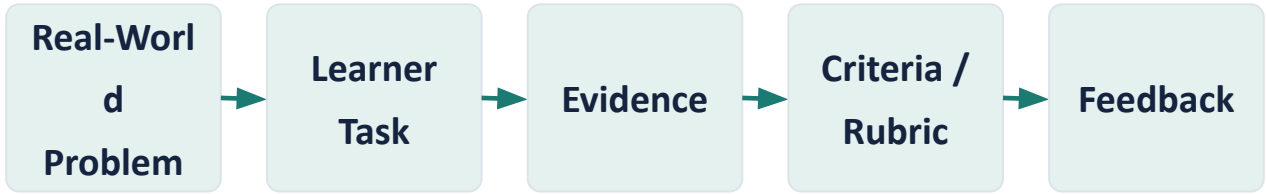
CAST, Universal Design for Learning Guidelines

Authenticity and Transparency

Authentic assessment asks learners to apply knowledge to realistic tasks; transparency means they know how they will be judged in advance.

AUTHENTIC FORMATS

- Case analysis
- Project
- Digital portfolio
- Simulation
- Problem-solving task
- Real-world decision-making

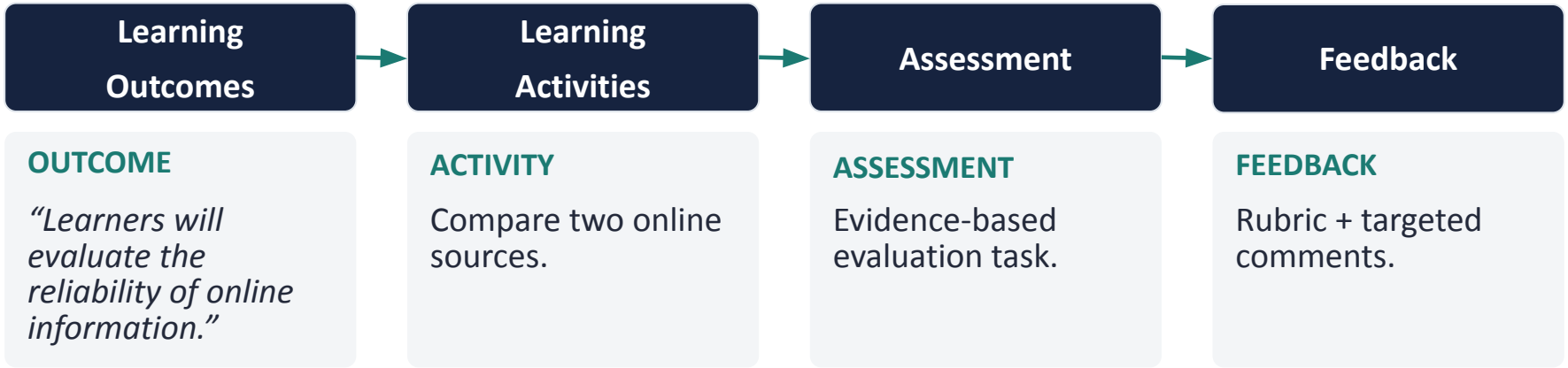


Authenticity asks: could this task exist outside the classroom?
Transparency asks: could the learner explain exactly how their work will be judged before starting?

Related to constructive alignment (Biggs) — see next slide

Constructive Alignment

Learning outcomes, learning activities and assessment must point to the same target for learning to be coherent.



Each column points to the same target: what learners should achieve, what they do to get there, how that is checked, and how they find out how they did.

Mini Case: Is the Assessment Aligned?

Alignment must be checked in practice; a well-written outcome statement does not guarantee alignment in the assessment.

SAMPLE CASE — FOR ILLUSTRATION ONLY

Course: "Introduction to Data Privacy" (online)

LEARNING OUTCOME	→	LEARNING ACTIVITY	→	ASSESSMENT	→	EVIDENCE OF LEARNING
Apply data-protection principles to a real scenario.		Watch a recorded lecture on data-protection law.		A multiple-choice quiz on definitions.		Quiz scores only.

Q: Does this assessment actually measure the stated learning outcome?

A: Not fully. The outcome asks learners to apply principles, but the quiz only checks recall of definitions. A short applied task, such as reviewing a case for data-protection violations, would align better.

Illustrative case built on Biggs' constructive alignment framework

Formative vs Summative Assessment

Formative and summative assessment serve different purposes, and both have a legitimate place in an eLearning course.

	Formative	Summative
Purpose	Guide ongoing learning	Judge achievement
Timing	During learning	End of unit / course
Feedback	Detailed, developmental	Often a score or grade
Stakes	Low	High
Example	Practice quiz, draft review	Final exam, capstone project
Use of results	Adjust teaching and learning	Certify, grade, progress

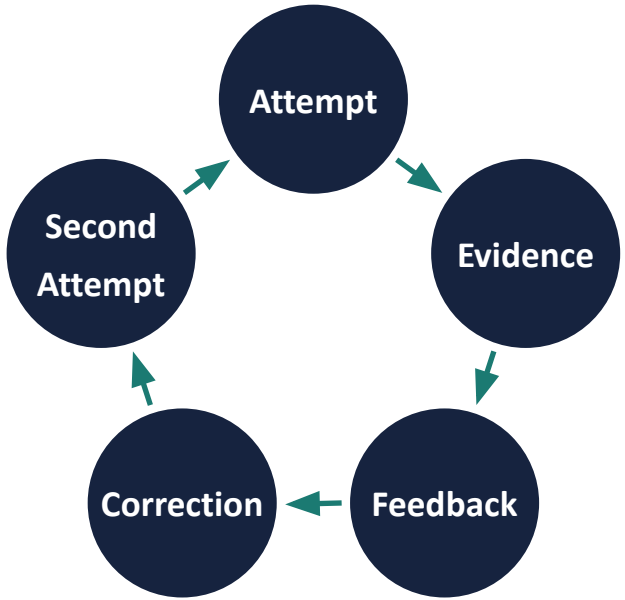
OECD, Formative Assessment: Improving Learning in Secondary Classrooms (2005)

Formative Assessment in eLearning

Formative assessment provides an instructor with evidence to adjust instruction before the stakes become high.

EXAMPLES

- Practice quizzes
- Polls
- Discussion prompts
- Draft submissions
- Peer review
- Self-assessment
- Exit questions



Example: Several learners score poorly on a practice quiz question about a statistics concept. The instructor reviews the question, checks the related video, and adds a short remedial explainer before the final test.

OECD research links formative assessment to some of the largest measured gains among educational interventions

Summative Assessment in eLearning

Summative assessment provides a defensible judgment of achievement and remains necessary alongside formative assessment.

EXAMPLES

- Final examination
- Final project
- Capstone task
- Digital portfolio
- Final presentation

APPROPRIATE WHEN

- Concluding a course or unit
- Certification, grading, or progression decisions are needed
- A comprehensive judgment of achieved outcomes is required

Formative assessment supports the journey; summative assessment confirms the destination — the two are complementary, not opposed.

OECD, Integrating Formative and Summative Assessment (Working Paper No. 58)

Assessment OF, FOR and AS Learning

These three lenses describe different roles that assessment can play within the same course.

	Main Question	Learner Role	Teacher Role	Example
OF Learning	What has been achieved?	Is assessed	Judges achievement	End-of-course exam
FOR Learning	What is needed next?	Receives feedback	Adjusts teaching	Feedback on a draft
AS Learning	How do I judge my own progress?	Self-monitors	Builds self-assessment skill	Learner scores own draft

OF *Looking back at achievement*

FOR *Looking forward to improvement*

AS *Looking inward at one's own progress*

Based on Lorna Earl's framework — Manitoba Government curriculum document

Feedback: The Link Between Assessment and Learning

Feedback improves learning only when it is specific, timely and actionable.

Specific **Timely** **Actionable** **Related to the goal** **Understandable**

WEAK

“Good work. Improve your answer.”

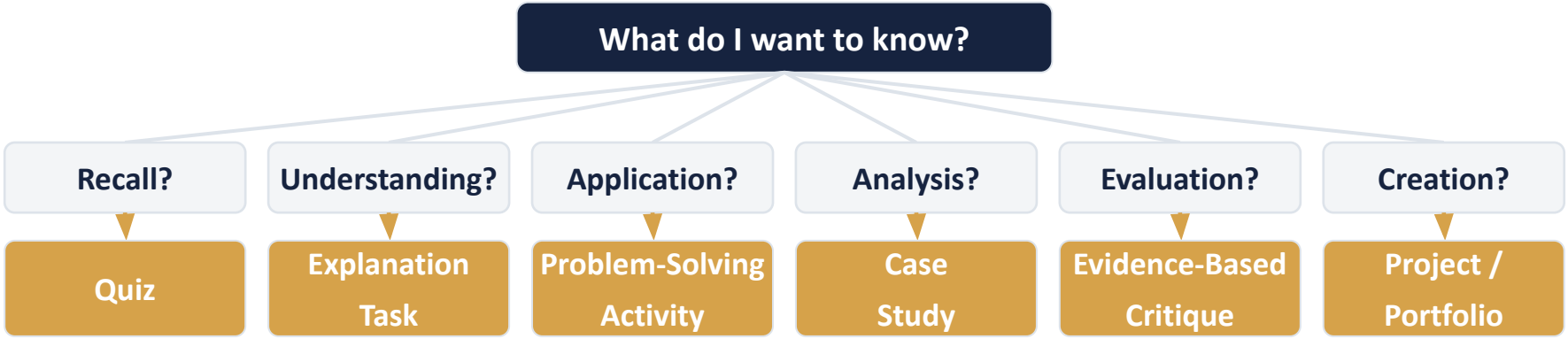
EFFECTIVE

“Your answer identifies the main issue, but the evidence does not yet support your conclusion. Add one relevant source and explain how it supports your claim.”

The difference is not tone — it is whether the learner knows exactly what to do next.

Which Assessment Should an Educator Choose?

The cognitive level of the intended outcome should determine the assessment format.

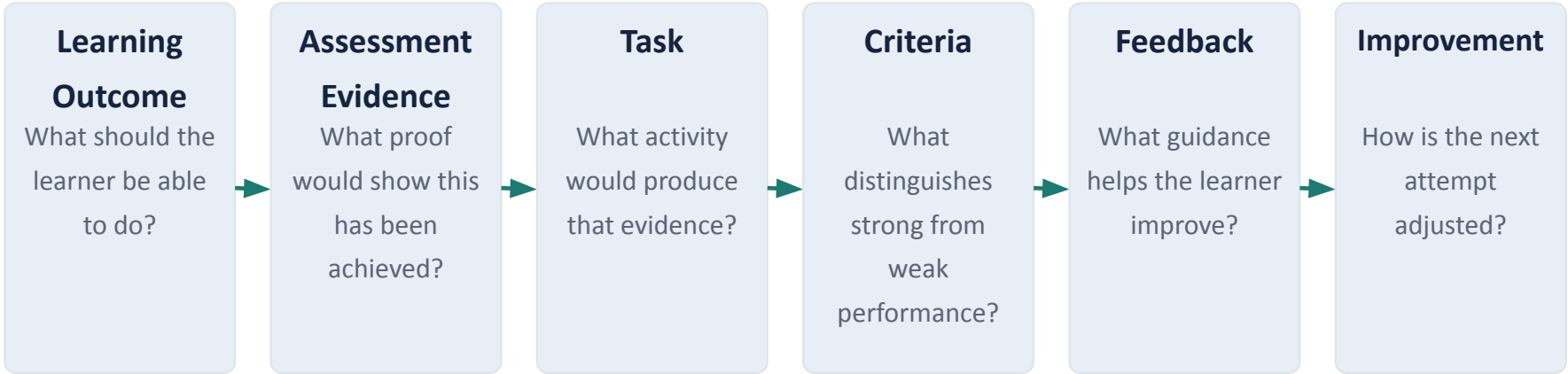


A single course rarely sits at one level. Most units combine several rows of this tree across their formative and summative tasks.

Based on the cognitive levels of Bloom's Revised Taxonomy — Vanderbilt University Center for Teaching

Designing Effective Online Assessment Activities

Good online assessment design starts from the learning outcome and works forward to feedback and improvement.



Design in this order- outcome first, task last. Reversing the order (starting from a favourite activity) often produces a mismatch.

Extends the constructive alignment model (Biggs)

Writing Better Online Questions

Small changes in question wording can shift what a question actually measures.

MCQs | **Multiple-response** | **Short-answer** | **Scenario-based** | **Case-based**

POORLY DESIGNED

“What is formative assessment?”

Tests recall only. The answer is easily searched or guessed, and reveals nothing about whether the learner can apply the idea.

IMPROVED

“A learner submits a first draft with a weak thesis statement. Which formative assessment strategy would best help this learner improve before final submission?”

Requires applying the concept to a realistic situation, not just naming a definition.

Bloom's Taxonomy and Online Assessment

Each level of Bloom's Revised Taxonomy calls for a different kind of online assessment task.

Design a short formative quiz on a topic of your choice.

Judge which of two proposed interventions better addresses a learner's gap.

Compare two online sources on the same topic for bias.

Use a rubric to score a sample assignment.

Explain in your own words why formative feedback differs from a grade.

Label the parts of an LMS discussion forum interface.

Scenario-Based Online Assessment

A well-designed scenario can reveal whether learners can apply knowledge, not just recall it.

SCENARIO

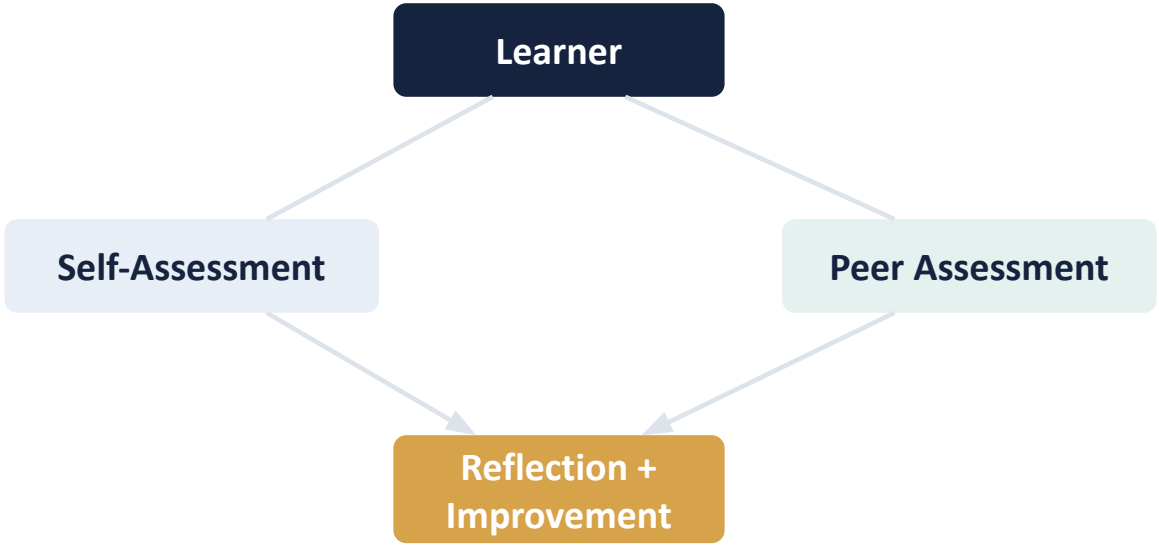
"An online course shows that many learners completed the module but performed poorly on an application question. What should the instructor do next?"

1. **Interpret the evidence**
2. **Identify the likely learning problem**
3. **Suggest an intervention**
4. **Justify the decision**

Scenario tasks like this reveal reasoning that a multiple-choice recall question cannot — they show how a learner would actually respond to an ambiguous, real classroom situation.

Peer and Self-Assessment

Peer and self-assessment build the reflective skills learners need to judge and improve their own work.



Peer review · Self-assessment · Reflection · Metacognition · Rubrics · Feedback literacy

Related evidence on classroom assessment practice — OECD

Rubrics for Online Assessment

A clear rubric tells learners what "good" looks like before they submit their work.

Criteria · Performance levels · Descriptors · Analytic rubric · Holistic rubric

SAMPLE RUBRIC — ILLUSTRATIVE

Criterion	Developing	Proficient
Understanding	Partial grasp of concept	Accurate, complete grasp
Evidence	Limited or irrelevant	Relevant and sufficient
Analysis	Descriptive only	Draws reasoned conclusions
Clarity	Hard to follow	Clear and well-organised

An analytic rubric scores each criterion separately, useful for detailed feedback. A holistic rubric gives one overall judgment, useful for quick, consistent grading at scale.

Principle grounded in AERA, APA & NCME assessment standards

Academic Integrity in Online Assessment

Thoughtful assessment design can reduce opportunities for misconduct- proctoring is only one tool among several.

1. **Authentic tasks**
2. **Question variation**
3. **Question banks**
4. **Randomized questions**
5. **Open-book assessment**
6. **Application-based questions**
7. **Oral follow-up**
8. **Clear integrity expectations**

REDUCED OPPORTUNITY FOR MISCONDUCT

Proctoring is one tool among many, not the only solution. Assessment design that makes copying difficult or pointless works alongside, not instead of, monitoring.

International Center for Academic Integrity, Fundamental Values of Academic Integrity

What Is Learning Analytics?

Learning analytics turns learner data into insights that support educational decisions; it is more than just viewing an LMS report.

Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, to understand and improve learning and the environments in which it occurs.

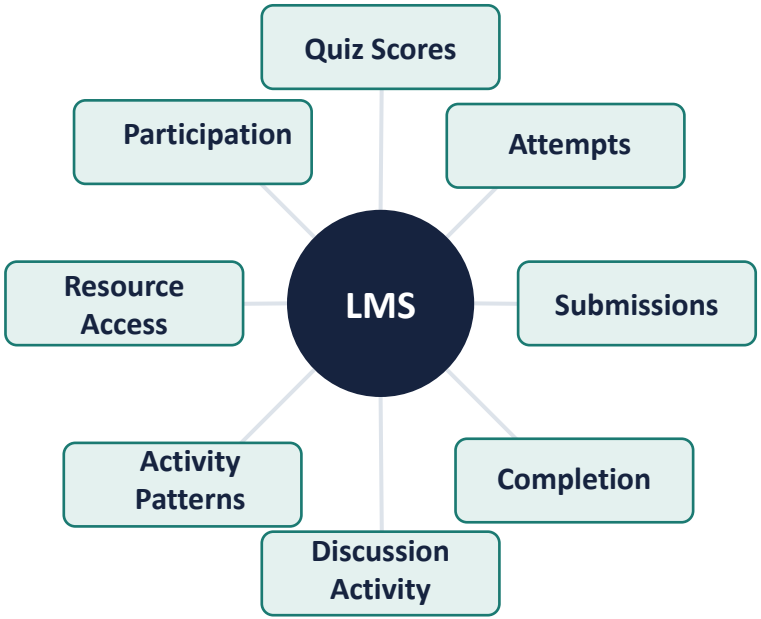
Viewing an LMS activity report is a form of data access. Learning analytics goes further- it interprets patterns and connects them to action.

EXAMPLE An instructor compares quiz-timing data across a cohort and notices most errors cluster around one question type, prompting a review of how that skill is taught.

Society for Learning Analytics Research (SoLAR), What Is Learning Analytics

What Learner Data Can an LMS Provide?

The data an LMS can provide depends entirely on the platform, its configuration and the permissions in place.



Not every LMS collects all of these. Availability depends on the platform, configuration, permissions and course design.

Society for Learning Analytics Research (SoLAR), What Is Learning Analytics

Monitoring Learner Progress

A dashboard highlights patterns worth investigating; it does not, by itself, explain why a learner is progressing or struggling.

SAMPLE DATA — FOR ILLUSTRATION ONLY

Learner A

On track

Quiz

85%

Participation: High

Assignment: On time

Learner B

Needs Attention

Quiz

48%

Participation: Low

Assignment: Late

Learner C

Monitor

Quiz

72%

Participation: Medium

Assignment: On time

CAN CONCLUDE

These indicators flag learners who may benefit from a closer look.

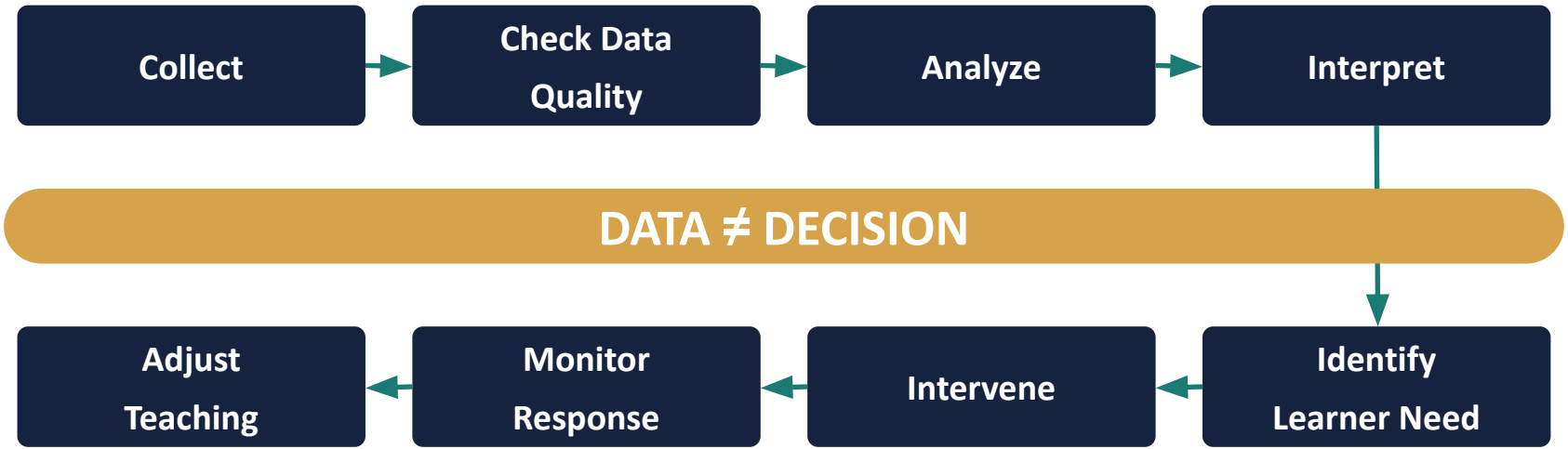
CANNOT CONCLUDE

Low activity alone does not prove poor learning — a learner may be studying offline, working at a different pace, or facing a temporary personal constraint.

Interpretive caution grounded in Jisc, Code of Practice for Learning Analytics

From Data to Educational Action

Data becomes useful only after it passes through quality checks and human interpretation.



Data needs educational interpretation and context before it becomes a decision.

Using Data to Enhance Learning Outcomes

Learning analytics can inform action at the level of the individual learner, the course, and teaching practice.

LEARNER LEVEL
- Targeted support
- Feedback
- Additional practice

COURSE LEVEL
- Identify difficult topics
- Improve resources
- Adjust assessment

TEACHING LEVEL
- Review teaching strategies
- Identify learning gaps
- Improve instructional design

EXAMPLE

Suppose several learners score poorly on questions related to one concept. The instructor reviews the questions, checks the learning material, and provides a short remedial activity. A second assessment is then used to see whether performance improves.

This work happens at three levels, but it always starts the same way: a specific pattern in evidence, not a general hunch about what might be wrong.

Society for Learning Analytics Research (SoLAR), What Is Learning Analytics

Ethical Use of Learning Analytics

Learner data should be used to support learning, and every use of it carries a responsibility to protect the learner.

POTENTIAL BENEFITS

- Earlier, more targeted support
- Timely, specific feedback
- Evidence-based course improvement
- Better-informed teaching decisions

POTENTIAL RISKS

- Loss of privacy or over-surveillance
- Bias in how patterns are interpreted
- Reduced trust between learner and institution
- Decisions made without human judgment

Consent | **Transparency** | **Data Minimization** | **Human Judgment** | **Data Security**

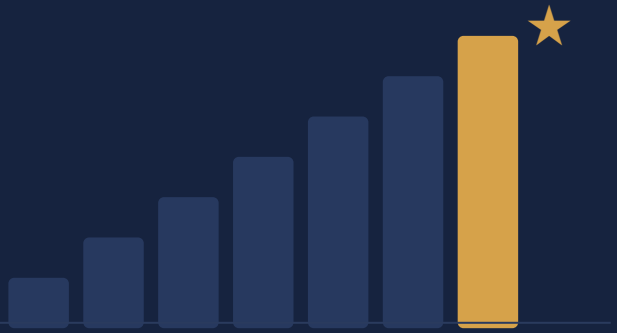
"Use learner data to support learning, not simply to monitor learners."

Jisc, Code of Practice for Learning Analytics

Key Takeaways and Action Plan

Effective assessment and analytics practice begins with the learning outcome and ends with responsible, evidence-informed action.

1. Start with the learning outcome.
2. Select assessment evidence that matches the outcome.
3. Use formative assessment to support improvement.
4. Design authentic and accessible online tasks.
5. Use learning analytics to identify meaningful patterns.
6. Turn evidence into appropriate educational action.
7. Protect learner privacy and use human judgment.

REFLECTION QUESTION

"What is one assessment or learner-data practice you could improve in your own eLearning context?"