

Motor learning · supported focus

International Baccalaureate · IB Diploma · Sports, Exercise and Health Science · HL

Scope and prerequisites

Supported HL focus. First assessment 2026; current SL/HL brief acquired. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

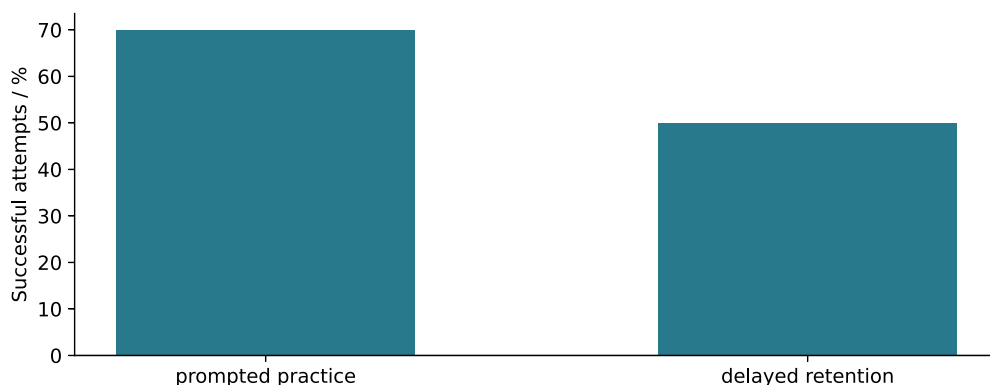
Motor control: feedback, timing and evidence

■ What would explain this observation?

- A learner adjusts a slow movement after seeing an error, but a very fast action may end before visual feedback can change it. Timing constrains the role of feedback.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- Open-loop control emphasizes a pre-organized command during an action; closed-loop control uses feedback to compare the result with a goal and modify control. Many sporting actions combine feedforward preparation with feedback. Intrinsic feedback arises from the performer's sensory information, while **augmented feedback** is additional information supplied by another source.
- augmented feedback: Additional task information supplied beyond the performer's own sensory feedback; **knowledge of results** : Feedback about the outcome of an action.



■ Choose evidence that can test it

- Distinguish knowledge of results from knowledge of performance. A score reports the outcome; a description of arm position reports movement features. Feedback can guide practice, yet immediate success with continuous prompts may not persist when prompts are removed. Retention and transfer therefore provide stronger learning evidence than one practice score.
- Use a voluntary, low-risk seated target or tracing task. Define the outcome, keep practice opportunities equal, give an agreed feedback schedule and assess delayed performance without feedback. Counterbalance group order where feasible and use anonymous records. Do not claim the task completely models elite performance.

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: one trial provides 20 attempts and 14 successes, or 70%. A delayed no-feedback test provides 20 attempts and 10 successes, or 50%. The decline is 20 percentage points, not a 20% relative decline; relative decline is $(14-10)/14 \times 100$, approximately 28.6%. The observation supports investigating dependence on prompts, not a guaranteed explanation.

Example:

Success rate changes from 80% in practice to 55% in retention. Find the decrease in percentage points. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

■ Check the conclusion and its limits

- Open-loop and closed-loop are models, not a claim that an athlete's nervous system uses only one mechanism. Feedback timing, task complexity and sensory availability affect what can be inferred.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

A strong score with continuous prompts proves lasting motor learning. This claim is false: Open-loop and closed-loop are models, not a claim that an athlete's nervous system uses only one mechanism. Feedback timing, task complexity and sensory availability affect what can be inferred.

Key:

Motor control: feedback, timing and evidence: Distinguish knowledge of results from

knowledge of performance. A score reports the outcome; a description of arm position reports movement features. Feedback can guide practice, yet immediate success with continuous prompts may not persist when prompts are removed. Retention and transfer therefore provide stronger learning evidence than one practice score.

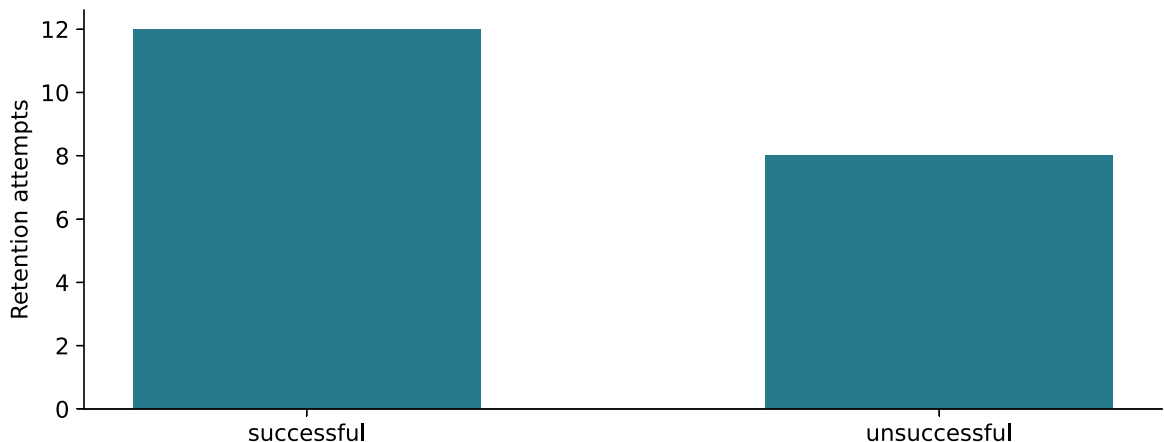
Motor learning, feedback and retention

■ What would explain this observation?

- A learner performs well while a coach gives constant instructions, then struggles the next day. Immediate performance and retained learning are different outcomes.
 - Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.
-

■ Build the model

- Motor learning is a relatively lasting change in movement capability from practice. **Knowledge of results** concerns the outcome; knowledge of performance concerns movement quality.
- **retention**: Persistence of learning after a delay; knowledge of results: Feedback about the task outcome.



■ Choose evidence that can test it

- A retention test after a delay and without the same assistance can provide evidence of learning. Practice conditions, prior experience and task difficulty need control before comparing feedback methods.
 - Use a low-risk target task, equal practice time, random or balanced assignment, and a delayed retention test. Record outcome accuracy separately from movement quality. Seek consent and avoid labels about a participant ability or personality.
-

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: 12 of 20 throws hit a target during retention. $\text{Accuracy} = \frac{\text{successful attempts}}{\text{total attempts}} \times 100 = \frac{12}{20} \times 100 = 60\%$. Another group at 70% is not automatically superior without sample variability and comparable starting performance.

Example:

15 of 25 retention attempts succeed. Find success percentage. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- More feedback is not always better for independent performance. A short-term improvement alone does not demonstrate a lasting learning change.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

High performance during guided practice always proves lasting motor learning. This claim is false: More feedback is not always better for independent performance. A short-term improvement alone does not demonstrate a lasting learning change.

Key:

Motor learning, feedback and retention: A retention test after a delay and without the same assistance can provide evidence of learning. Practice conditions, prior experience and task difficulty need control before comparing feedback methods.