

- For teachers who set exam-style or extended-answer questions

COGNITIVE SCIENCE: QUESTIONING & ASSESSMENT

Why the same class scores lower as questions climb Bloom's ladder

If two questions test the same topic, does one being harder to think about explain a lower mark, or does it show something about how the topic was taught?

Evidence from a US university physiology class; the pattern of higher-order questions scoring lower is worth watching for in any subject that sets exam-style or extended-answer questions.

In one university class, the same learners scored 80% on exam questions that only asked them to recall facts, 70% on questions asking them to explain ideas in their own words, and just 55% on questions asking them to apply that knowledge, one exam, one class, the mark falling as the thinking climbed the ladder from knowledge to comprehension to application.

● ● ● Evidence: Early signal

Randomised controlled pretest-posttest trials with UK school-age learners, independent replication, and exact effect estimates for thinking-ladder outcomes.



WHAT HAPPENED

The mark falls as the thinking climbs

A 120-learner upper-division university physiology class had Bloom's Taxonomy explicitly introduced early in term: a well-known way of ranking thinking from simple recall up through explaining, applying, and eventually analysing and evaluating. On the class's first exam, the instructor broke down performance by the level of thinking each question demanded. The same learners, sitting the same exam, earned 80% of the available points on knowledge-level questions (straight recall), 70% on comprehension-level questions (explaining a concept in their own words), and only 55% on application-level questions (using the knowledge to solve something new).

Knowledge: recall facts

80% of points

Comprehension: explain it back

70% of points

Application: use it in a new problem

55% of points

Percentage of the available exam points the class earned at each level of Bloom's Taxonomy tested on that paper (the exam itself weighted 16% of its marks at knowledge level, 38% at comprehension, 46% at application). One exam, one class, a descriptive snapshot rather than a controlled comparison.

The moves the instructor used

1

Name the rung before answering

Three to four questions a lesson, and learners were always asked to "Bloom" the question, naming what level of thinking it needed, before attempting it.

2

Map the exam's ladder in advance

As homework, learners categorised the previous year's exam by Bloom's level and worked out what share of the marks sat at each level, before revising.

3

Show the ladder in the results, not just a mark

Alongside the usual mark, learners could see how they had scored at each level of the ladder, not only an overall percentage.

Across your subjects and classes

This comes from one US university physiology class, not a UK school and not a tested comparison. What follows are sensible ways the "name the rung, then climb it" idea could work in your subjects, worth trying, not proven for your specific class.

Subject	How it could translate
Science	Before a recap quiz, sort last term's questions into "just recall it", "explain it" and "use it", so learners see which rung tends to cost the most marks.
English	Turn essay questions into a visible ladder: "what happens" (knowledge), "why it happens" (comprehension), "what it means for a different text" (application).
Maths	Pair a recall question ("state the formula") with an application question ("use it to solve this new problem") and name the jump between them out loud.
Humanities	Before a source-based answer, ask learners to name whether the question wants a fact, an explanation, or a judgement, before they start writing.

Adapt it to the class in front of you

Quieter or less confident classes

Naming the rung takes the guesswork out of a question: "this one only wants a fact" can lower the stakes before a nervous learner even attempts it.

Top set or higher-attaining group

Push straight to noticing their own pattern: which rung of the ladder costs them the most marks, recall, explaining, or applying?

Livelier or lower-attaining classes

Start with the exam-mapping homework in pairs: sorting old questions by rung is a low-stakes way into the idea before asking learners to climb it themselves.

EAL or SEND learners

The source study does not cover this group specifically, a genuine gap. Naming the rung in plain language before answering is worth testing individually, not assumed to help.

A real pattern from one class, not yet a tested method

Early signal

This rates the evidence's firmness, not our endorsement of the idea. A single, plainly reported classroom pattern from a peer-reviewed paper, with no comparison group and no significance test behind the headline numbers.

- One exam, one class: the 80% / 70% / 55% pattern is a single snapshot from one 120-learner course, not compared against a control group or tested for statistical significance.
- University learners, not school-age ones: every case in the source paper is a US undergraduate class (physiology, cell biology, immunology), not a UK primary or secondary classroom.
- The authors' own words: showing learners their personal thinking-ladder breakdown "was not possible to show significant changes to student learning" in the time available, an idea tried, not one shown to work.

What that means for you: treat "questions higher up Bloom's ladder are harder, and it shows in the marks" as a believable, well-illustrated pattern worth watching for in your own classes, not as a proven method for raising scores. The instructor's moves are ideas worth testing with your own group, not guarantees.

TRY IT THIS WEEK

Your first small step

THIS WEEK

Pick one topic you're about to test. Before learners answer each question, have them name which rung it sits on: recall it, explain it, or use it.

Try it and watch: notice which rung your class names most confidently, and which one they hesitate over. That gap is your own evidence about where to focus next, not just the study's. In the instructor's own words, the exam breakdown "indicated the cognitive challenge of the exam" long before any mark was returned.

Go deeper

Bloom's Taxonomy: a teacher's guide · structural-learning.com/post/blooms-taxonomy-a-teachers-alternative

Open a free account

app.structural-learning.com/register

Structural Learning · evidence without the hype.