

Variation theory

Choose examples that make the intended feature available to notice.

Intended feature

Example: explain how both side lengths affect a rectangle's area.

Name what matters before choosing what changes and what stays constant.

Four patterns, not a lesson sequence

CONTRAST

Make a relevant difference available.

What difference should be noticed?

SEPARATION

Vary one dimension; others stay steady or change at a different rate.

GENERALISATION

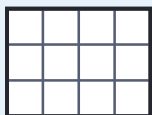
Keep a relevant value constant while other dimensions change.

FUSION

Vary relevant dimensions together so their relationship can be noticed.

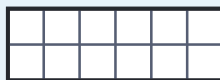
One accurate comparison: same area, different shapes

B · 4 by 3



12 square units

D · 6 by 2



12 square units

Varies: both side lengths and the shape.

Stays the same: area, at 12 square units.

Ask: "How can both cover 12 unit squares when they have different shapes?"

Check the explanation

Likely wrong inference: "The longer first side always means greater area."

Ask the learner to explain each area using both side lengths and the unit squares.

A planned comparison does not show what a learner actually noticed.

ACADEMIC REFERENCES · AUTHORED EXAMPLE LIMITS

Marton, F. & Pang, M. F. (2006). On some necessary conditions of learning. *Journal of the Learning Sciences*, 15(2), 193–220. doi:10.1207/s15327809jls1502_2.

Marton, F. & Pang, M. F. (2013). Meanings are acquired from experiencing differences against a background of sameness, rather than from experiencing sameness against a background of difference: Putting a conjecture to the test by embedding it in a pedagogical tool. *Frontline Learning Research*, 1, 24–41. doi:10.14786/flr.v1i1.16.

Rectangle examples are authored for this article, not evaluated sequences or evidence of learner outcomes.