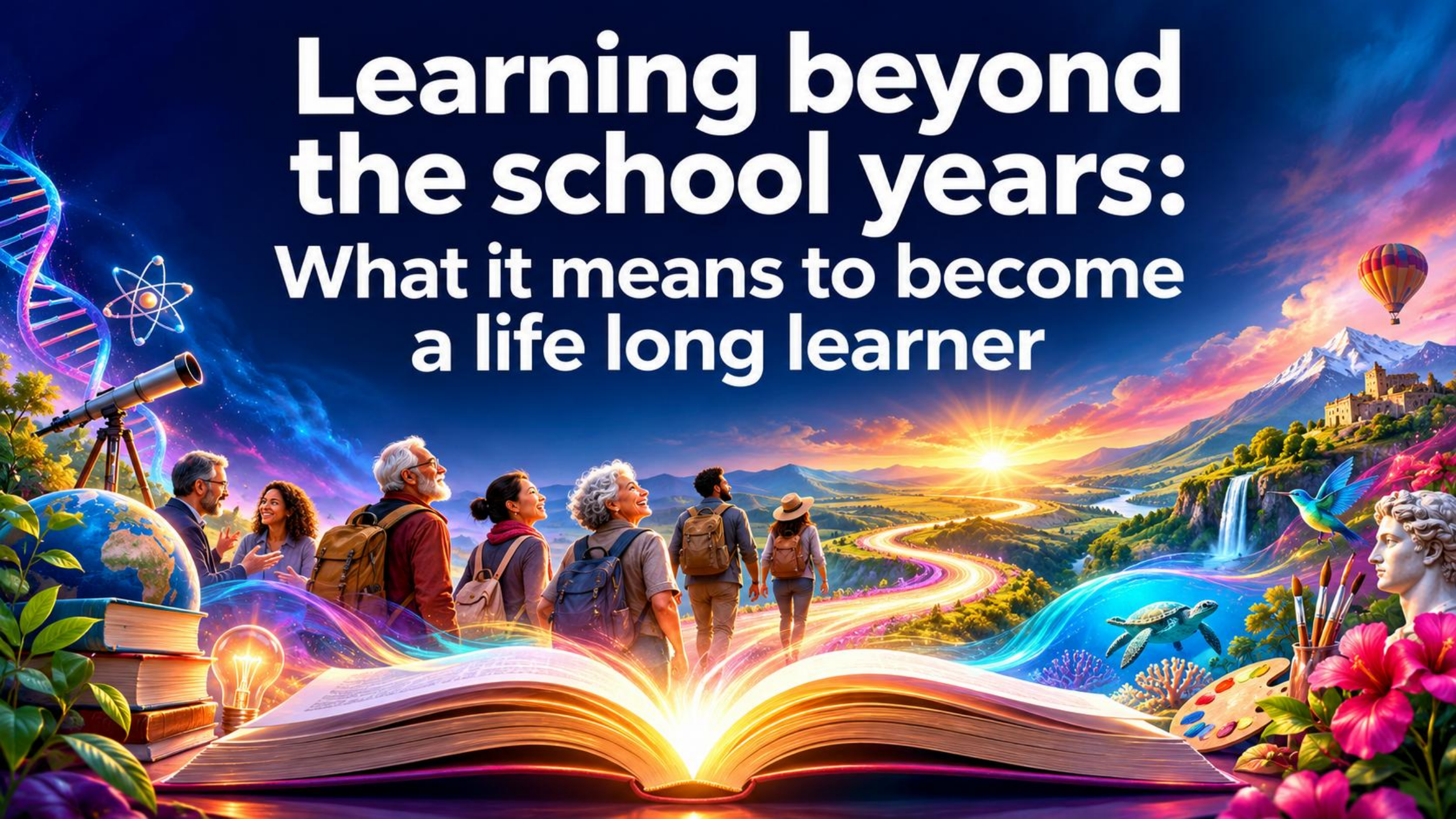
Learning beyond the school years:

What it means to become a life long learner



Lifelong learners
Directing their own learning

1 Be curious

Ask worthwhile questions.

2 Know yourself

Recognise strengths, needs and when to seek help.

3 Set meaningful goals

Know what is worth learning and what success looks like.

4 Choose strategies

Know how, when and why to use them.

5 Embrace challenge

Use difficulty and mistakes to learn.

6 Use feedback

Turn insights into action.

7 Monitor progress

Check what is improving.

8 Learn with others

Listen, question, explain and consider perspectives.

9 Examine evidence

Test ideas and be willing to change your mind.

10 Transfer learning

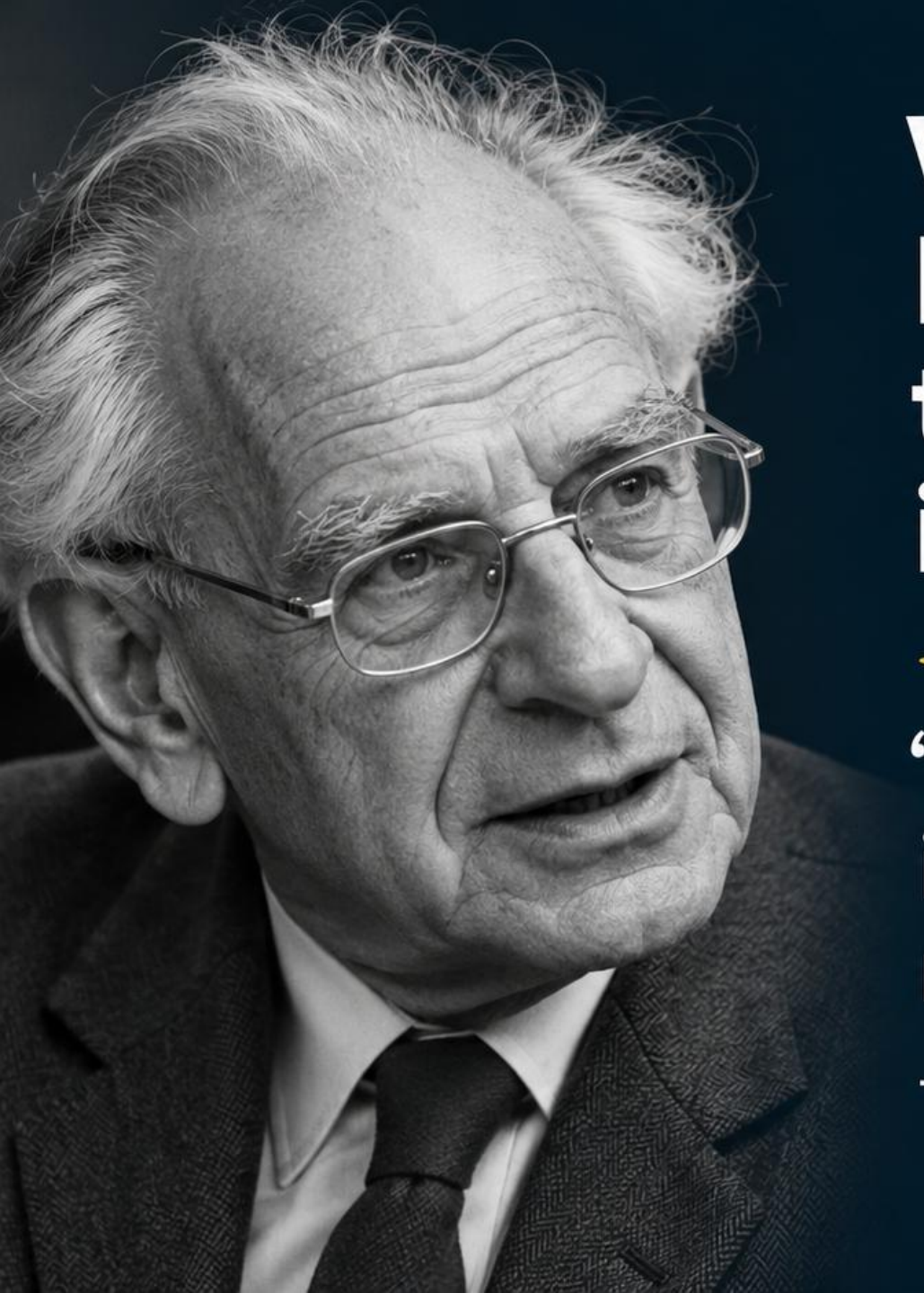
Connect and apply ideas in new situations.

11 Adapt your approach

Change strategies when progress stalls.

12 Take responsibility

Decide next steps and draw on people and resources.



What evidence would lead me to conclude that my explanation is wrong?

"Every genuine test of a theory is an attempt to falsify it, or to refute it."

—Karl Popper, *Conjectures and Refutations* (1963).

WHY?

Why are the effects of teacher subject knowledge so small?



The absence of lesson design



Why are there so few evidence-based implementation models in education?



Learning strategies



Pets in class



Teacher self-concept



Evaluative thinking



Why has the learning styles effect increased recently?



Understanding patterns in the effects of teaching methods



Why are class size effects so small?



The heart of Visible Learning:

Becoming your own teacher.



How do we develop the knowledge, curiosity and evaluative judgement to keep learning when the direction and responsibility increasingly become our own?

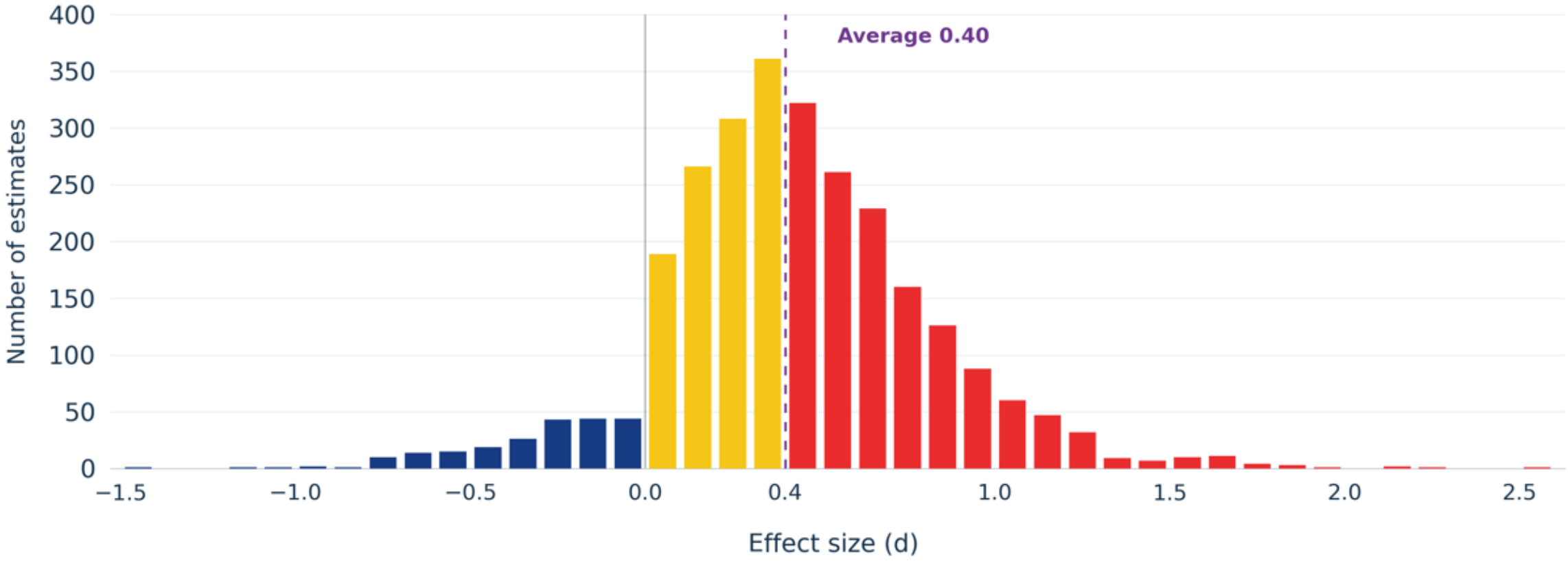


How do we know what to do when we don't know what to do?

DISTRIBUTION OF EFFECTS

Distribution across 2,719 supplied meta-analytic estimates

No. metas = 2,720
No. effects = 164,000+
Est. students = 250m
influences = 440
Average d = 0.40



Becoming your own teacher

Capabilities worth developing through schooling

Reported effect sizes (d)



Curiosity
Curiosity
0.74



Critical thinking
Critical thinking
0.78



Creativity
Creativity programs
0.51



Confidence to learn
Self-efficacy
0.69



Knowing how, when and why
Meta-cognition strategies
0.59



Effective learning approaches
Learning strategies
0.72



Evaluating your learning
Self-judgement and reflection
0.81



Managing your learning
Self-regulation strategies
0.52



Directing your learning
Self-directed learning
0.60



Applying learning elsewhere
Transfer strategies
0.89



Learning with others
Cooperative learning
0.56



Seeking support
Seeking help from peers
0.68

Becoming your own teacher

Worthwhile capabilities with lower achievement-related effects

Selected lower effect sizes (d)



Taking control
Student control over learning
0.03



Growth mindset
Growth vs. fixed mindsets
0.14



Social and emotional skills
Socio-emotional learning
0.15



Relaxation
Relaxation
0.16



Mindful attention
Mindfulness interventions
0.19



Study habits
Study skills programs
0.24



Wellbeing
Well-being
0.27



Sense of personal control
Locus of control
0.30



Mastery focus
Mastery goals – approach
0.32



Taking notes
Note-taking
0.33



Perseverance
Grit
0.37



Learning by teaching
Teaching students to be teachers
0.37

Becoming your own teacher means knowing how to make your learning work—and knowing when it is working.

HIGHER EFFECTS



Understanding, selecting, evaluating and adapting learning

Knowing how, when and why; judging progress; transferring learning.

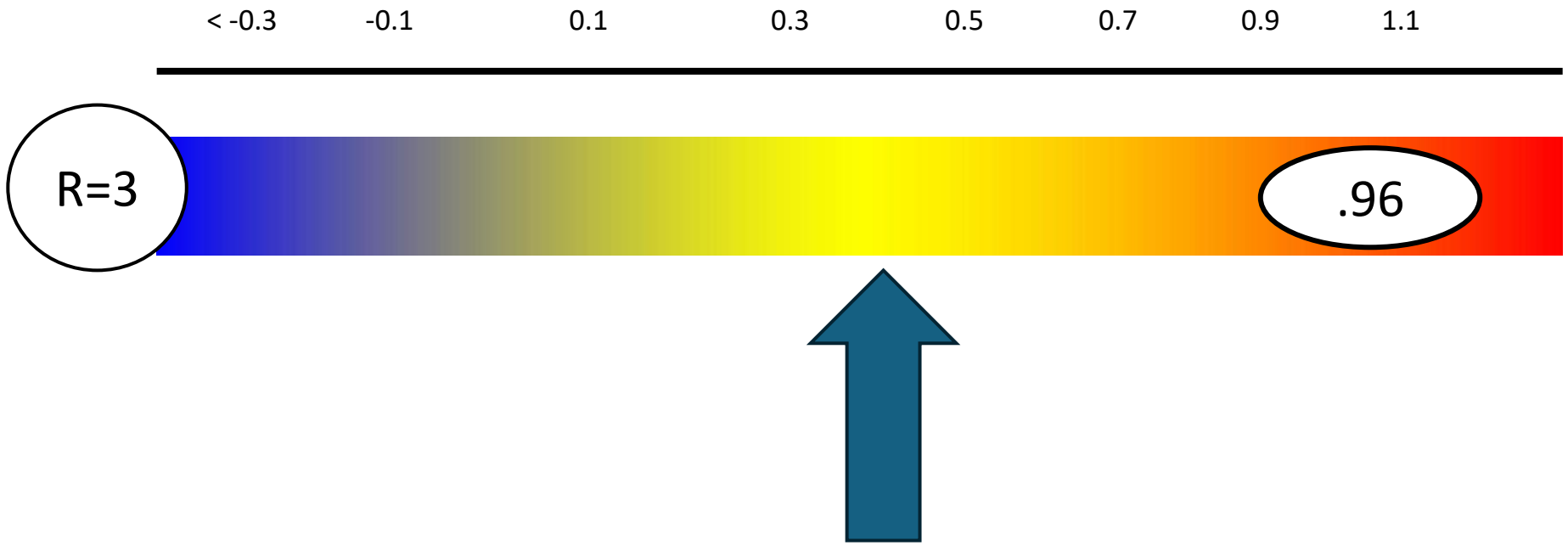
LOWER EFFECTS

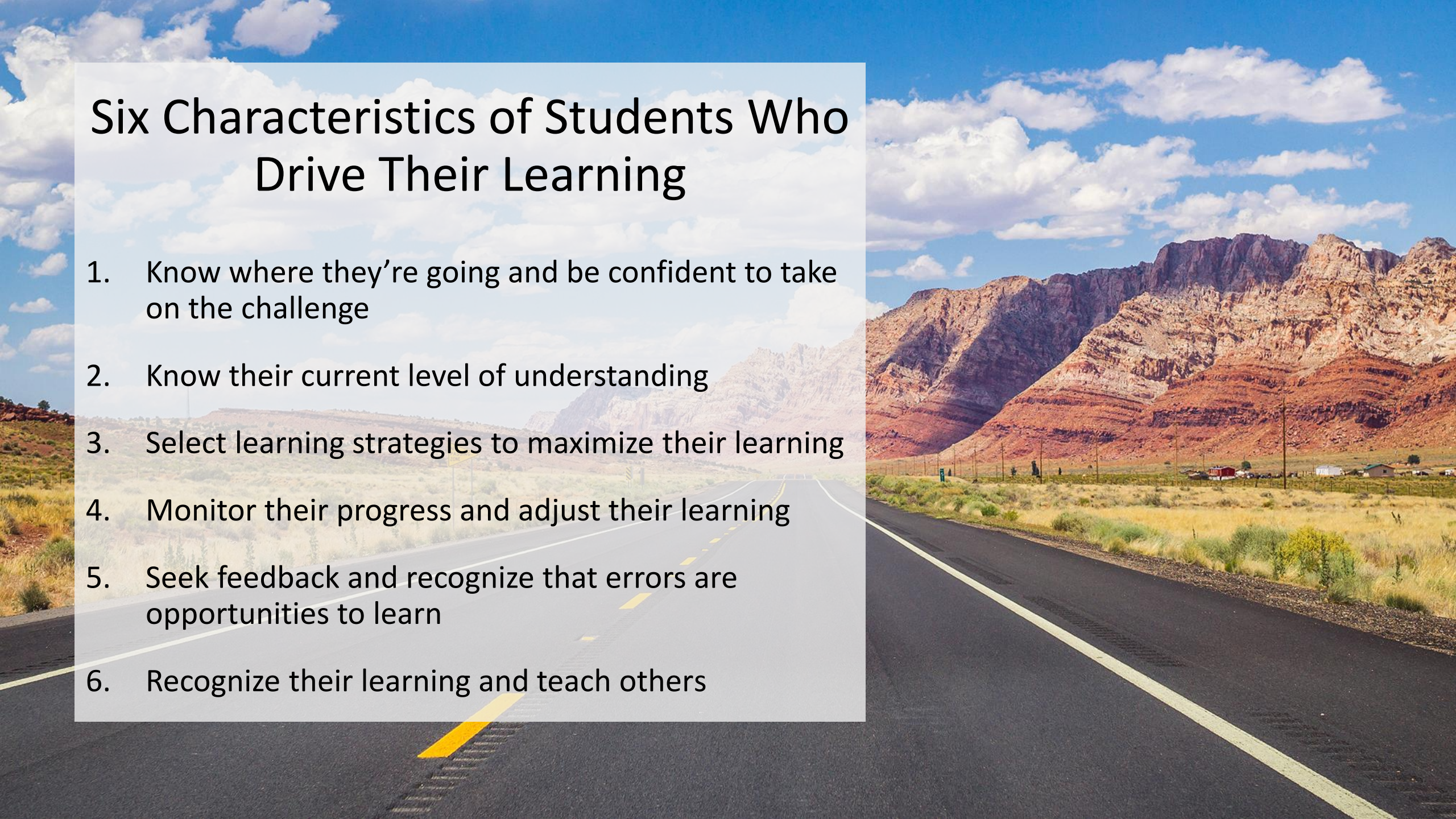


Broader dispositions, wellbeing, study habits and opportunities for control

These support learning when connected with effective strategies and evaluative judgement.

Students Driving their Learning





Six Characteristics of Students Who Drive Their Learning

1. Know where they're going and be confident to take on the challenge
2. Know their current level of understanding
3. Select learning strategies to maximize their learning
4. Monitor their progress and adjust their learning
5. Seek feedback and recognize that errors are opportunities to learn
6. Recognize their learning and teach others

Two approaches to improving learning

RESILIENCE

Help students navigate academic challenges



- Show relevance
- Learn from feedback
- Build academic confidence
- Use self-affirmation
- Teach a growth mindset
- Reframe difficulties as challenges

CULTURE & CLIMATE

Called ‘inclusion’ in the study

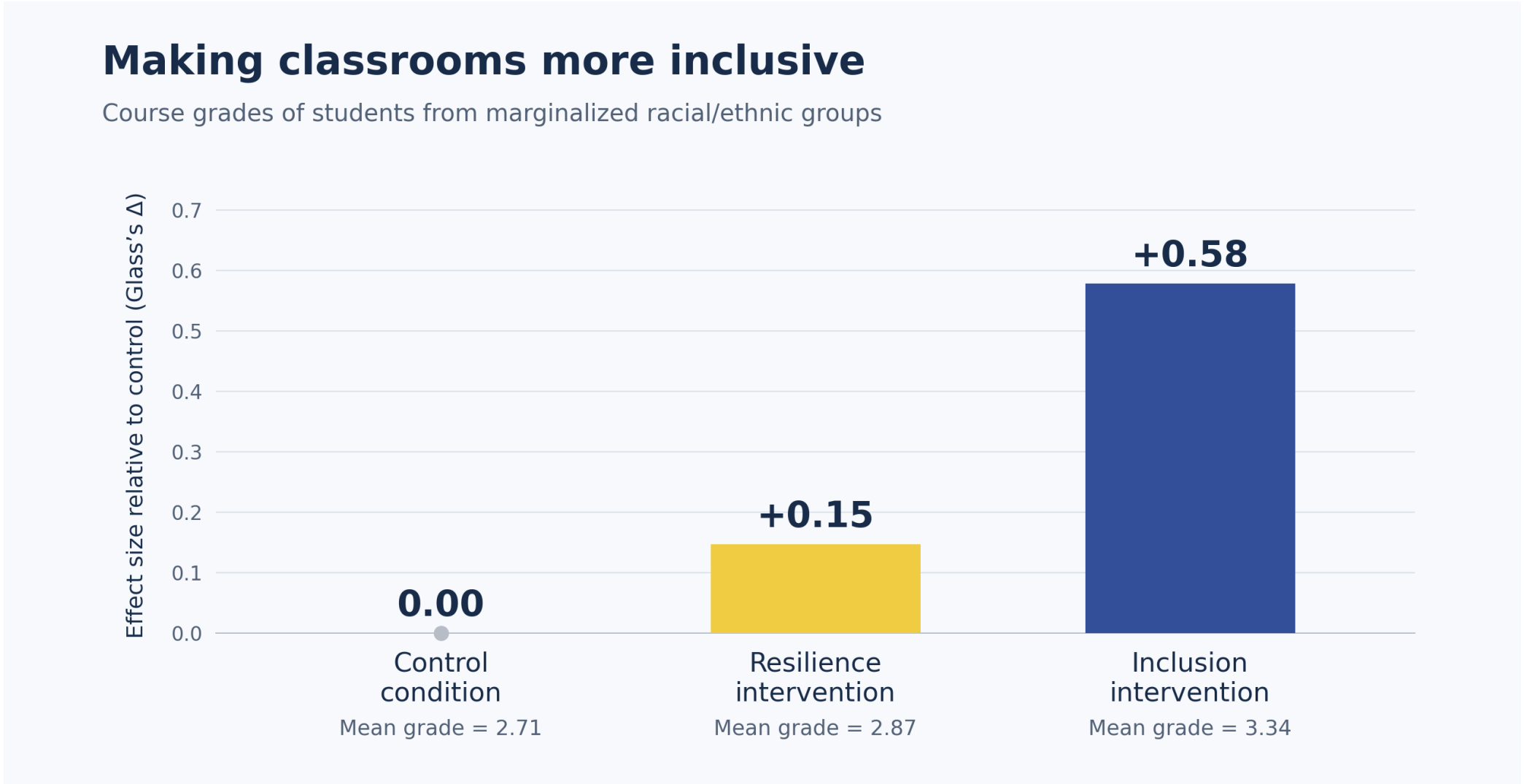
Change the conditions for learning



- Connect across backgrounds
- Promote cooperation
- See and hear each student
- Make inclusion the norm
- Build belonging
- Address group misconceptions

Control: Teaching as usual

Both interventions: Brochure • Website • Planning meeting • Mid-semester support



Kennedy, K. R., Means, K. K., & Brauer, M. (2026). Making classrooms more inclusive reduces the achievement gap in STEM: evidence from a large-scale randomized controlled trial. *Scientific Reports*. **https://doi.org/10.1038/s41598-026-70718-9**

What is your theory of teaching?

What is your theory of learning?

Six perspectives on learning

Behaviourism

External stimuli, reinforcement and rewards shape behaviour.

Cognitivism

Learning involves processing, storing and retrieving information, then applying it in new situations.

Humanism

Learning attends to the whole person: unique qualities, potential, needs and self-direction.

Cognitive Load Theory

Working memory has limited capacity. Teaching should manage cognitive load to support learning.

Constructivism

Learners actively construct knowledge through experience and interpretation.

Social Constructivism

Knowledge develops through social interaction, dialogue and cultural contexts.

SOLO Taxonomy (Biggs & Collis, 1982)

Prestructural:	Unistructural:	Multi structural:	Relational:	Extended abstract:
A very basic understanding of a concept or idea.	*A more developed understanding of a concept or idea.*	*An understanding of multiple aspects of a concept or idea and the ability to relate them to each other.*	*Understanding the relationships between multiple concepts or ideas and the ability to analyze and synthesize this information.*	*The highest level of understanding and the ability to think abstractly and critically about a concept or idea.*

SOLO Taxonomy (Biggs & Collis, 1982)

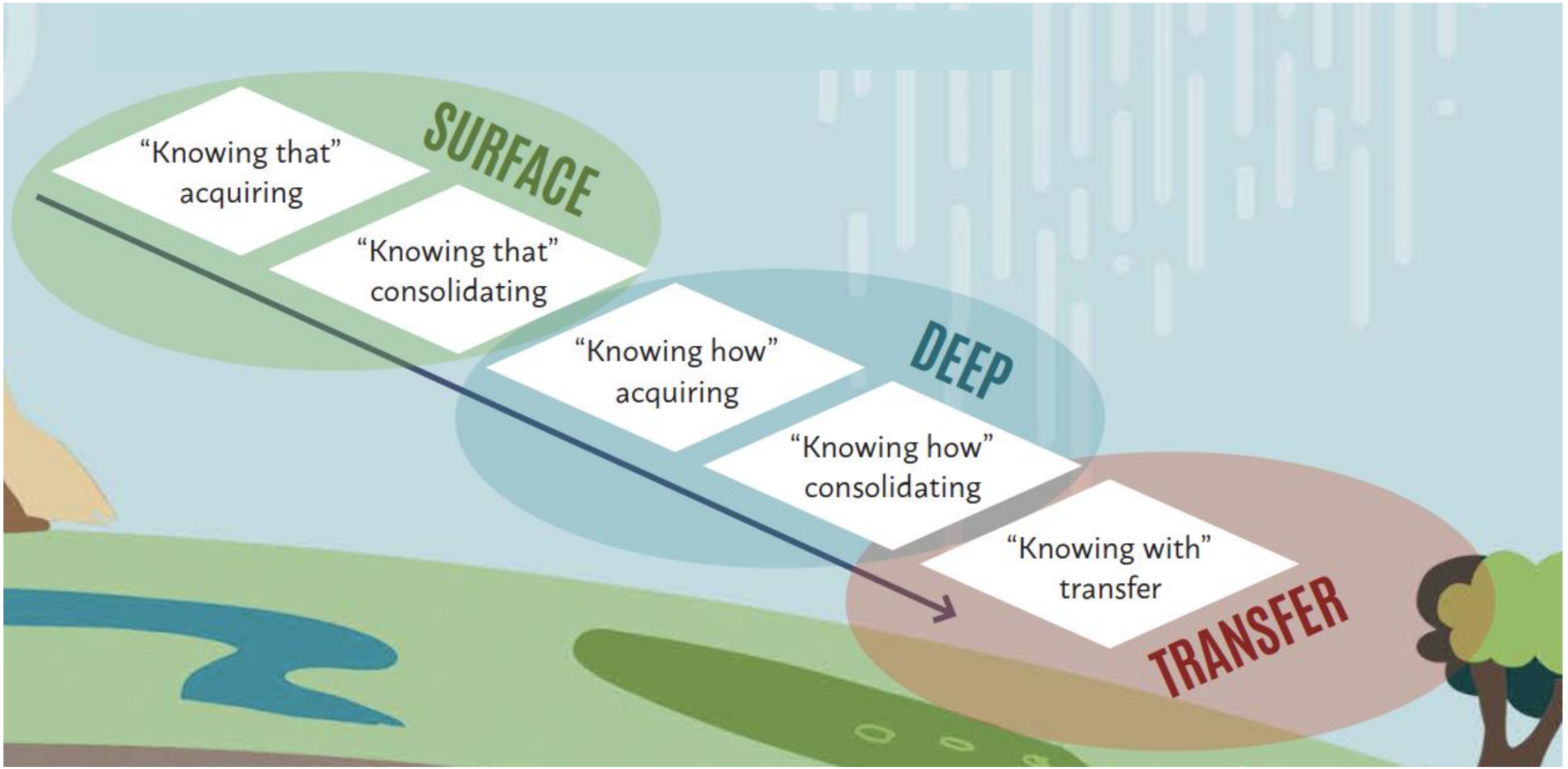
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No Idea	One idea	Many ideas	Relating Ideas	Extended Ideas

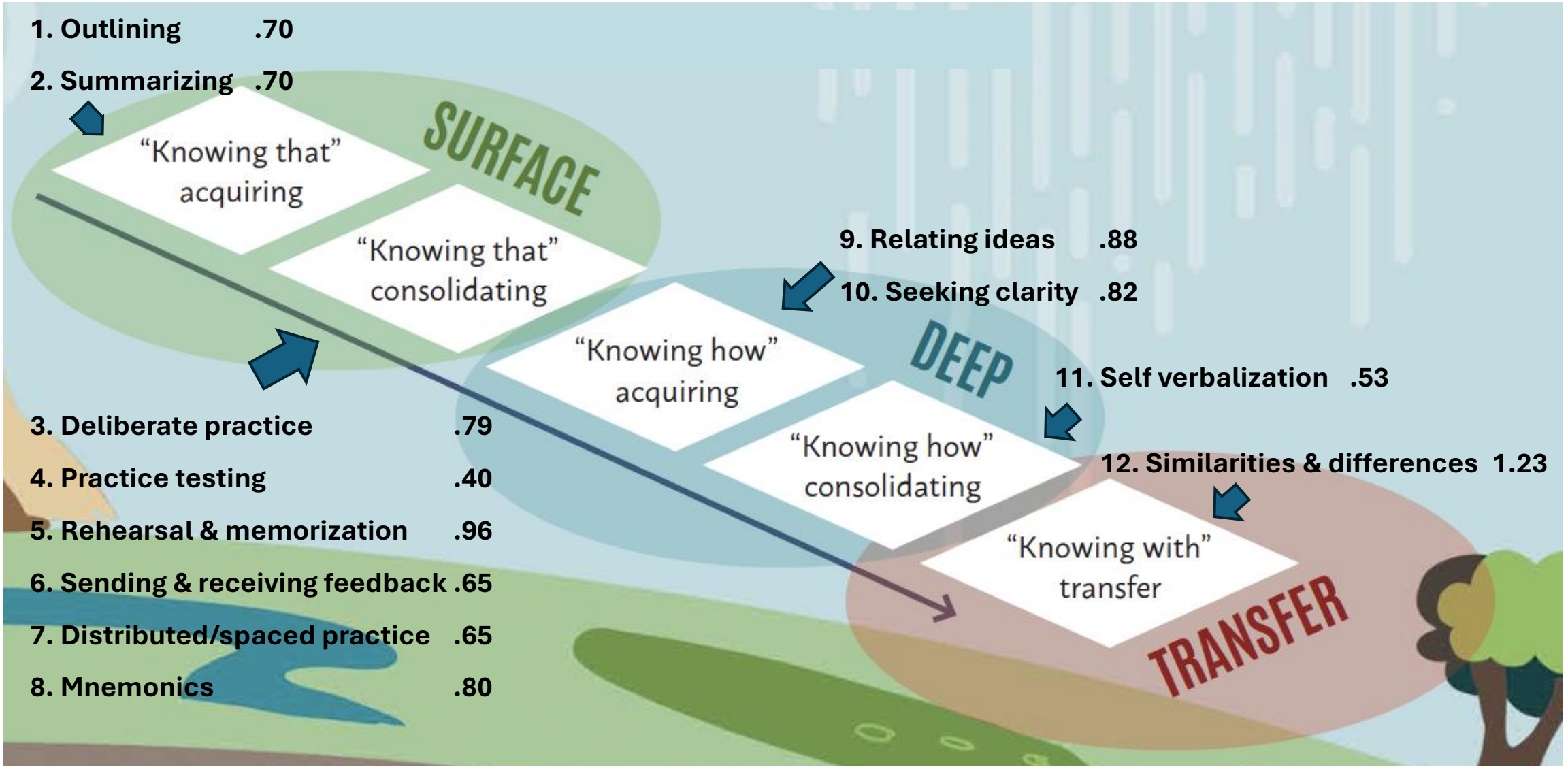
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No Idea	One idea	Many ideas	Relating Ideas	Extended Ideas

Knowing that
Surface

Knowing how
Deep


SURFACE
"Knowing that" acquiring
"Knowing that" consolidating
DEEP
"Knowing how" acquiring
"Knowing how" consolidating
TRANSFER
"Knowing with" transfer


1. Outlining .70
2. Summarizing .70
SURFACE
"Knowing that" acquiring
"Knowing that" consolidating
9. Relating ideas .88
10. Seeking clarity .82
DEEP
"Knowing how" acquiring
"Knowing how" consolidating
11. Self verbalization .53
12. Similarities & differences 1.23
"Knowing with" transfer
TRANSFER
3. Deliberate practice .79
4. Practice testing .40
5. Rehearsal & memorization .96
6. Sending & receiving feedback .65
7. Distributed/spaced practice .65
8. Mnemonics .80

VL model of Teaching & Learning

1. "Knowing That" — Curriculum & Content Knowledge

- Understanding *what* concepts, skills, & dispositions students need to think & problem solve

2. "Knowing How" — Deeper thinking, connections, problem solving

- Active-processing strategies consistently beat passive ones

Why Alignment Matters

- Alignment only works when curriculum, cognitive complexity, teaching moves, assignments, & assessments supports, and evaluation are all **pointed at the same target**

Align the Teaching Methods

Direct Instruction

Knowing that

d = high

Knowing how

d = low

Problem Based Learning

Knowing that

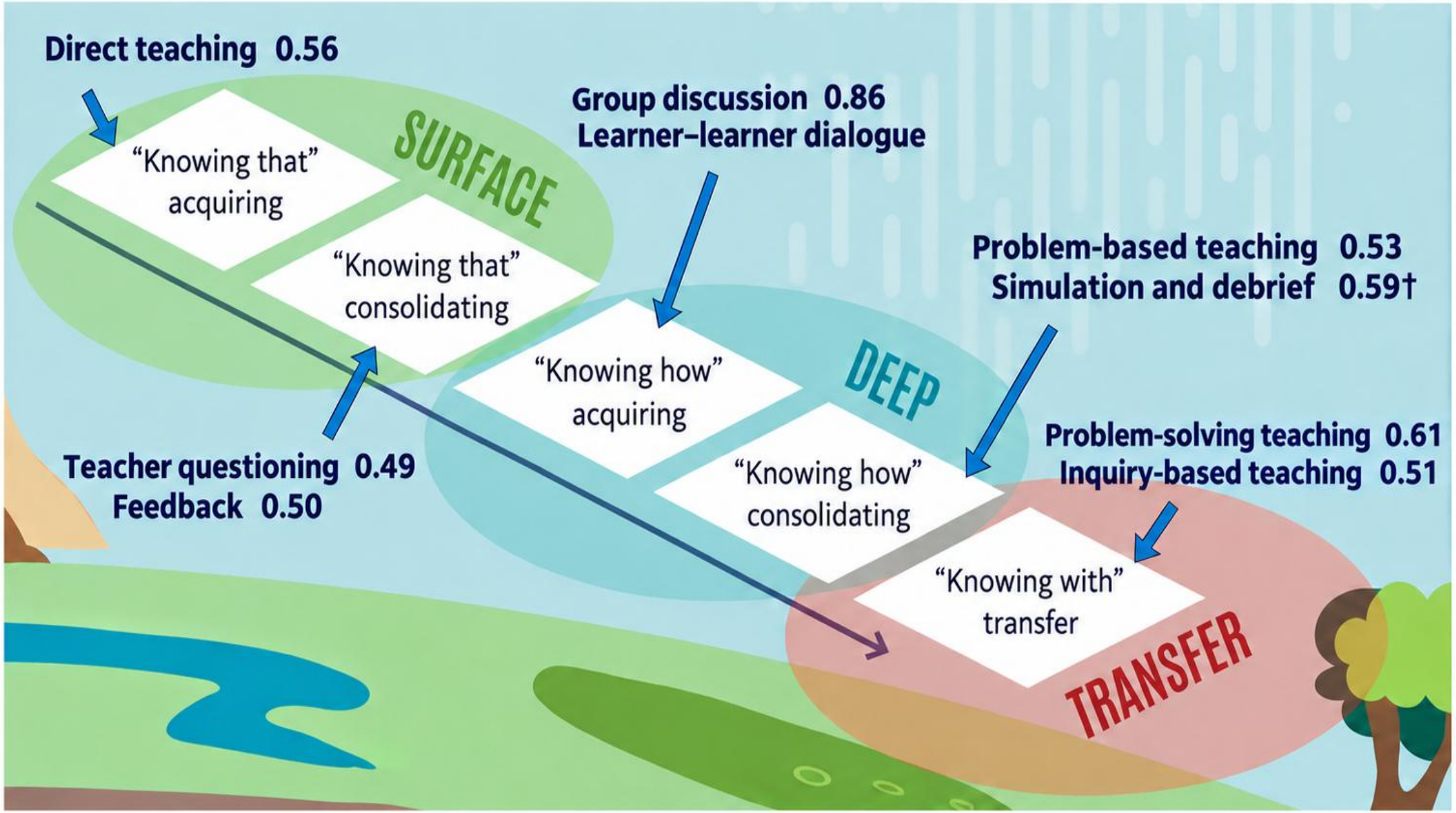
d = 0.15

Knowing how

d = 0.54



Teaching methods across the five phases



Intentional Alignment Model

Theory of Teaching

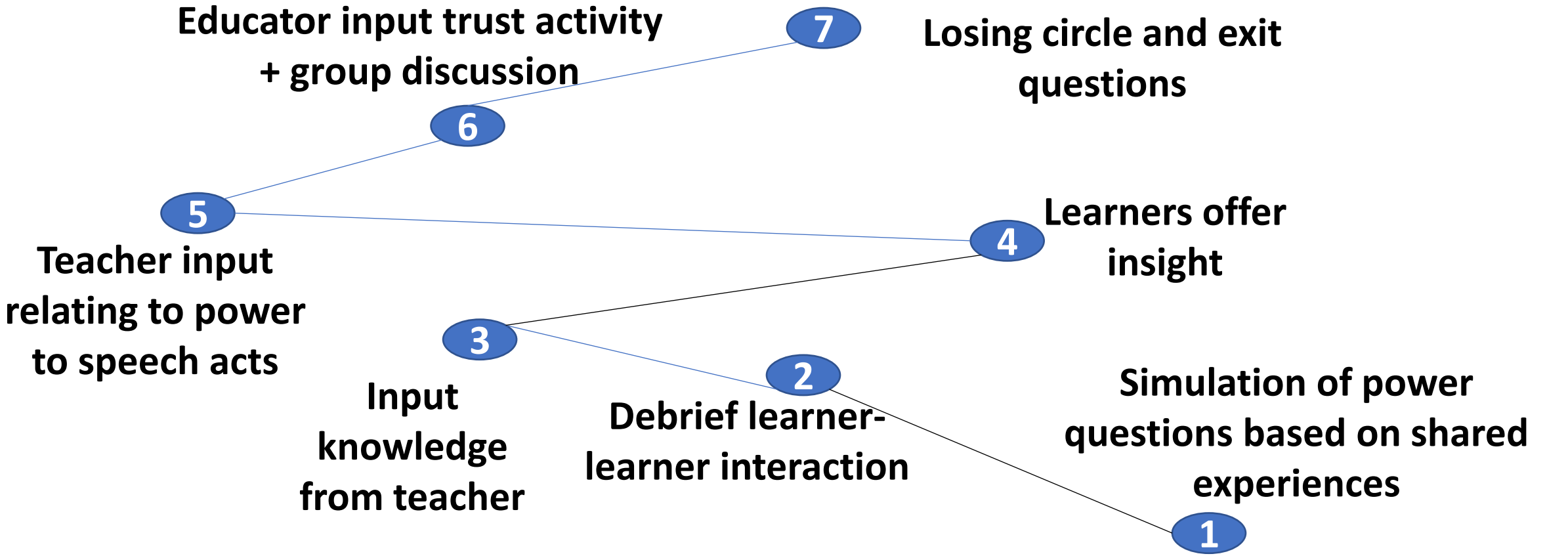
Direct teaching — **Problem-based teaching**

Acquiring	Consolidating	Acquiring	Consolidating
TEACHING METHODS			
Direct teaching Teacher input	Teacher questioning Feedback	Group discussion Learner–learner dialogue	Problem-based teaching Simulation and debrief

SURFACE: Knowing that — **DEEP: Knowing how**

Acquiring	Consolidating	Acquiring	Consolidating
LEARNING STRATEGIES			
Outlining Summarizing	Practice testing Spaced practice	Relating ideas Similarities & differences	Self-verbalization Sending & receiving feedback

Theory of Learning



Knowing that
Surface
Content ideas

Knowing how
Relating ideas
Conceptual understanding

Knowing with
Transfer to new and far contexts

Adapted from Bound, H. (2023). Developing Future-oriented pedagogical practices in the Training and Adult Education Sector, Singapore. Meeting with Ministry of Education 1st March 2023. Singapore.

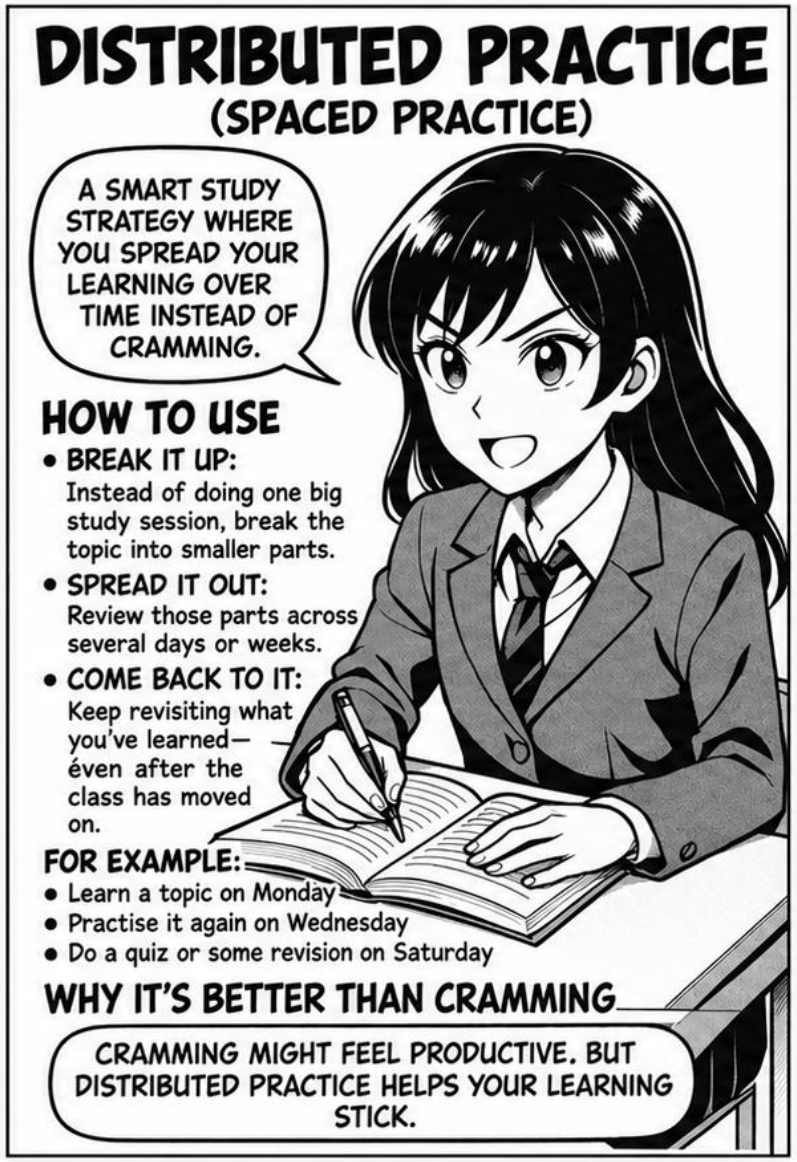
DELIBERATE PRACTICE

Focused, intentional effort to improve a specific skill.

- **Set** a clear goal.
- **Break** the skill into manageable parts.
- **Target** weaknesses with full concentration.
- **Stretch** beyond what you can already do.
- **Seek** feedback and act on it.
- **Reflect**, adjust and practise again.

Purposeful practice makes progress.





DISTRIBUTED PRACTICE

(Spaced practice)

Spread learning over time to strengthen long-term memory.

- **Break it up:** short, focused sessions.
- **Space it out:** practise across days or weeks.
- **Return to it:** revisit earlier learning.

For example

- **Monday:** Learn
- **Wednesday:** Practise
- **Saturday:** Quiz
- **Next week:** Review

Space your practice. Make learning stick.

Becoming a lifelong learner

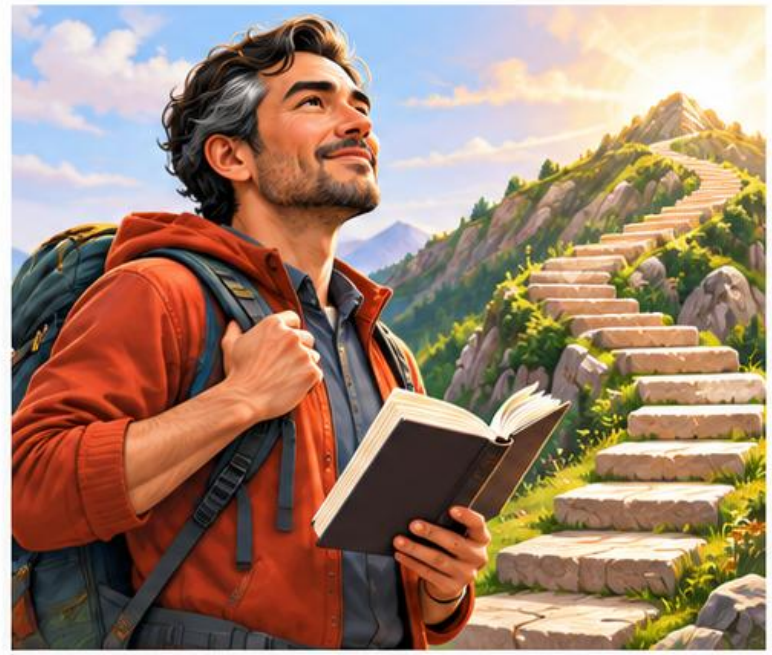
Knowledge, dispositions and motivation

SKILL



Build knowledge and a repertoire of learning strategies.

WILL



Develop the confidence and readiness to engage with challenge.

THRILL



Find purpose, interest and satisfaction in learning.

Become your own teacher

Develop evaluative thinking

Judge your understanding. Make informed decisions about your next steps.

KNOW



Know your starting point, your goal and what successful performance looks like.

MONITOR & ADJUST



Select approaches, monitor their effectiveness and adjust.

COMPARE



Compare your work with criteria, examples and informed feedback.

Taking on challenges

Challenge others and be challenged by others

What evidence would convince you that you are learning?

SEEK FEEDBACK



Invite others to question and improve your thinking.

LEARN FROM ERRORS



Use errors to identify what needs to change.

BUILD TRUST



Discuss uncertainty and misunderstanding openly.

Probative questioning

Knowledge

Help seeking & feedback

Optimal ‘where to next’ choices

Quality control

Assessment credibility

Error management

Evaluative thinking

Collaborative critique

Oral fluency & listening



Skills when using AI

- Probative questioning
- Knowledge
- Help seeking & feedback
- Optimal ‘where to next’ choices
- Quality control
- Assessment credibility
- Error management
- Evaluative thinking
- Collaborative critique
- Oral fluency & listening



EVALUATIVE THINKING

Skills for becoming your own teacher

Make a judgement. Show the evidence. Decide what next.



CLARIFY SUCCESS

What am I learning? What does quality look like?



CHALLENGE THINKING

Question assumptions. Seek other perspectives. Could I be wrong?



WEIGH EVIDENCE

Compare credible evidence with criteria, examples and feedback.



CHECK IMPLEMENTATION

Did I use the approach as intended?



JUDGE IMPACT

What progress, for whom, how much—and why?



ACT & REVIEW

What should I continue, change or stop? Check again.

Adapted synthesis: Clinton (2019); Clinton & Hattie (2021); Visible Learning.

The enduring contribution of education is to help people approach their next learning challenge with **knowledge**, **curiosity**, **evaluative thinking**, **sound judgement** and the confidence to begin and work with others to succeed.

