Science of Learning Principles

Cognitive Load Theory

1. The worked example effect
2. Completion tasks
3. The split attention effect
4. The modality effect.
5. The redundancy effect
6. The Imagination Effect
7. The isolated interacting Elements effect
8. The expertise reversal effect
9. The guidance fading effect
10. The goal-free effect

https://blog.innerdrive.co.uk/10-principles-cognitive-load-theory

Rosenshine

1) Begin the lesson with a review of previous learning.
2) Present new material in small steps.
3) Ask a large number of questions of all students
4) Provide models and worked examples.
5) Practise using the new material.
6) Check for understanding frequently and correct errors.
7) Obtain a high success rate.
8) Provide scaffolds for difficult tasks.
9) Independent practice.
10) Monthly and weekly reviews

https://blog.innerdrive.co.uk/guide-to-rosenshine-principles-of-instruction

PEN Principles & SLRC

1) Written Text & Spoken Word Do Not Mix
2) Visual Images & Spoken Word Mix Well
3) Spatial Predictability Guides Attention
4) Spacing Out Practice Enhances Memory
5) Leverage Context According to Outcome
6) Multitasking Impairs Learning
7) Mix Up Practice Tasks
8) Embrace Error to Drive Learning
9) Active Recall Trumps Passive Review
10) First Impressions Colour Future Judgements
11) Find the Story behind the Facts
12) Pre-activate Strategies to Guide Learning

https://www.slrc.org.au/resources/pen-principles/

POWERFUL TEACHING

1) Empower teaching with retrieval practice
2) Energize learning with spaced practice
3) Energize learning with interleaved practice
4) Engage students with feedback-driven metacognition

https://www.powerfulteaching.org/

CESE NSW: Strategies

Strategy 1: Tailor lessons according to students existing knowledge and skill. (Element Interactivity effect)

Strategy 2: Use lots of work examples to teach students news content or skills (Worked Example effect)

Strategy 3: Gradually increase independent problem solving as students become more proficient. (Expertise Reversal effect)

Strategy 4: Cut out in essential information. (Redundancy effect)

Strategy 5: Present all the essential information together. (Split-attention effect)

Strategy 6: Simplify a complex information by presenting it both orally and visually (Modality effect)

Strategy 7: Encourage students to imagine concepts and procedures that they have learned (Imagination effect)

https://education.nsw.gov.au/about-us/educational-data/cese/publications/practical-guides-for-educators/cognitive-load-theory-in-practice

THE LEARNING SCIENTISTS

1) Space out study over time (Spaced practice)
2) Practice bringing information to mind (Retrieval practice)
3) Explain and describe ideas using personal details (Elaboration)
4) Switch between different ideas and topics when studying (Interleaving)
5) Use specific examples to understand abstract ideas (Concrete examples)
6) Combine words and visuals and improve comprehension (Dual Coding)

https://www.learningscientists.org/

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The Ten Principles of Cognitive Load Theory https://blog.innerdrive.co.uk/10-principles-cognitive-load-theory

Extension Reading

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