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This one-pager offers practical strategies and summarises key ideas from Cognitive Load Theory which emerged from the work of educational psychologist John Sweller and colleagues in the 1980s.

JOHN SWELLER et al.

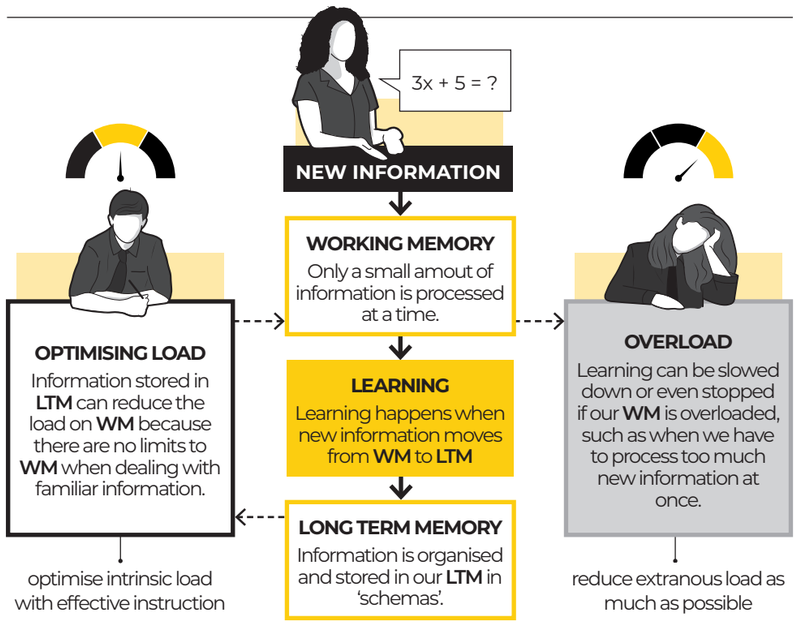
COGNITIVE LOAD THEORY EXPLAINED

TAILORING INSTRUCTION FOR MAXIMUM LEARNING

COGNITIVE LOAD THEORY

TAILORING INSTRUCTION FOR MAXIMUM LEARNING

Cognitive Load Theory (CLT) explores how the cognitive load, or mental effort, required to process information impacts learning. To learn something new, knowledge must first be processed in working memory (WM) before being transferred and stored in long- term memory (LTM) in the form of 'schemas'. If WM is overloaded, there is a greater risk that the content being taught will not be understood by the learner. This knowledge of the human brain is critical for teachers because it helps to design teaching strategies that free-up and optimise the load on students' working memories to help maximise learning.



TYPES OF COGNITIVE LOAD

REDUCE EXTRANEOUS LOAD AND OPTIMISE INTRINSIC LOAD

CLT identifies two main types of cognitive load: intrinsic and extraneous. Intrinsic cognitive load relates to the inherent difficulty of the subject matter being learnt. We must optimise intrinsic load by by responding to and adjusting the difficulty of learning content. Extraneous cognitive load relates to how the subject matter is taught. Extraneous load is the 'bad' type of cognitive load, because it does not directly contribute to learning and therefore must be reduced as much as possible.

EXPLICIT TEACHING

CLT AND GUIDED INSTRUCTION

CLT supports the use of explicit instruction (especially for novice learners). Research shows that direct, explicit guidance is more effective and efficient for teaching new content and skills to novices. Instructional strategies (such as worked examples) are not only more motivating but are effective because they reduce cognitive load.

WHEN INFORMATION IS...

COMPLEX / NEW
Reduce cognitive load on working memory.

TOO EASY
Gradually increase complexity of the lesson.

STRATEGY 1

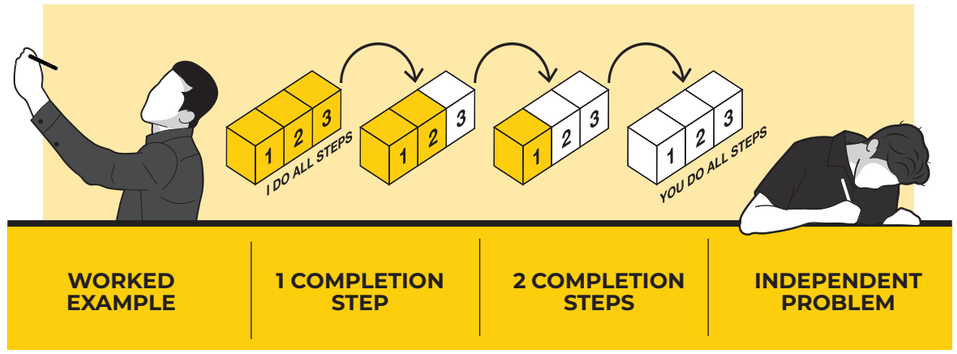
USE WORKED EXAMPLES TO TEACH NEW CONTENT OR SKILLS

A 'worked example' is a problem that has already been solved for the student, with every step fully explained and clearly shown. Research consistently demonstrates that students who are given lots of worked examples learn new content more effectively than students who are required to solve the same problem themselves. Unguided problem-solving can overburden WM and therefore impact the transfer of knowledge to LTM. Worked examples are most effective when combined with the teacher thinking aloud to externalise their thought process when solving a problem.

STRATEGY 2

INCREASE INDEPENDENT PROBLEM SOLVING

Fully guided instruction is effective for teaching new material, but as students become more skilled, it becomes counterproductive. Too much guidance can burden working memory. Independent problem-solving is more beneficial as students develop expertise. Monitor students' knowledge and skill levels, and adjust your teaching strategies accordingly as students gradually become more proficient. This might mean omitting some of the steps from a worked example or gradually giving the students fewer worked examples.



STRATEGY 3

CUT OUT ANY INESSENTIAL INFORMATION

Presenting students with inessential information can hinder learning and add extra load on their WM. To avoid this, cut out unnecessary information For multimedia presentations, try chunking information into separate slides, reading text out loud (without presenting it on the slide), or removing irrelevant images. Information that is essential for novice students might become redundant as they become more advanced.

STRATEGY 4

PRESENT ALL ESSENTIAL INFORMATION TOGETHER

Cognitive overload can occur when students have to split their attention between two or more sources of information that have been presented separately, but can only be understood in reference to each other. Design learning activities that take this into account. For example you could: integrate labels into diagrams, incorporate written instructions next to tasks and utilise visual cues to stress key information on worksheets.

STRATEGY 5

PRESENT INFORMATION ORALLY AND VISUALLY

According to dual coding theory, our WM has two channels. One for processing visual information and one for processing auditory information. We can manage cognitive load and maximise student learning by disributing learning across both channels. To do this, you can verbalise information instead of presenting it. For example, when presenting a diagram, use visual cues only (such as pointing) and orally present the labels.

STRATEGY 6

DRAW ON STUDENTS' PRIOR KNOWLEDGE

Tailoring lessons to students' existing knowledge and skills is crucial for optimal learning. By adjusting the complexity of tasks based on students' abilities and minimising cognitive load, you can maximise learning outcomes. You can activate students' prior knowledge by relating new information to what students already know with analogies, real-world examples, or comparing and contrasting with familiar ideas.

REFERENCE: COGNITIVE LOAD THEORY: RESEARCH THAT TEACHERS REALLY NEED TO UNDERSTAND: CLASSROOM PRACTICE GUIDE, CENTRE FOR EDUCATION STATISTICS AND EVALUATION 2017