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Using pedagogical theory in psychology teaching

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Contents

CHAPTER 1	3
Introduction	4
Cognitive load	5
CHAPTER 2	8
Rosenshine's Principles of Instruction (2012)	9
References	12



CHAPTER 1

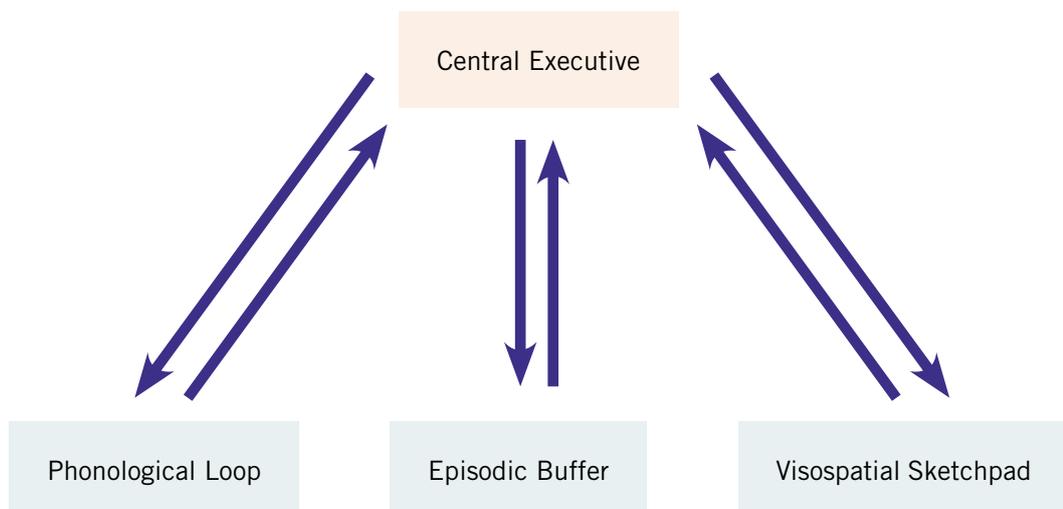
Introduction

Teachers of psychology are uniquely placed to understand and apply pedagogical theories to their teaching. Psychology gives an insight into learning theories, cognitive processes and memory which can ensure that teaching is effective. As a psychology teacher, senior positions which emphasis teaching and learning are very suited to your knowledge and skill set.

This article will focus on two of the most popular theories: [Cognitive Load Theory \(Sweller 1988\)](#) and [Rosenshine's Principles of Instruction \(2012\)](#) and apply them to psychology teaching.

COGNITIVE LOAD THEORY (SWELLER 1998)

The theory is based on the principles of the Working Memory Model (Baddeley & Hitch, 1974). The basic principles are to avoid overloading a student's working memory.



Cognitive load

THREE MAIN TYPES

There are three main types of cognitive load:

Intrinsic

Extraneous

Germane

Your role as a teacher is to help students to manage their cognitive load to achieve effective learning.

INTRINSIC COGNITIVE LOAD

Intrinsic cognitive load refers to the relative difficulty or complexity of what you are asking your students to learn. Teaching new concepts or ideas will always lead to a relatively high level of intrinsic cognitive load, this is not necessarily a bad thing! As psychology teachers you already know about the limited capacity of short-term memory. Miller's Magic 7 (1956) suggests that the capacity of short-term memory is between 5–9 items for most people, but this can be extended by chunking information together. The implication for your teaching is to think carefully about the amount of new information you will be presenting in a lesson and try to limit it to between 5–9 chunks of information. However, it is recognised that controlling the intrinsic cognitive load in a mixed ability class is difficult, as it is different for each student. This requires careful planning and differentiation.

However, more new information could be presented in a lesson if dual processing is taken advantage of to increase the capacity of the working memory. Dual processing was first suggested by Allan Paivio (1971) as a way to facilitate learning by using a combination of words and images. This theory is further supported by Baddeley & Hitch (1974) who showed that the working memory has separate stores; the visuo-spatial sketchpad and the phonological loop. Their dual task experiments showed that if information is visual and auditory it does not interfere with memory retention in the same way that two visual or two auditory tasks would. This means that presenting visual and auditory information can effectively double the capacity of the working memory.

For example, when teaching the working memory model:

Get students to draw an annotated diagram from notes (words and pictures, dual processing)

Add a third level of processing by asking them to explain the process to their partner, whilst tracing the pathway with their finger (tactile)

For homework ask them to explain the model to a family member.

Test knowledge and understanding at start of next lesson e.g. ask them to sketch diagram from memory or give an exam question

EXTRANEOUS COGNITIVE LOAD

Extraneous cognitive load refers to factors outside of the task or information to be learnt which may provide a distraction.

Sometimes the teacher can unwittingly add to the extraneous cognitive load by including information or instructions that are overly complicated and unnecessary. When you plan a lesson review it and ask yourself whether everything you have included is strictly necessary.

A further factor is low level disruption in the classroom, this is a serious impediment to learning, and can be addressed by classroom management techniques. Even experienced teachers sometimes struggle with this with particular classes. Do not be afraid to ask for help and advice. Environmental factors also need to be considered, as it is impossible to learn in a room that is too hot or too cold. Also, consider classroom displays, an overly busy classroom can be distracting, and this is especially true for students with Autistic spectrum disorders (ASD) as it can lead to sensory overload.

GERMANE COGNITIVE LOAD

Germane cognitive load is the construction of schemata and this is a desirable form of cognitive load. This is when real, deep learning is occurring.

As psychology teachers are well aware, a schema is a cognitive representation of all we know about an object, person or idea.

For example, a child may have a quite simple schema for a table; a flat rectangular surface to eat or work on with four legs. As the child becomes more experienced, they realise that tables come in all shapes and sizes and that some can have three legs, whilst others just have a central pedestal. A young child is constantly developing new schemata, as we get older, we tend to just amend or adapt our existing schemata.

Piaget (1969) argues that we are motivated to learn when our existing schemata no longer allows us to make sense of the world, this leads to the cognitive state of disequilibrium. He further argues that as disequilibrium is an uncomfortable state (e.g. not knowing, being unsure), we are motivated to discover what we need to know to achieve equilibrium in our cognitive states once more.

Learning takes place through the processes of assimilation and accommodation.

Assimilation occurs when we discover new information to add to an existing schema. Once this information is successfully assimilated, we have achieved equilibrium. For example, imagine a family have a pet Yorkshire terrier. The child learns that this animal is called a dog. Whilst out with parents the child encounters a Great Dane, this animal looks nothing like their pet Yorkie. The child is told by their parents that this is also a dog as it has four legs and a tail; it is simply a bigger version. Therefore, the child's dog schema has now expanded to include dogs of varying sizes.

Accommodation occurs when a child must either radically change their current schema or form a new one. For example, the same child in the previous example encounters a cat for the first time. They immediately think it is a dog as it has four legs and a tail. The parent has to explain that dogs bark and cats meow. The child now develops a cat schema.

Germane cognitive load occurs when students either assimilate knowledge into an existing schema or through the process of accommodation build a new schema.

Consider a lesson you are going to teach and plan how you can apply cognitive load theory to it to ensure you effectively reduce the cognitive load of your students.

INTRINSIC COGNITIVE LOAD

Consider the complexity of the material you are presenting, limit it to between 5–9 new items.

EXTRANEOUS COGNITIVE LOAD

Control and eliminate any unnecessary distractions.

GERMANE COGNITIVE LOAD

Consider whether the new information requires your students to assimilate knowledge into an existing schema or requires, through the process of accommodation, to build a new schema. You will then be considering the germane cognitive load of your lesson.

Carry out action research by evaluating your lesson or ask a colleague (peer observation) to observe you paying attention to cognitive load.

CHAPTER 2



Rosenshine's Principles of Instruction (2012)

Barack Rosenshine's 10 instructional principles are firmly grounded in research:

Cognitive science – How our brains process information

Classroom practice of effective (master) teachers

Cognitive supports – Strategies and techniques that assist student learning

It is important to stress that no one will be expecting you to use all 10 principles in every lesson. Lessons should be seen as a series of linked learning opportunities rather than discreet entities.

THE 10 INSTRUCTION PRINCIPLES ARE

1. BEGIN EACH LESSON WITH A SHORT REVIEW

Research has shown that teachers who begin each lesson with an eight-minute review have students with consistently higher achievement scores compared to teachers who do not do this regularly. This principle is linked to retrieval practice in cognitive psychology. Bruner's (1960) theory of the spiral curriculum is also important here. In psychology, research methods are central to an understanding of psychology, so regular review and integration of research methods into lessons will improve student performance in examinations.

2. PRESENT NEW INFORMATION IN STEPS AND ALLOW OPPORTUNITY FOR STUDENT PRACTICE

This principle links to cognitive load theory. Intrinsic cognitive load refers to the relative difficulty or complexity of what you are asking your students to learn. Teaching new concepts or ideas will always lead to a relatively high level of intrinsic cognitive load. Miller's Magic 7 (1956) suggests that the capacity of short-term memory is between 5–9 items for most people, but this can be extended by chunking information together. Therefore, the implication is to think carefully about the amount of new information you

will be presenting in a lesson and try to limit it to between 5–9 chunks of information. Psychology provides lots of opportunities for active learning techniques, by replicating many of the studies and especially in the teaching of research methods via mini-practicals. As the Chinese proverb says: 'I listen and I forget, I see and I remember, I do and I understand'.

3. QUESTION ALL STUDENTS

Black & Wiliam (2003) found that on average a teacher waits less than one second for students to answer questions before giving the answer themselves. This leads to questions and answers being rather superficial. Therefore, think about the questions you are asking, plan questions and follow up questions. Inform students that you do not expect an immediate answer, give them thinking time. Think, pair, share is a good strategy for this. It is good practice not to rely on 'hands up' as the same few students will offer an answer. Keep a tally of which students have answered questions and target those that have not. Use randomisation methods to choose students to answer. It is also essential to use prior knowledge of student ability to ensure that you target questions appropriately, but do not be afraid to challenge. For example, you could use bronze, silver and gold questions which represent increasing levels of challenge.

4. PROVIDE MODELS

Students really appreciate model examination answers. But, how do you make sure they read them? Make your model answers into a cloze activity by removing key words. You can differentiate this activity by either providing the list of missing words or not. This ensures that the students fully engage with the material to complete the activity. Alternatively, ask students to highlight different sections of the model answer, for example all the descriptive material (AO1), all the evaluation (AO3), all the application (AO2) or specialist terminology etc. Many of the awarding bodies provide model answers on their websites.

5. GUIDE PRACTICE

This is similar to point 8. Scaffold difficult tasks. Students need time for practice and rehearsal in order for new material to be successfully transferred to long term memory. New information should be presented in small chunks, with the opportunity to practice with guidance and support from the teacher to offer reassurance and pick up on any errors. Students will then be confident and prepared to complete further independent study.

6. CHECK UNDERSTANDING

How do you know students have learnt what you wanted them to learn? An ineffective teacher might ask 'Are there any questions?' at the end of the lesson and assume that if there are no questions everyone understands the content of the lesson. Students need targeted questions that check for understanding throughout the lesson. An effective teacher uses this feedback to assess the students' level of knowledge and understanding and gauge whether the new information has been successfully transferred into long-term memory.

7. OBTAIN A HIGH SUCCESS RATE BEFORE CONTINUING

An important consideration to ensure student understanding are 'threshold concepts': 'A threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress.' (Meyer & Land, 2003).

A threshold concept has the following features: They are transformative. Once a student grasps the threshold concept it changes the way a student thinks about a subject. It is also highly likely to be troublesome for the student. It may seem counter-intuitive, or at best, really difficult to grasp. Yet, once understood, it can make subsequent learning feel more intuitive or 'easy'. It is irreversible. Once grasped, the student would find it difficult to unlearn. It is integrative. That is to say that once learned, the concept helps unify aspects of the subject that may not have appeared related to the student. It may completely shift the view that the student has towards the subject. Unless students have a firm grasp of threshold concepts they will be unable to progress with their learning. Any misunderstandings identified when checking understanding must be rectified either at a whole class or individual level as appropriate. Some threshold concepts in psychology include:

The experimental method

Reliability and validity

IV and DV

Writing hypotheses

Probability levels

Ethics, etc.

8. SCAFFOLD DIFFICULT TASKS

The social aspect of learning involves the teacher supporting and guiding the student until they have gained the knowledge or skills being taught.

Vygotsky (1978) defined the zone of proximal development as the difference between what a learner can do without help and what he or she can do with help. He suggests that teachers use cooperative learning exercises where less competent students develop with help from more skillful peers – within the zone of proximal development. Scaffolding is a term which describes the kind of help a teacher or more advanced peer will give to a student in the zone of proximal development.

One way to scaffold is to provide writing frames for extended writing tasks.

The problem that many teachers have is that they fail to remove the scaffolding and students then find it difficult to think for themselves and tackle questions in examinations. Scaffolding should be removed gradually, to build up student confidence, so that early in their course of study writing frames contain a lot of detail and that level of detail is gradually reduced until students no longer need a writing frame.

9. SET INDEPENDENT WORK AND MONITOR TO ENSURE COMPLETION

Think outside of the box – homework does not have to be exam questions! Work smarter, not harder, try to think of tasks which are easy to check and do not create lots of marking. Some examples include: Self-checking quizzes and tests (online), poster tasks (or other creative tasks), Flipped learning etc. Tasks should be meaningful for students and be effective at reinforcing learning.

10. ENGAGE IN WEEKLY AND MONTHLY REVIEWS

Do not leave revision until the end of the course. Regular reviews could be end of topic tests, low stakes weekly quizzes or practice examination questions. Personal Learning Checklists (PLCs) are really useful for this. Produce a checklist from the specification which covers the knowledge and skills required for each unit or topic. Students then self-assess themselves either red (no idea – I need to revise this), amber (OK – but I could do with refreshing my knowledge) or green (I'm confident with this). This allows students to identify where their strengths and weaknesses are and target their revision appropriately.

Activity

Look at your medium-term planning for a unit of work or topic. Consider how the 10 principles fit into your plan. Carry out action research by comparing students' end of topic test scores on this unit and one taught without considering the 10 principles.

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