WILDERN SCHOOL PROFESSIONAL DEVELOPMENT BULLETIN

THE ROUND

AUTUMN 2017

PROFESSOR ROBERT COE'S 'POOR PROXIES FOR LEARNING'

In his inaugural lecture as Director of the Centre for Evaluation and Monitoring at Durham University's School of Education, Professor Robert Coe identified an interesting error we might make when evaluating learning in pupils.

Learning is something that happens inside our pupils' minds, so it is very hard for us to know whether they are actually learning or not. As I've written about in the Spring 2017 edition of *The Round*, there is a difference between performance and learning. What we often see in the classroom is performance, and so we have to infer learning using proxies.

Coe identifies a set of proxies that we often use to infer learning, but which don't actually tell us anything about learning at all. It is important to note that these proxies are often very desirable things and might be considered to be the best conditions for learning to take place. But Coe also makes the distinction that these proxies don't actually tell us whether learning is actually taking place, so we shouldn't use them to make inferences:

Poor Proxies for Learning

(Easily observed, but not really about learning)

1. Students are busy: lots of work is done (especially written work)
2. Students are engaged, interested, motivated
3. Students are getting attention: feedback, explanations
4. Classroom is ordered, calm, under control
5. Curriculum has been 'covered' (ie presented to students in some form)
6. (At least some) students have supplied correct answers (whether or not they really understood them or could reproduce them independently)

It is useful to be aware of these when we are reflecting on our classroom or observing others. Fortunately, Coe gives us a better proxy when he tells us *"Learning happens when people have to think hard."* So if you look for evidence of pupils thinking hard, you can make more assured inferences that they are learning.

COGNITIVE LOAD THEORY

JOHN SWELLER

This year, education academic Dylan Wiliam described cognitive load theory as 'the single most important thing for teachers to know'. So what is it and why should we know about it?

To understand cognitive load theory, we must first understand how our brain is divided into *working memory* and *long-term memory*. Working memory is where small amounts of information are stored for very short periods – it is basically what we are conscious of at any one time: the space in which we think. Long-term memory is a 'big mental warehouse' of everything we know. Large amounts can be stored here and retrieved into working memory (the thinking space) when it needs to be used.

Cognitive load theory tells us that knowledge is stored in long-term memory in what is known as *schemas*. A schema organises information in a way that aids use of that information. In doing this, schemas also reduce the load on working memory. This is because it reduces complex information to a single element in working memory. For example, if you try to remember the letters y-m-r-e-o-m, you are being asked to remember six items at once. But if you try and remember the letters m-e-m-o-r-y, those six items rely on the schema you have in your long-term memory for the word 'memory'. This frees up your working memory to remember other items.

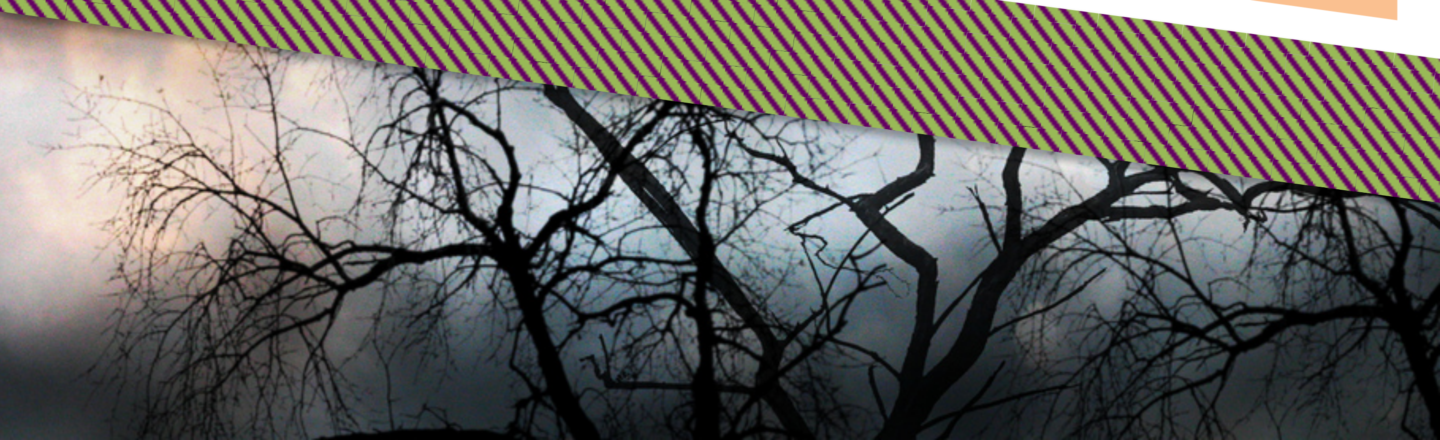
Cognitive load theory is built upon the idea that our working memory is hugely limited in what it can process at one time, and that our long-term memory has no limits of which we know.

Therefore we should be aware of the load that we are placing on working memory. We call this cognitive load.

Cognitive load comes in three types, as shown in the table opposite. *Intrinsic load* relates to the inherent difficulty of what is being learnt, and is the 'necessary' type of cognitive load. *Extraneous* load is not necessary so can be described as the 'bad' type of load. And *germane load* is the load imposed on working memory by the process of learning, and can be described as the 'good' type of load. Instructional material has maximum effectiveness when it reduces extraneous load and increases germane load.

You can read about CLT in more detail here.

JNT

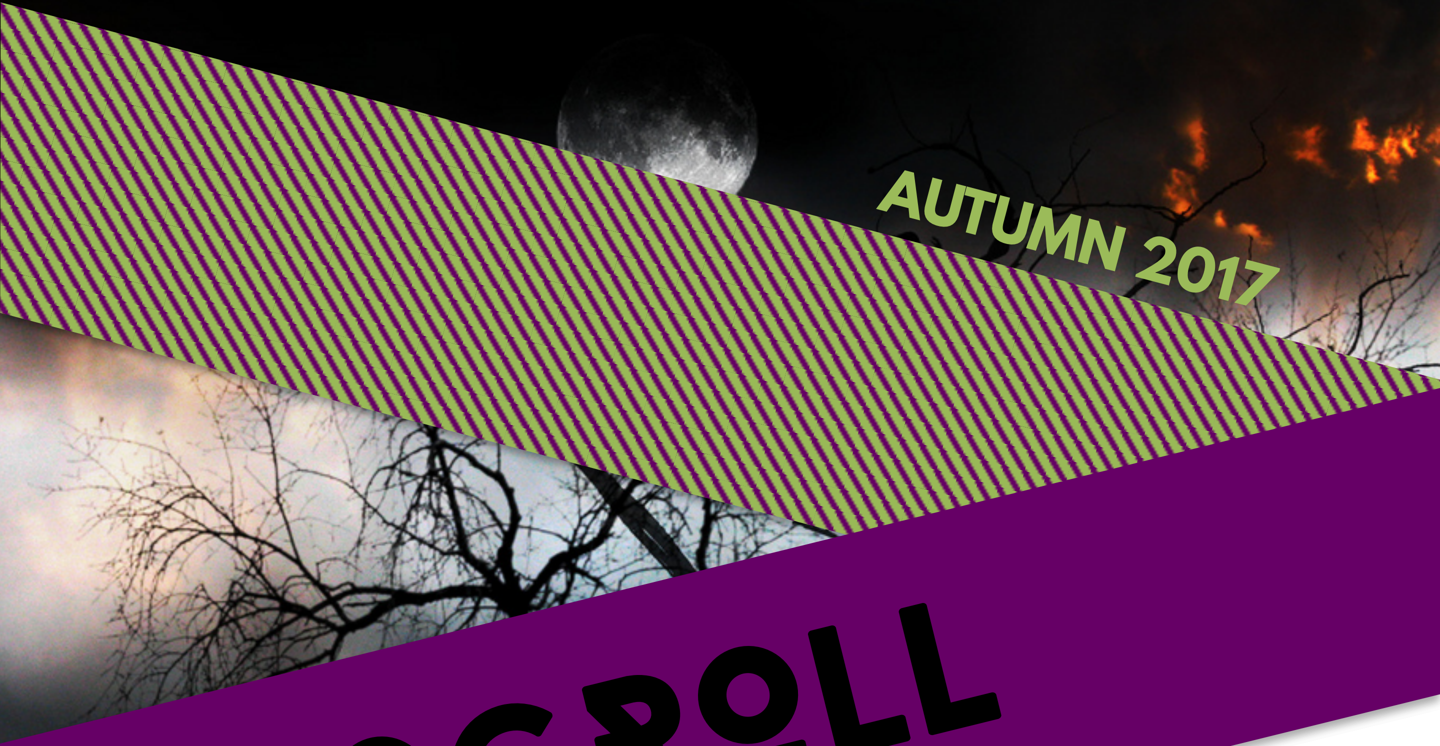


CHARACTERISTICS

Load type	Source	Effect on learning	Example
Intrinsic load	This comes from the complexity of the material being learnt as well as the prior knowledge of the learner	Necessary to learning (but potentially harmful if too high because it can cause cognitive overload)	Learning how to solve the mathematical equation: *a / b = c, solve for a* Learning this equation might have a high intrinsic load for a novice maths student, but would have a low intrinsic load for an expert mathematician
Extraneous load	This comes from poorly designed instruction that **doesn't** help learners construct schemas (systems in the brain that organise information for later use) and facilitate automation	Harmful because it does not contribute to learning	The student is required to figure out how to solve the equation themselves, with minimal guidance from the teacher This imposes a high cognitive load, but does little to encourage schema construction because the student's attention is focused on *solving* the problem rather than on *learning* the technique
Germane load	Well designed instruction that directly facilitates schema construction and automation	Helpful because it directly contributes to learning	The student is explicitly taught how to solve the problem and given lots of worked examples demonstrating how to do it This imposes a lower cognitive load on the student, enabling them to learn and remember *how* to solve the problem when faced with it again

intrinsic load + extraneous load + germane load = total cognitive load

Cognitive overload occurs when the *total cognitive load* exceeds the working memory capacity of the learner.



BLOGROLL

ARTICLES AND BLOGS YOU MIGHT FIND INTERESTING

'7 tools for thinking about education' by teacher Greg Ashman. Greg is a prolific and brilliant blogger on research in education. In this blog, he lists seven tools we as teachers can use to evaluate the claims made about any particular method and intervention.

'Memory not memories – teaching for long term learning'. Primary Headteacher Clare Sealy breaks down exactly how the memory works, making the distinction between semantic memory and episodic memory and the errors that can occur if we don't know about these things, and shows us how we might plan better for long term retention.

'A lesson is the wrong unit of time'. Bodil Isaksen's brilliant blog challenges the idea that we should think of what we teach in units of lessons. This has become a much-cited blog in the wider education community.

If you want to know a little bit more about any of the ideas in this edition, please don't hesitate to email me – j.theobald@wildern.hants.sch.uk – or come and find me in Block 9. James