

How students learn	How students learn
<p><b>1.</b> <b>Most students need formal teaching to learn biologically secondary knowledge.</b> While many students learn biologically primary knowledge without any formal teaching (e.g. learning to listen and speak), biologically secondary knowledge (e.g. reading, writing, mathematics) requires instruction, and must be taught (Castles, Rastle &amp; Nation 2018).</p>	<p><b>2.</b> <b>Thinking occurs when we combine information from our environment and from our long-term memory in new ways</b> (Willingham 2009b). Working memory is the space where we think (Clark, Kirschner &amp; Sweller 2012). Long-term memory stores information organised in ‘schemas’.</p>
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<p><b>3.</b> <b>Working memory has limits</b> (Sweller 2011). Students can only keep so much new information in their minds at once. Cognitive overload can occur when students try to process multiple pieces of new information or try to complete new tasks without prior instruction or scaffolding.</p>	<p><b>4.</b> <b>Memory is the residue of thought</b> (Willingham 2009a). Students retain knowledge and develop understanding through thinking. To help ensure students retain meaning in their learning, we want them to think about the things that matter most.</p>

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<p><b>5.</b>  <b>Memory is prone to forgetting</b> (Pashler et al. 2007). Students may be able to do something one day but find it difficult to recall a week later. Teachers can make things easier for their students to recall by connecting information to other ideas and by practising retrieval of information from long-term memory.</p>	<p><b>6.</b>  <b>Knowledge builds on knowledge.</b> Knowledge is mental Velcro (Hirsch 1996) – students who have lots of knowledge about topics across the curriculum find that new knowledge ‘sticks’ to it, building understanding from one year level to the next.</p>
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<p><b>7.</b>  <b>Novices learn differently to experts.</b> Novice learners process information differently as they do not yet have the mental models that experts do.</p>	