

# Instructional Illusions by Paul Kirschner, Carl Hendrick, Jim Heal

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Content		Do This/Remember This
<p><b>Introduction:</b>            Illusions work because humans are cognitively predisposed to being deceived. Education is susceptible - we can't see what's going on when people learn, AND what we see can be opposite to what is happening.  <b>Instructional illusions</b> are seen as real while effective strategies are overlooked/ undervalued. Teaching is multifaceted/ complex. People think they know what works in as they have all been taught → false confidence.  <b>Misconceptions about teaching:</b> Anyone can teach. Teaching is: a job/ not a profession/a calling/not work/easy/means short days + long summers/good when it's fun/teachers just need to know their subject/be one step ahead of students/to impart knowledge and teaching hasn't changed much.  <b>Misconceptions about learning:</b> It's memorization/which is drill and kill/ faster is better/ends after graduation/ academic performance is sole indicator of learning/just because you learn some things without explicit instruction (speaking) doesn't mean you can learn other things without it (reading).            Illusions= outward appearance masks deeper truth about what works and why (are not edu-myths)</p>		
The illusion	Unmasking the illusion	Do This/Remember This
<p><b>1 The engagement illusion</b>            "If a child is engaged (busy), they are learning."  <b>Appearance of engagement</b> is poor proxy for actual learning. <b>Performance</b> manifests as: Activity without progress/ emotional engagement/ Familiarity trap = doing what they already know/ Performance illusion: short term performance = learning.  <b>Research:</b> Soderstrom + Bjork (desirable difficulties), Nuthall (Hidden Lives of Learners)</p>	<p><b>Reconceptualise engagement</b> as internal cognitive process which is NOT observable.</p> <ul style="list-style-type: none"> <li>• <b>Effortful thinking</b>=difficult in a good way + THEY have to attribute meaning/connect</li> <li>• Distinguish behavioural/emotional/ cognitive engagement</li> <li>• Focus on <b>desirable difficulties</b></li> <li>• Design tasks that <b>direct attention</b> to underlying features</li> <li>• Use <b>formative assessment</b></li> <li>• <b>Explain</b> process to students</li> <li>• <b>Prior knowledge</b> is the biggest determinant of learning</li> </ul>	
<p><b>2 The expertise illusion:</b>            "Expertise is always a good thing."  <b>Double edged sword: Knowing too little</b> = think subjective reality is objective reality (<b>naïve realism</b>) + over-estimate what we know + assume we know what we need  <b>Knowing too much</b> = <b>curse of knowledge</b>, novice and experts organize knowledge differently, experts can do more with what they have BUT assume novices think similarly, forget what it's like not to know.  <b>Research:</b> Dunning + Kruger (their effect)</p>	<p><b>Use lesson internalization</b> to move novice-expert gap- ask:</p> <ul style="list-style-type: none"> <li>• What do students <b>know</b> (background knowledge)?</li> <li>• What am I <b>asking them to do</b> (cognitive task analysis)?</li> <li>• What do they <b>need</b> so they can do the task (often underestimated because of curse)?</li> <li>• What is this learning <b>building towards</b>?</li> <li>• How might they <b>struggle</b> (in ways you don't)?</li> <li>• How might they <b>succeed</b> (what gains)?</li> <li>• Use <b>examples/non-examples*</b> to help ameliorate <b>conversational implicature</b> – lack of precision in language of novices-</li> </ul>	
<p><b>3. The student-centred illusion:</b>            "Students know what's best for them." Can be philosophical/political. Need <b>schema theory</b> – which means: what they learn depends on what they know AND what they know can be inaccurate and they still use it. To learn new material students must <b>activate</b> and <b>link</b> to <b>prior knowledge (PK)</b>. <b>Pitfall 1:</b> PK is irrelevant or wrong (missing by a mile). <b>Pitfall 2:</b> PK is marginal, not strong enough (just enough to be dangerous). <b>Pitfall 3:</b> Accurate, relevant PK isn't activated (hiding in plain sight)  <b>Research:</b> Brophy + Good (Teacher behavior &amp; student achievement)</p>	<p><b>Take students' prior knowledge and schemas into account</b> so</p> <ul style="list-style-type: none"> <li>• Students <b>are at the center</b> of learning AND <b>require</b> an intentional <b>teacher-led process</b></li> <li>• <b>Make schemas explicit</b></li> <li>• <b>Make connections</b> with prior knowledge visible</li> <li>• Avoid activities that do not help to build schemas (e.g. list as many as possible)</li> <li>• Use activities that <b>build schemas</b> (sort/categorize/justify inclusion/exclusion) that link to PK)</li> <li>• Building schemas means <b>meaningful encoding</b></li> <li>• Can do <b>both</b> teacher-led + student-centred if teachers:               <ul style="list-style-type: none"> <li>○ realize students learn new material by referencing PK</li> <li>○ activate PK that in ways that helps build schemas</li> <li>○ invite students to make organization explicit when activating PK</li> </ul> </li> </ul>	
<p><b>4 The transfer illusion:</b>            "Optimizing performance is the goal."            (Transfer = apply knowledge/understanding to near or far novel situation). <b>True understanding</b> = seeing superficial +deep structure.  <b>Research:</b> Thorndike – <b>contextual imprisonment</b> (knowledge easily bound to</p>	<p>Conditions that <b>optimize performance</b> now <b>differ</b> from those needed for <b>long-term far-reaching transfer</b> so</p> <ul style="list-style-type: none"> <li>• <b>Vary the context</b> during the initial learning process</li> <li>• Present problems with <b>calculated superficial differences</b> but <b>same underlying principles</b> – develops 'boundary crossing competencies'/metacognitive skills</li> <li>• Use <b>interleaving</b> (not blocking) e.g. mixing problem types</li> </ul>	

<p>original learning context), Roediger – remember more when <b>tested</b> where you learned it, Salomon – <b>low-road</b> (automatic) vs. <b>high-road</b> (mindful abstraction) transfer. Lave and Wenger’s <b>situated learning theory</b> (learning embedded socially/culturally) = challenge, need to orchestrate contexts</p>	<ul style="list-style-type: none"> <li>• Likewise use <b>spacing</b> – dividing study over time</li> <li>• <b>Initially slower</b> as having to shift attention between strategies but makes for <b>more robust and flexible knowledge</b></li> <li>• Aiming for <b>orchestration of variation</b> to avoid hyper-contextualization (only know that context), or <b>decontextualization</b> (inert knowledge)</li> </ul>	
<p><b>5 The easy wins illusion</b>  “Learning should be made easy.”  <b>Students/teachers want easy</b> (perverse incentives = course evaluations, happy students, test scores.) <b>No pain no gain</b> BUT can’t be too hard. A ‘calculating student’ expends min effort for max benefit. Need to <b>coax/stimulate</b> them to expend more effort.  <b>Research:</b> Bjork &amp; Bjork – difference between ‘<b>storage strength</b>’ (how stored) vs ‘<b>retrieval strength</b>’ (how easily recalled), developed ‘desirable difficulties’ to produce ‘<b>better conditions</b>’ to improving storage.</p>	<p><b>Teachers</b> can:</p> <ul style="list-style-type: none"> <li>• Select and use <b>desirable difficulties</b>: Interleaving/variable practice (different contexts), contextual interference (e.g. different rooms!), spaced practice (different times), reduced feedback, retrieval practice/practice testing.</li> </ul> <p><b>School leaders/inspectors</b> can:</p> <ul style="list-style-type: none"> <li>• Stop using test scores/student evaluations/self-reports of lesson judgements,</li> <li>• Develop <b>assessments of real long-term learning</b></li> </ul> <p><b>Students</b> can:</p> <ul style="list-style-type: none"> <li>• Learn (with our help!) the <b>benefits of delayed gratification/embracing the effort</b> for long-term gain</li> </ul>	
<p><b>6 The motivation illusion:</b>  “Motivation leads to success.” <b>Motivation</b> may prompt <b>initial engagement</b>, but <b>success is needed for sustained effort</b> + we don’t really know what motivation is.  <b>Research:</b> Nuthall (see Engagement Illusion), Murayama: motivation as linguistic construct, difficulties in definition otherwise.</p>	<p>Give <b>experiences of success</b> by:</p> <ul style="list-style-type: none"> <li>• Rosenshine: <b>breaking down</b> the material into manageable steps then ensuring a <b>high (80%+) success rate</b> in guided practice</li> <li>• <b>Monitor/adjust tasks</b> based on student performance</li> <li>• Give thoughtful, timely and actionable <b>feedback</b> that <b>builds foundational knowledge</b> that they can then transfer (and see even more success)</li> </ul>	
<p><b>7 The discovery illusion:</b>  “Children learn best when they discover things for themselves”.  No because <b>effort fallacy</b>, discovery not ‘natural’, <b>confirmation bias</b>, <b>category error</b> – how experts <b>create knowledge</b> ≠ how novices <b>acquire it</b>.  <b>Research:</b> Hodson – epistemology ≠ pedagogy, novices have different cognitive architecture, need to help them build it.</p>	<p>Educational <b>realism</b> (not romanticism) =</p> <ul style="list-style-type: none"> <li>• Give <b>novice learners structured instructional techniques</b></li> <li>• <b>Transition</b> from worked examples to guided practice to independent practice with expertise development</li> <li>• Aim for <b>80% success</b> to <b>sustain motivation/reduce frustration</b></li> <li>• <b>Structure to avoid working memory overload</b> (that can happen with discovery)</li> </ul>	
<p><b>8 The uniqueness illusion:</b>  “Students learn differently because they are all different.”  All humans have <b>same cognitive architecture</b>: sensory memory → working memory → encoding → long-term memory = <b>use same principles + tailor to needs of students</b>.  <b>Research:</b> Rosenshine, Sweller (cognitive load theory), Mayer (16 multimedia principles) but NOT rigid checklists</p>	<p><b>Tailor proven general principles</b> (e.g. Rosenshine) to students:</p> <ol style="list-style-type: none"> <li>1. Start with <b>short review</b>: younger = game, older = quiz,</li> <li>2. new material in <b>chunks</b>: stories vs graphic organizers,</li> <li>3. <b>questions</b>: open vs epistemic (how/why),</li> <li>4. <b>models</b>: physical vs abstract,</li> <li>5. <b>guided practice</b>: immediate feedback vs delay,</li> <li>6. <b>check for understanding</b>: show &amp; tell vs written response,</li> <li>7. <b>high success rate</b>: achievable vs varying tasks,</li> <li>8. <b>scaffolding</b>: hands on tools vs templates/outlines,</li> <li>9. <b>independent practice</b>: short vs long,</li> <li>10. <b>weekly/monthly review</b>: drawings vs quizzes</li> </ol>	
<p><b>9 The performance illusion:</b>  “If a student performs well, they’ve learned it.” <b>Performance</b> = short-term change to knowledge (fragile, fragmentary shallow processing). <b>Learning</b> = long-term change (durable, cumulative, deep processing).  <b>Research:</b> Soderstrom &amp; Bjork – can ‘see’ performance not learning, Fiorella &amp; Mayer – generative learning</p>	<p>Hone a set of <b>observational/diagnostic techniques</b> to assess learning e.g.</p> <ul style="list-style-type: none"> <li>• <b>Desirable difficulties</b> (see 5. Easy wins)</li> <li>• <b>Generative learning strategies</b> = actively constructing their understanding of new knowledge: summarizing, mapping, drawing, self-explanation, teaching others, generating questions, imagining, enacting</li> <li>• <b>Teach students benefits</b> of learning over performance</li> </ul>	
<p><b>10 The innovation illusion:</b>  “Newer methods are better than old ones.”  <b>Seductive</b> as: innovation = progress, forward thinking. Pressure on schools/admin/SLT. <b>History</b> is important – <b>reveals cycle</b>. Notable ‘innovations that failed’: open classrooms, whole language approach, multiple intelligences.  Often <b>failure</b> due to implementation ‘gap’, difference between lab and classroom, + not all ideas transplant.</p>	<p><b>Things to remember</b> when faced with innovation:</p> <ul style="list-style-type: none"> <li>• <b>Watch for cycle</b>: new approach/catchy name, research findings often simplified, spreads via social media, schools invest money/time, teachers required to implement/replace, limited success/results, replaced by next new idea.</li> <li>• <b>Whole replacement rarely works</b>, thoughtful refinement better</li> <li>• We should ‘<b>define problem</b>, look at current situation: what’s going well, what needs changing.’</li> <li>• Effective practices have <b>more commonalities than differences</b>.</li> </ul>	