

More Than the Core: New Discoveries in the Science of Learning

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Chief Academic Officer

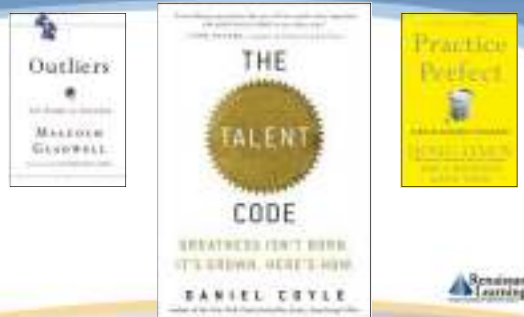
RENAISSANCE LEARNING

More Than the Core: New Discoveries in the Science of Learning



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Talent and Expertise

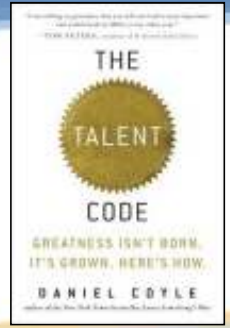


Outliers
MALCOLM GLADWELL


THE TALENT CODE
GREATNESS ISN'T BORN. IT'S GROWN. HERE'S HOW.
DANIEL COYLE

Practice Perfect

The Talent Code



Daniel Coyle



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GREATNESS ISN'T BORN. IT'S GROWN. HERE'S HOW.
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Hotbeds of Talent

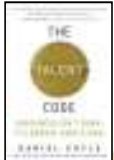
- The Bronte sisters - Victorian literature
- The Z-Boys - extreme skateboarders
- Bartok Tennis School, Russia
- Brazil – soccer
- Dominican Republic - baseball
- Meadowmount School (classical music)
- Septien School of Music (vocal)

Coyle, 2009

Three Main Points

- Deep practice
- Ignition
- Master coaching

Coyle, 2009



Cognitive Science




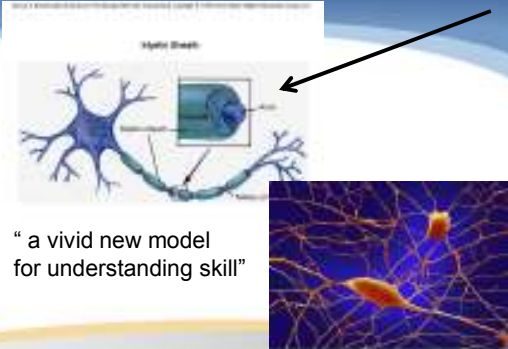


Diagram illustrating brain activity and cognitive science concepts, including labels for various brain regions like the prefrontal cortex, amygdala, and hippocampus.


Cognitive Science

Myelin




“a vivid new model for understanding skill”




Myelin: “A Vivid New Model for Understanding Skill”


- “Myelin’s vital role is to wrap those nerve fibers the same way that rubber insulation wraps a copper wire, making the signal stronger and faster” (p. 5)
- “When we fire our circuits. . .our myelin responds by wrapping layers of insulation around that circuit, each new layer adding a bit more skill and speed” (p. 5)



Big Idea #1




- The role of practice (in building myelin) is vitally important.
- Myelin can increase speed by a factor of 200!




Lemov (2012) on Practice

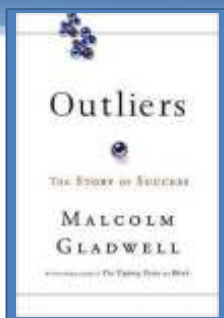
- “. . . the underestimated concept of **practice**. Generally seen as mundane and humdrum, poorly used or much maligned, or too familiar to be interesting, practice is often considered unworthy of deep, sustained reflection and precise engineering.”



Practice in the Press



Gladwell (2008)



“The 10,000-Hour Rule”

National Math Panel

The Panel recommends that high-quality computer assisted instruction (CAI) drill and practice, implemented with fidelity, be considered as a useful tool in developing students’ automaticity (i.e., fast, accurate, and effortless performance on computation)

What Works Clearinghouse



Recommendation 6: Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts

Coyle (2009)

“Deep practice is build on a paradox: struggling in certain targeted ways – operating at the edges of your ability, where you make mistakes – makes you smarter.”

Different Names, Same Idea

- “Deep practice” – Coyle
- “Deliberate practice” – Ericsson
- “Zone of proximal development” – Lev Vygotsky

Coyle (2011)

- Maximize Reachfulness – daily growth
- Ruthlessly eliminate passive learning
- Embrace struggle and repetition – kids don’t embrace either and we don’t embrace repetition.
- Work in short, intensive, and frequent session – 5 min. each day easily beats and 1 hour session each week
- Teach brainology

Coyle (2009)

- 1995 study
- “class time [spent] inventing, thinking, and actively struggling with underlying concepts” in Mathematics
- Japanese classroom – 44 %
- U.S. classroom – 1%



Coyle (2009)

Jim Stigler, *The Teaching Gap*

“Sometimes the [Japanese] teacher will purposefully give the wrong answer so the kids will grapple with the theory. American teachers, though, worked like waiters. Whenever there was struggle, they wanted to move past it, make sure the class kept gliding along. But you don’t learn from gliding.”



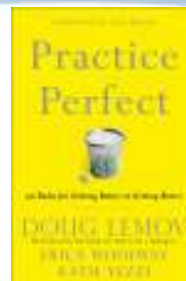
Big Idea #2



- Practicing at the right level and in the right way/s is vitally important.
- We may need to rethink our ideas about struggle.



Practice Perfect –Lemov



Practice Perfect –Lemov

- “Practice the 20”
- “The 80/20 Rule” or “law of the vital few”
- “. . . if you’re practicing one of those important skills – one of the 20% of skills that drive 80% of performance – don’t stop when your participants ‘know how to do it.’”
- “Your **goal** with these 20 percent skills is **excellence, not mere proficiency.**”



Barody, 1985 & Carroll, 1999

- “On entering seventh grade, only 42 percent of students have demonstrated mastery of multiplication facts, and less than a third have demonstrated mastery of division.”
- “And because there is little if any focus on these facts after the fifth grade, it is a safe assumption that many never master them at all.”



Renaissance Learning (2012)

- “This is not to say that they do not know how to add, subtract, multiply, and divide. Clearly they do or they would not score even as well as they do on benchmark assessments. But they have not achieved mastery – or more strictly speaking, they have not achieved automaticity, the essential foundation of computational fluency.”



Math Facts

- Caron (2007) points out that without the mastery of math facts “students are virtually denied anything but minimal growth in any serious use of mathematics or related subjects for the remainder of their school years.”



Big Idea #3



- Practicing the right stuff is vitally important.
- When practicing a vital skill, the goal must be **mastery not proficiency**.



Running High Quality Practices



Lemov (2012)

- “. . . running an effective practice requires systematic attentiveness to participants’ rate of success.”
- “lack of understanding builds on itself and gets harder to fix the longer you wait”
- “requires responding to failure to remediate it as quickly and as positively as you can”



Big Idea #4



- Closely monitoring success is a key element of effective practice.



Passion and Persistence

Question: Why are passion and persistence key ingredients of talent?

Answer: Because wrapping myelin around a big circuit requires immense energy and time. **If you don't love it, you'll never work hard enough to be great.**

Coyle (2009)



Myelination

- "It's one of the most intricate and exquisite cell-to-cell processes there is, and it's slow."
- Small sections "can take days or weeks"
 - Dr. R. Douglas Fields
 - National Institute of Health (NIH)



Myelination

- "Imagine doing that to an entire neuron, then an entire circuit with thousands of nerves. It would be like insulating a transatlantic cable."
 - Dr. R. Douglas Fields
 - NIH



Michelangelo



"If people knew how hard I had to work to gain mastery, it would not seem so wonderful at all."



"The Rage to Master"

Ellen Winner



The Last Big Idea



- Practicing the right stuff at the right level is tough, so considering motivation is vitally important.

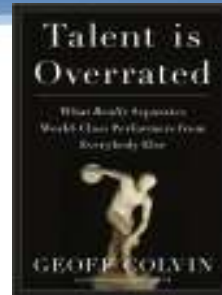


Really!?

What about talent?
You're telling me there's no such
thing as raw talent?



Talent is Overrated



The Talent Code

- “This is not to say that every person on the planet has the potential to become an Einstein. Nor does it mean that our genes don't matter – they do. The point, rather, is that although talent feels and looks predestined, in fact **we have a good deal of control over what skills we develop.** . . .”



The Talent Code

- “. . . and we each have more potential than we might ever presume to guess.”



**This all fundamentally
changes the story!**

