

**Cognitivism & Transfer: Why Doesn't Knowledge Transfer and What Can We Do?**  
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Let's consider insights from cognitive science—a study of how people think and learn—to try to account for differences between deep and shallow levels of processing (and understanding).

What is **the most** important factor in successful learning?

1. The intention and desire to learn.
2. Paying close attention to the material as you study
3. Learning in a way that matches your own learning style
4. The time you spend studying
5. What you think about while studying

The answer that has research support is “5” (Hyde and Jenkins 1969).

Levels of processing vary from deep to shallow. Shallow processing focuses on meaningless aspects of information (e.g, mindless re-reading, copying notes) and deep processing focuses on subjective meaning (e.g., interpreting information and relating to prior knowledge or experience. Deeper processing leads to better recall/remembering. **In other words, we only remember what we deeply think about.**

Exemplifying a Failure to Transfer:

- **Tumor Problem:** Suppose you are a doctor faced with a patient who has a malignant tumor in his stomach. It is impossible to operate on the patient, but unless the tumor is destroyed, the patient will die. There is a kind of ray that can be used to destroy the tumor. If the rays reach the tumor all at once at a sufficiently high intensity, the tumor will be destroyed. Unfortunately, at this intensity the healthy tissue the rays pass through on the way to the tumor will also be destroyed. At lower intensities the rays are harmless to healthy tissue, but they will not affect the tumor either. What type of procedure might be used to destroy the tumor with the rays while at the same time avoid destroying the healthy tissue?
- **Fortress Problem:** A dictator ruled a small country from a fortress. The fortress was situated in the middle of the country, and many roads radiated outward from it, like spokes on a wheel. A great general vowed to capture the fortress and free the country of the dictator. The general knew that if his entire army could attack the fortress at once, it could be captured. But a spy reported that the dictator had planted mines on each of the roads. The mines were set so that small bodies of men could pass over them safely, because the dictator needed to be able to move troops and workers about; however, any large force would detonate the mines. Not only would this activity blow up the road, but the dictator would destroy many villages in retaliation. How could the general attack the fortress?

The solution here is the same for both problems. When combined forces will cause collateral damage, scatter your forces and have them converge from different directions on the point of attack. This solution seems obvious, but it was not obvious to the research subjects. Only 30 percent solved the second problem, even though they had just heard the conceptually identical problem and its solution. The failure here is a failure to transfer.

**Transfer: When knowledge transfers, this means you can successfully apply old knowledge to a new problem. Transfer is hard and we are not very good at it!**

**Teaching Implications:**

- **Teachers will need to help students see the deep structure.**
  - Experience helps students see deep structure so provide lots of experience via lots of examples
  - Stress comparisons—Be straightforward!
- **Consider carefully the implicit messages in your teaching.**
- **Practice assists transfer**
  - What is good practice?
    - Space out practice (don't cram!), every 10-15 minutes stop and change, work on different sorts of problems (not all the same kind), change seats regularly

**For Further Reading:**

Dr. Stephen L. Chew, Cognitive Psychologist, Videos on “How to Get the Most Out of Studying,” <http://www.youtube.com/watch?v=RH95h36NChI&list=PL85708E6EA236E3DB&index=1>

Dr. Daniel Willingham, Cognitive Psychologist, Book titled, *Why Don't Students Like School?*

Dr. Daniel Willingham, Cognitive Psychologist, Article titled, “What Will Improve a Student's Memory,” <http://www.aft.org/pdfs/americaneducator/winter0809/willingham.pdf>

Dr. Daniel Willingham's, Cognitive Psychologist, Video on “Learning Styles Don't Exist,” <http://www.youtube.com/watch?v=sIv9rz2NTUk>

Benedict Carey, Article titled, “Forget What You Know About Good Study Habits,” *New York Times*, September 6, 2010.