LEARN BETTER

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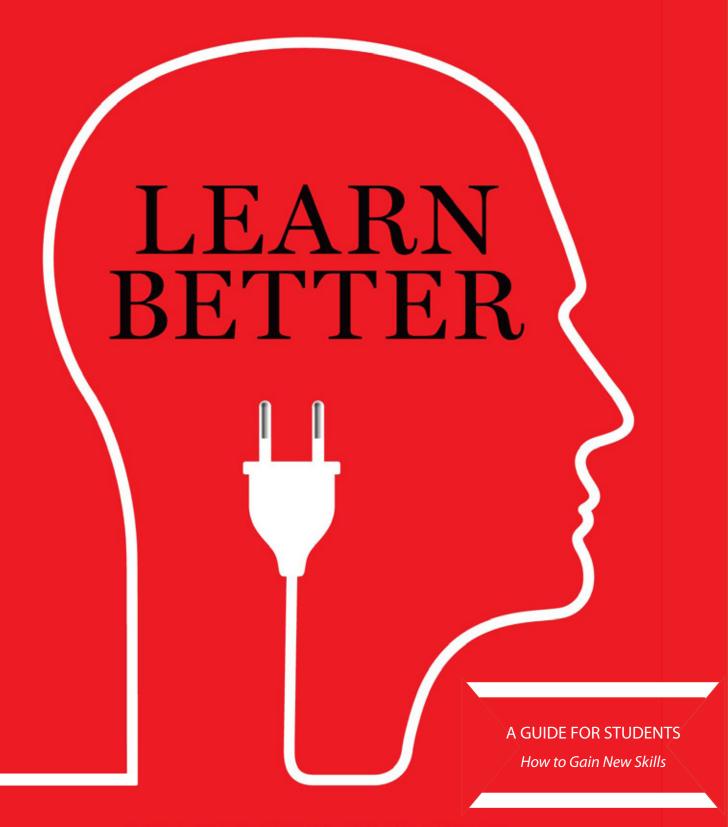Almost all of the material below has been published before, either in *Learn Better: Mastering the Skills for Success in Life, Business, and School, or, How to Become an Expert in Just About Anything,* or in other articles by Ulrich Boser. For citations and other notes, please see the full book.

LEARN BETTER FOR STUDENTS
How to Gain New Skills

Ulrich Boser

An experiment took place some years ago at an all-girls school in New York City. It was an old Catholic school, with some crucifixes hanging from the walls, looking somber and stern. The girls were in their first two years of high school, teenagers wearing polo shirts and pleated skirts, and the young women would later receive a little gift for agreeing to enroll in the study.

As part of the experiment, the girls were taught how to play darts for the first time, and the two psychologists conducting the study divided the young women into some groups. Let's call members of the first group "Team Performance," and they were told that they should learn the game of darts by trying to throw the darts as close to the center of the board as possible. In other words, the researchers informed the women that the best way to win was to rack up some points.

The psychologists also pulled together another group of young women. Let's call them "Team Learning Method," and they learned to play darts very differently. The researchers had these girls focus on the process of gaining expertise, and the women started by focusing on how exactly to throw the darts, mastering some basic processes like "keep your arm close to your body." Then, after the women showed some proficiency, they were encouraged to aim at the bull's eye, slowly shifting from some process goals to some outcome goals like hitting the target.

Finally, there was the control group. Their instructions? The researchers told them to learn to "do their best." In other words, these young women could take any approach that they wanted

to learning darts. Let's think of this group as "Team Conventional Wisdom."

To learn more about the experiment, I met up with Anastasia Kitsantas, who ran the study together with psychologist Barry Zimmerman. While the experiment took place some years ago, Kitsantas still has the darts stashed away in her office at George Mason University, and on a rainy afternoon, she pulled out the little yellow missiles from an office cabinet to show them to me, laying the darts out like an important relic from some forgotten South American tribe.

Kitsantas held onto the darts because of the study's surprisingly large outcomes, and by the end of the experiment, the young women on Team Learning Method dramatically outperformed the others, with scores nearly twice as high as Team Conventional Wisdom. The women also enjoyed the experience much more. "Several of the students asked me to teach them more about darts after the experiment. They kept asking me for weeks," Kitsantas told me.

The takeaway from the dart experiment is a straightforward one, one supported by a growing number of studies, because learning turns out to be a process, a method, a system of understanding. It's an activity that requires focus, planning, and reflection, and when people know how to learn, they acquire mastery in much more effective ways.

Indeed, the learning process turns out to be one of the most important predictors of learning. One recent analysis—or a study of studies—showed that using a learning method dramatically shifted outcomes in just about every field. Another analysis found that the process of learning works in lockstep with GPA. Follow-up research by Kitsantas and Zimmerman replicated the dart study in other fields, finding that dedicated strategies boosted performance in everything from volleyball to writing.

To help people gain a sense of the overall learning method, I briefly mapped out some of the key steps, from setting goals to reviewing key ideas.

Find Value

It's impossible to learn if we won't want to learn, and to gain expertise, people have to see skills and knowledge as valuable. So look for relevance in your learning and find ways to make expertise meaningful to you. If you're learning math—and love gymnastics—for instance, then work on math problems involving rotations. If you're learning knitting, create a sweater for a close friend.

At the same time, look beyond facts and see how things hang together. Ask yourself questions that examine relationships within an area of expertise: What's the system within this area of mastery? What's the nature of cause and effect? What are some analogies?

Keep in mind that we learn something so that we can learn the system of thought that makes up that field. So, if we study microeconomics, we're learning how to think like microeconomic experts. If we learn biochemistry, we learn how to think like biochemistry experts. As educational psychologists argue, "think of learning as figuring out parts of an organized and intelligible system."

Create Targets

In the early part of learning, focus is key. People need to figure out exactly what skills they want to learn. Think of learning, then, as a type of knowledge management, and to succeed, we need goals, deadlines, and strategies. Indeed, hundreds of studies have shown that people with clear goals outperform those with vague aspirations like "do a good job."

Learning goals should not be vague aims like learn the waltz, though. Overly ambitious learning targets can backfire because they seem too distant. Instead, people are more likely to succeed if they have easy-to-accomplish benchmarks. So instead of something like learn the waltz, people should develop smaller targets like attend waltzing lessons once a week, which are easier to accomplish.

When it comes to targeting your learning, rigor matters a lot, too, and always look to practice material just beyond your area of expertise. In other words, try and make things a little more difficult than you're used to. If you're learning art history, for instance, most people would start by reviewing some

of the things that they are already fairly familiar with—Rembrandt is a Dutch painter, Van Gogh was a post-Impressionist, etc.

But learning happens when people are pushed just a bit past their comfort zone, when they struggle with ideas just beyond reach. So the more effective questions for the person learning about art history might be—who was Giacometti? Why was Louise Nevelson such an important artist? Why is Degas considered the first modernist painter?

Develop Knowledge and Skills

In this stage of learning, people need to hone their abilities and take steps to improve performance. In short, people need to practice, setting aside time to developing an area of mastery.

Some forms of practice make people more perfect than others, though, and the best practice is typically a matter of mental doing. So don't use more passive forms of learning like re-reading. Instead, rely on more active learning strategies like self-quizzing or self-explaining.

Similarly, people should be sure to practice retrieving knowledge. In one well-known study, a group of subjects who practiced recalling a passage learned a lot more than people who simply re-read the passage. More concretely, you'd learn a lot more if you asked yourself questions after reading the text than simply re-reading it.

Extend Expertise

At this point in the learning process, we want to go beyond the basics—and apply what we know. We want to flesh out our skills and knowledge, and people can gain a lot by expanding on a skill. Want to get better at public speaking, for instance? Do more public speaking of all kinds, from lectures to media interviews.

People can also learn a lot by explaining ideas to themselves, asking: Does this make sense? How does this work? In much the same way, people gain a lot when they explain ideas to others. This helps explain why group work is often so effective: By providing instruction to their peers, individuals gain more.

Admittedly, this approach to learning requires cognitive struggle, and we should be sure to support our emotional side. This means measuring progress and celebrating accomplishments, however small.

Relate Skills

This is the phase where we see how it all fits together. After all, we don't want to know just a single detail or procedure—we want to know how that detail or procedure interacts with other details and procedures. In short, we want to understand the underlying system of an area of expertise.

One effective technique in this regard is hypotheticals. If you're learning biology, for example, consider what would happen if living things didn't evolve over time. Same with reading literature. Want to better understand *Romeo and Juliet*? Then consider what would have happened if the young lovers had not died in the Shakespeare play. Would the Capulets and Montagues have continued their feud? These types of questions promote effective learning.

Concept maps are another powerful way to uncover connections in a body of expertise. When we graphically map relationships between knowledge and skills, we gain a lot more. Also be sure to mix it up. We get a better sense of relationships when our practice is varied. Want to learn to teach yourself code, for instance? Then mix a bit of Drupal editing with learning WordPress.

Rethink Understanding

When it comes to learning, it's easy to make mistakes, to be overconfident, and we need to review our knowledge, to reconsider our understanding. So people should ask themselves as they learn: Do I really know what I think that I know?

Other people can help a lot here, and we often learn better when we're exposed to diverse ways of thinking. As political scientist Scott Page has shown, teams are more likely to succeed if they have people with diverse experiences. So if you're aim is to

crack a pressing issue, ask someone with a different background to help. Want to solve a problem in your company? Invite your janitor into the brainstorming meeting.

At the same time, we need to reflect, and people should think about, what they've learned. Specifically, ask yourself: How has my thinking changed? How does this material all come together? What did I learn—and what do I need to learn next?

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