The Scientific Method of Practicing
With Dr. Timothy Hagen

Over my 16 years of teaching, I have had countless students who did not know how to practice effectively. Sometimes, I had been their only flute teacher, and other times, I had inherited them. This experience taught me that I was not thinking and talking about practice methodology often enough or clearly enough and that there was room to begin a conversation about it with my community of colleagues (hence, this workshop). As the ideas in The Scientific Method of Practicing began to coalesce, some (specifically those in “securing the parameters”) grew from practicing and teaching, while others came from reading about the psychology and neuroscience behind high-level performance.

The precepts of The Scientific Method of Practicing are rooted in mindfulness, which has been proven to increase effectiveness and enjoyment. We can encourage a state of mindfulness by continually questioning ourselves and reflecting upon our work as we follow four basic, scientific principles, outlined below.

- **Secure the Parameters**: Detectives secure a building before searching, and scientists establish controls. Both groups are drawing boundaries to ensure effectiveness. Likewise, effective practice contains boundaries: **clear goals and vivid images of what those goals look/sound like**. Two primary goals are **where to practice** (exact place in the music) and **what to practice** (exact nature of a problem). When possible, these should be set before practicing, though sometimes a new goal becomes clear when we are in the midst of practicing. Questions to mindfully foster boundaries:
  - Should I practice a small or large section?
  - Did my playing match the vivid image in my mind?
  - What, precisely, is the problem here?
  - Am I isolating the problem?
  - What passages line up with the fundamentals I am working on?

- **Exploit the Unexpected**: Most of us hate mistakes, but according to acclaimed pianist William Westney, **avoiding mistakes is the biggest mistake of all**. In our practice, comfort, physical freedom, expression, and mistakes should emerge. When a mistake occurs, it is the result of the body acting freely. Moreover, according to Dr. Bob Duke at The University of Texas, **mistakes prime the brain for learning**. Mistakes are therefore not bad; instead, **they are the portals to improvement**. Once made, a mistake can be consciously fixed while maintaining comfort, physical freedom, and expressive playing, causing mistake-free passages to become natural instead of forced. **The scientific method (observation, hypothesis, testing, conclusion, and repetition) is an excellent template for processing mistakes**. Questions to mindfully foster healthy processing of mistakes:
  - Am I avoiding a mistake?
  - Do I really know what/where the mistake is?
・ **Get Stuck on Repeat:** Repetition tells you if a mistake has been processed. **Aim to repeat a passage 15-20 times**, matching your vivid image. In the process, according to Dr. Bob Duke and olympian and author Matthew Syed, **habit strength will develop, and the brain will chemically transform itself into a more powerful processor.** Questions to mindfully foster effective repetition:
  o Did these performances match my goal?
  o Am I able repeat this passage without physical tension?
  o If I leave this passage now, will it haunt me later?

・ **Walk the Road to Well:** Your mindset is as important to effective practice as your actions. Recognize, as Stanford psychologist Carol Dweck has proven, that **continued effort is more important than current ability.** You will create a better practice environment if you **reject value judgments and instead celebrate your successes and use your failures to learn.** Questions to mindfully foster a healthy attitude:
  o Did I play what I intended?
  o Am I putting in enough effort? The precise kind of effort required?
  o Am I making time to celebrate successes?

It is up to each of us to decide where, when, and how to use these principles. As such, *The Scientific Method of Practicing* is not a template onto which we can simply map our practice but rather a set of logical, healthy behaviors and attitudes meant to make our practicing increasingly satisfying. In other words, enjoy putting on your musical goggles, turning your practice space into a laboratory, and experimenting with these ideas!

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