

KATA IN THE CLASSROOM

CONCEPT OVERVIEW from www.katatogrow.com

A simple pattern that helps educators teach scientific habits of mind

BACKGROUND

(1) Scientific thinking is a life skill that can help us navigate more effectively in our work lives, personal lives, politics, etc. "Science" is a term that describes both (A) a body of knowledge and (B) a process that is used to acquire knowledge. Kata in the Classroom (KiC) is about students practicing a scientific way of acquiring knowledge.

Practice Scientific Thinking
It's a great way to approach goals & problems!



- 1. **Acknowledge** that your comprehension is always incomplete and possibly wrong.
- 2. **Assume** that answers will be found by test, rather than just thinking about it.
- 3. **Appreciate** that differences between your expectation and what actually happens can be a useful source of learning!

Source: Toyota Kata

Current K-12 science education often tends to focus on science content, with only scattered practice of science process skills. We do little to show students how science actually functions and, in particular, how that process can be utilized in their daily lives.

Kata in the Classroom (KiC) focuses on students repeatedly practicing a thinking process and way of working that can be used for learning and navigating in any domain. It is not about knowledge like the periodic table of the elements, friction, the definition of absolute zero, alternating current, photosynthesis, Newton's laws, chemical equilibrium, etc. Nor is it about the artificially straightforward and prescriptive "scientific method." Instead, KiC is about developing in students the skill of thinking and reacting like a scientist.

This is a metacognitive skill, which students can apply whenever and wherever they strive for goals and try to overcome obstacles. KiC teaches students how to mobilize their rational powers to become effective problem solvers, creative team members, and informed citizens. It is science as a creative human process.

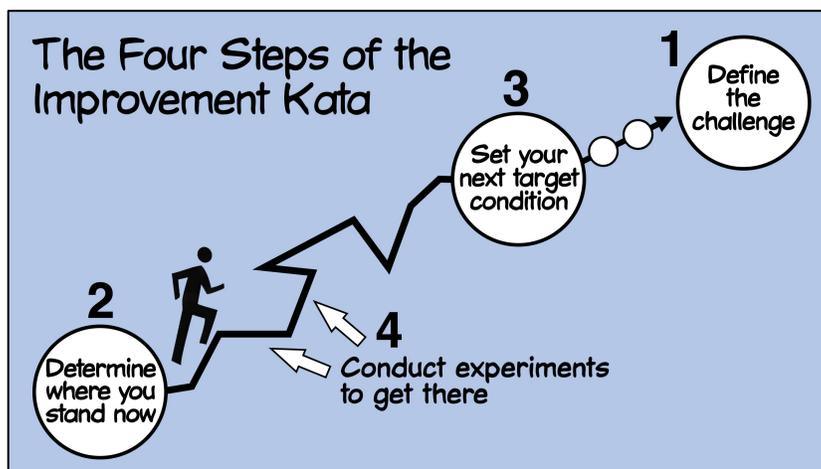
(2) Acquiring scientific thinking takes practice. Scientific thinking is not our default mode. Rather, our adult brains operate with habits – heuristics and biases – that naturally make us jump to conclusions. (It has been suggested this reflex stems from a better-safe-than-

sorry way of thinking that served early humans well.) As a result, scientific thinking is an educationally and culturally mediated skill and mindset.

Scientific reasoning and the ability to connect it to real-world situations are developed when learners are personally and repeatedly involved in hands-on, coached scientific inquiry; similar to the way we acquire skill in sports and music. This means that a factor influencing a student's ability to develop scientific thinking is the educator's approach to experiential learning. For example, by itself a project or activity with the challenge of building a tall tower out of spaghetti pasta does not necessarily impart a life skill. **The value of classroom activities and projects depends on what thinking patterns students are practicing when they engage in them.**

WHAT KATA IN THE CLASSROOM (KiC) PROVIDES

KiC makes it easy for an educator to overlay a practical, four-step scientific thinking/working pattern – called the *Improvement Kata* – onto nearly any activity or project. This turns those activities and projects into a parallel practice of scientific thinking. Ideally the educator will have students practice the scientific pattern as a way of working within different activities (or contexts) over the school year, which is a good way to develop new skills and mindset.



There are two ready-to-use KiC exercises that help the educator familiarize themselves with the Improvement Kata pattern and introduce it to their classroom. All it takes to get started is running one or both of these ready-made, fun, 50-minute hands-on exercises. The educator can then build on this start in an infinite variety of ways. After the educator runs the first exercise (KiC-1) to introduce the Improvement Kata, they can start adding its four-step pattern to whatever student exercises and assignments they prefer during the school year. Several examples are provided on the katatogrow.com website.

KiC has been used by educators around the world. Everything required to get started is available free on the katatogrow.com website.

BENEFITS

- KiC gives the educator a way to add a practical scientific-thinking practice pattern to their classroom activities and assignments. NO NEW CONTENT IS NEEDED. KiC helps the educator add scientific thinking practice to what the educator already teaches.
- Repeatedly interleaving the scientific Improvement Kata pattern as a way of working within different activities has two objectives. One is for students to succeed with the particular activity. The second is to learn how to work toward any goal in a scientific-thinking way. The second objective is what brings long-term confidence and benefits for the student.
- Over time, practicing a scientific-thinking pattern helps students develop the following skills:
 - **Scientific/Creative Thinking.** Generate & refine solutions to obstacles through experimentation.
 - **Collaboration.** Work in a team to accomplish a next goal on the way to a larger challenge.
 - **Communication.** Organize thoughts, data and findings, and share them effectively.
 - **Self-Efficacy.** Confidence in one's ability to complete a task or achieve a goal.
- KiC is not a comprehensive or complicated program to add to an educator's already overloaded schedule. Rather, it helps turn an educator's existing activities and projects into better practice of scientific thinking. Each educator can decide what activities are best for their students; locally.
- KiC is not limited to science classrooms just as application of scientific thinking is not limited to science topics. Educators in many subjects and grade levels have used the Improvement Kata pattern to add practice of scientific thinking to assignments, projects, and activities.
- KiC may also have interesting research potential, i.e., examining ways in which educators use it to integrate scientific thinking practice, and evaluating how effective they are.



Photos of students working on the KiC introductory exercise (KiC-1).