Kata in the Classroom
Instructions

THE EXPERIMENTING RECORD - *Turn Each Step Into an Experiment*

The Experimenting Record is a pencil & paper form that incorporates a scientific pattern for planning and reflecting on experiments. Students strengthen their problem-solving mindset by focusing on the next step, not the final answer, developing a sense for the iterative nature of learning and letting their thinking evolve through experimentation. This practice routine helps students learn how to deal with uncertainty by running experiments, and can easily be added to many activities and projects.

Using the Experimenting Record helps remove opinion and guesswork from the conversation, by giving students an easy way to compare yesterday's intent and today's reality with less debate. Intent and reality get compared based on evidence rather than opinion. This is an essence of scientific thinking: letting evidence guide our next step. The Experimenting Record helps students get the evidence, articulate what they learn, and plan their next step accordingly.

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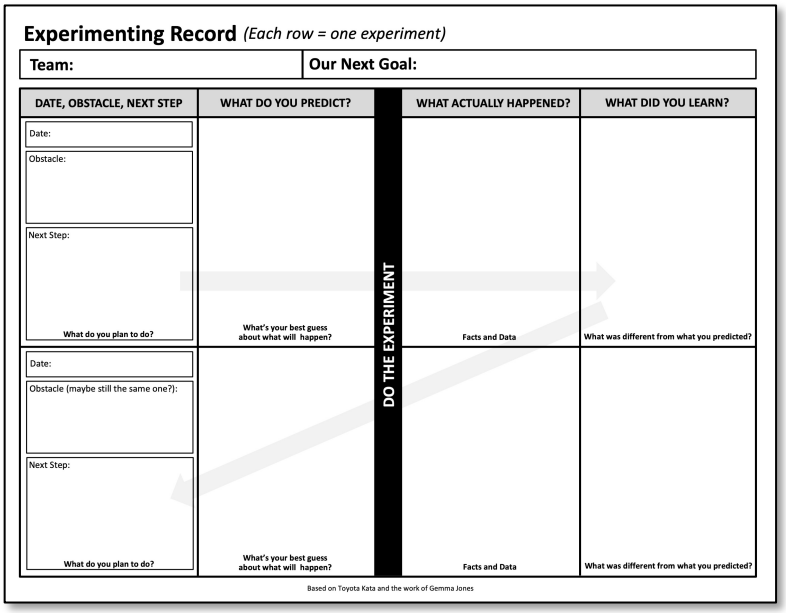
1) What is the Experimenting Record?

Among the entryway routines, the Experimenting Record is a good place to start.

The Experimenting Record is a simple but powerful pencil & paper tool to support structured experimenting. The student owns the Experimenting Record, and uses it to both plan and reflect on their next step (next experiment) as they work toward a larger goal, encouraging learning through action. Rather than focusing only on solutions, it emphasizes the process—what we plan to do next, what we expect, what happens, and what we learned.



Experimenting Record *(Each row = one experiment)*

Team:	Our Next Goal:

DATE, OBSTACLE, NEXT STEP	WHAT DO YOU PREDICT?	DO THE EXPERIMENT	WHAT ACTUALLY HAPPENED?	WHAT DID YOU LEARN?
Date: Obstacle: Next Step: What do you plan to do?	What's your best guess about what will happen?		Facts and Data	What was different from what you predicted?
Date: Obstacle (maybe still the same one?): Next Step: What do you plan to do?	What's your best guess about what will happen?		Facts and Data	What was different from what you predicted?

Based on Toyota Kata and the work of Gemma Jones

One scientific pattern embedded in this document involves comparing what we think will happen with what actually happens, and adjusting based on what we learn from the difference. Note the word, difference. Students make a prediction before taking a step, and then compare what happened to that prediction. A difference between those two things leads to learning something.

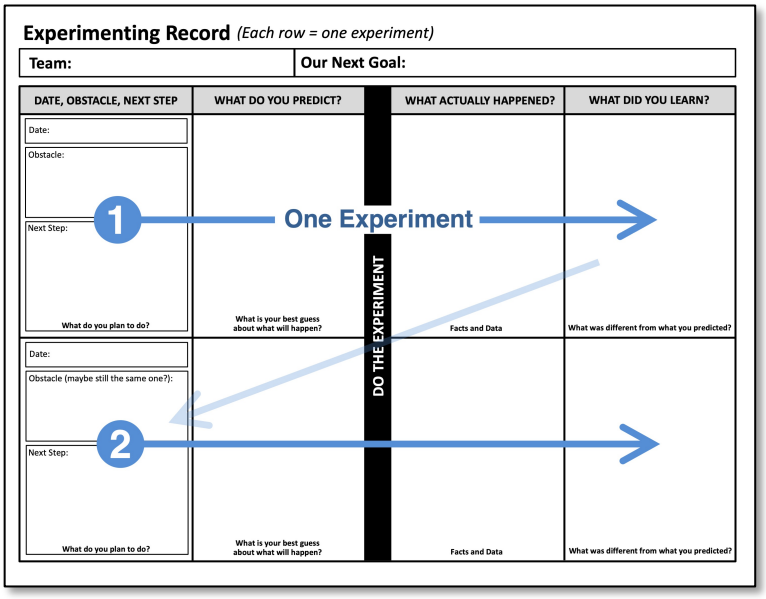
Illustration from the *Toyota Kata Practice Guide* (McGraw-Hill, 2018)

Not the word 'difference.' *Learning* by definition means something you don't yet know. When a result is as predicted, it confirms something we already thought. But when a result is different than we predicted, you may about to learn something new to you.

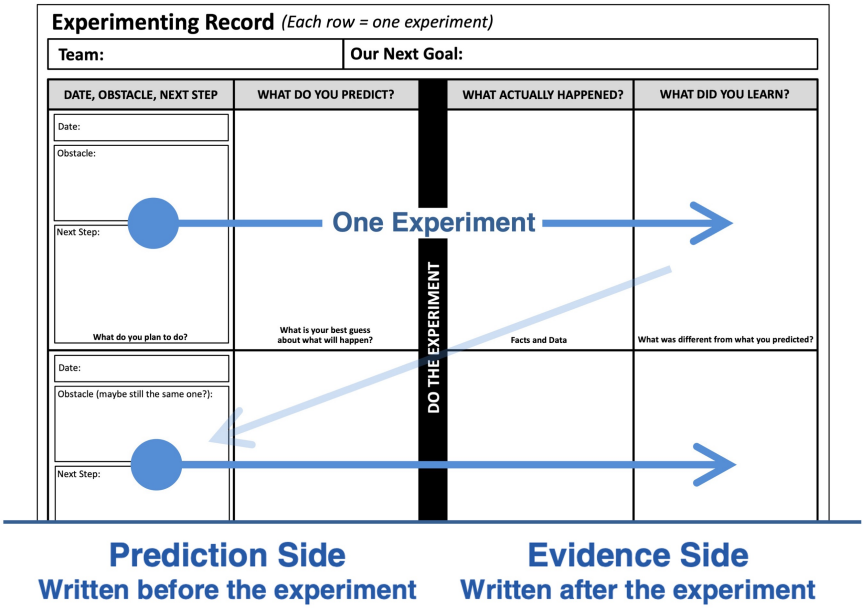
In conducting experiments, a negative result can be more useful than a positive one. With scientific thinking you're looking for facts and data that poke holes in your idea, not so much for confirmation of your idea. This may seem counterintuitive, but once students internalize it, it can make all the difference for finding pathways to their goals.

2) How to Use the Experimenting Record

Add the Experimenting Record to any activity that involves testing an idea, as a simple planning and reflection structure. Print out plenty of blank copies of the Experimenting Record document, for each student team to own and use. The Experimenting Record is read one row at a time, from left to right. Each row corresponds to one experiment (one step). Each document has space for two experiments. Note that it typically takes more than just one experiment to overcome an obstacle. You're learning what works and what doesn't.



The left side of the form is the “prediction side,” which is written before the experiment. The right side is the “evidence side,” which is written after the experiment.



Using the Experimenting Record involves four main steps, which align with the four columns on the form. Students write the following on the Experimenting Record, one step at a time:

BEFORE THE EXPERIMENT (Your plan):

1) What's the next step (experiment)?
Write down a description of the step you plan to take and test next, to move closer to your target condition. Ideally, what you learned in the last experiment leads to this next experiment. Start the description with *"We will..."* and be as specific as possible. Imagine someone else has to do the step - could they follow your instructions?

Don’t make the step too big. Tiny steps are great. Each experiment should contain one small step that can be accomplished in a short amount of time. Taking the next step quickly means you'll be able to see further quickly.

2) What do you expect (your best guess) and how will you measure it?
Make a prediction about what you think will happen. This encourages intentional thinking and sets up an opportunity to learn, whether your prediction is correct or not.

Start with “We expect that...” and be as specific as possible. Use actual numbers or clear outcomes—not just “more,” “better,” or “faster.” How will you measure whether your prediction was right or wrong?.

AFTER THE EXPERIMENT (Your reflection):

3) What actually happened?
After conducting the experiment, record the data of what actually happened. What did you measure and see? Include specific details and measurements, not just general impressions.

4) What did you learn?
Reflect on what the results tell you. What happened compared to what you expected? What was a surprise? What new understanding do you have now?

Start with "*We learned that...*" When what actually happened is different from what you expected, it often leads to useful insights and further questions. The more you practice this, the more your brain starts to enjoy discovering the unexpected.

The Power of the Prediction Side

When we define our next step toward a goal, **scientific thinking** asks us to also make a prediction, our best guess, about what will happen as a result of taking that step. The purpose of including a prediction is to create a reference point. By comparing what you expected with what actually happened, you open the door to seeing and learning something new.

That said, many people aren't used to making predictions with the goal of learning. We want learners to get more comfortable with viewing each step as an experiment rather than a guaranteed solution. Making a prediction before each step is what shifts us into the "experimenting zone."

It takes time and practice to see predictions as a setup for learning, rather than feeling like you have to make a definitive statement. Here are some ways you can help:

Reframe the purpose. Emphasize that making predictions isn't about being "right." It's about surfacing our current understanding so that any gap between expectation and reality becomes a chance to learn.

Model predictions yourself. Seeing you make predictions transparently can help make the process understandable. Express your uncertainty—and your learning—rather than only predicting when you're sure.

Reflect on past steps. Highlight examples where valuable insights came from a gap between what was expected and what occurred. Choose examples that are low stakes and show a "miss" leading to useful insights.

It's natural for learners to feel some discomfort here. Most of us grew up in cultures where being right is rewarded, so there's a fear in "being wrong." In Kata, however, the purpose of

prediction is precisely to learn from those moments when we were off. This is a mindset shift that Kata strives to nurture.

Encouraging your learners to view discomfort as a signal of growth can be powerful. You might say something like: *"The fact that this feels uncomfortable means you're right at the edge of learning, and moving into the experimenting zone!"*

Here are some ways you can invite predictions, using language that lowers the stakes and make the process feel exploratory—even playful—rather than a test of someone's knowledge:

> *"What is your best guess about what will happen?"* (This reinforces that we're at a threshold of knowledge, and the prediction is just a hypothesis.)
>
> *"Let's treat this as a little experiment. If you had to guess, what do you expect we'll see after taking this step?"*
>
> *"If it doesn't turn out the way we predict, that's actually helpful because we can learn something."*

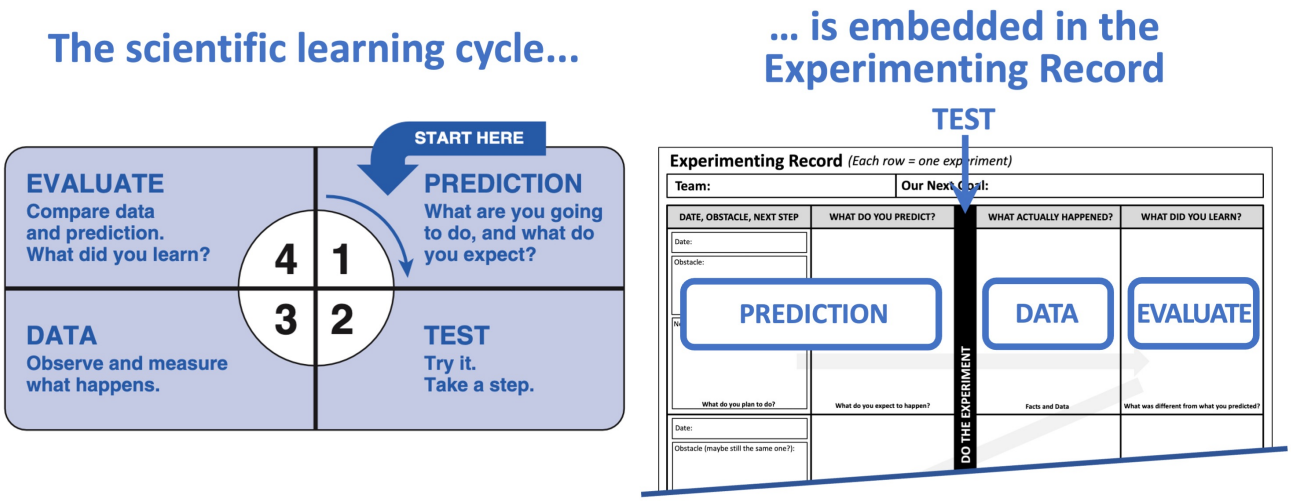
3) Why Practice Using the Experimenting Record?

Practicing with the Experimenting Record builds habits of reflective thinking, problem-solving, and resilience. It shifts the focus from "problems" to learning from obstacles. It encourages a mindset where experimentation is safe and a failed hypothesis is seen as a step toward understanding, not a setback.

There's an irony here: the discomfort we feel in the unpredictable learning zone—often enough to make us avoid it—is actually a good sign. It means we're weaving new neural paths and engaged in learning something new. Using the Experimenting Records gives students a tool, and agency, for dealing effectively with the discomfort we might experience in the learning zone.

The Experimenting Record supports data-informed decision-making and helps teams stay focused on goals while remaining flexible in how they get there. It models a kind of scientific thinking and perseverance that can be instilled across subject areas. By using the Experimenting Record we encourage learning through testing. observation and measurement, not assumption. It's regular use helps slow down our thinking and show us when we are jumping to a conclusion or being swayed by biases and assumptions.

The Experimenting Record isn't just a form—it's a practice. When used consistently, it makes scientific thinking a natural part of the teaching and learning rhythm. It provides a structured way to practice and teach the scientific learning cycle for pursuing goals. The **prediction → test → data → evaluate** cycle embedded in the Experimenting Record is a well-known scientific pattern that your students can apply throughout their lives, to work through uncertainty and achieve goals. The scientific learning cycle is the soul of improvement, adaptiveness, and innovation, and is made practical by embodying it in the Experimenting Record.



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SOME NOTES & TIPS FOR PRACTICE IN YOUR CLASSROOM:

• You can start any interaction with a student team by having them walk you through the last two (most recent) rows of their Experimenting Record. If you are already using the Coaching/Reflection Questions, those questions and the Experimenting Record can be used together. (The Coaching/Reflection questions are available on the KiC website.)

The experimenting record is owned by the student and is their tool for communicating what they are doing and learning. The four columns in the Experimenting Record correspond with the Coaching/Reflection questions. As the educator asks those questions, the student responds by pointing to and reading what's written in their experimenting record. This helps the educator see how the student is thinking, and to give appropriate feedback.

• One of the key things that distinguishes scientific thinking from simply “doing things” is the practice of making predictions. When we take action and deliberately predict the outcome, we create an opportunity to step outside our assumptions and consciously examine the results. This act of making an intentional prediction sets us up to learn. Why? Because rather than passively waiting to notice if something seems unusual, we are actively looking for it. In fact, any action we take is really a hypothesis — we are acting with the intention or expectation of a particular outcome.

• At first you'll have to guide the students through how to use the Experimenting Record. It may take a while before they get it right. It will take even more time for the students to internalize it's pattern and make it a habit.

• At first this practice can feel a bit clunky. It can be a bit annoying to have to slow things down. You can start to wonder if it is worth it... IT IS. Learning to pause and articulate our expectation, consciously, is a really great way to be more mindful and deliberate about the things we do. Learning to pause and actively reflect, and then learn, is a skill.

• To facilitate learning from an experiment, writing things down is important. Only then can you objectively compare plan and reality.

• One thing new users may struggle with is adding enough detail in their next step. This can make it harder to be specific about the expectation, which then, in turn, makes it harder to identify learnings. The ‘Next Step’ column is essentially instructions to yourself.

• Encourage keeping the 'next steps' small and frequent, as repetition is more important for developing habits, than taking big leaps. Don’t overthink it, test it.

• One tip to help you fill in the details...ask yourself ‘and what else?’ for each column. What else will you do? What else do you expect? What else actually happened? What else did you learn? By asking yourself ‘and what else?’ you go a bit deeper, you stretch yourself a little more. The first answer to a question is rarely the full, or best, answer.)

• As you review an Experimenting Record, look for logical links, where what was learned in one experiment leads to the next experiment. Most of the steps (experiments) students take should not be randomly selected, but come out of the “chain of experiments", where what they learn sets the stage for what they need to learn next. Otherwise you're "just trying stuff," rather than engaging in a 'chain of learning.' Once they get going, scientific thinkers let the results of their experiments, not their preconceived ideas and assumptions, show them what to work on next. Students are building a path to their target condition, link-by-link.

• Generally, you don’t reach a challenging goal through a single experiment, nor in a straight line. Many experiments will have outcomes other than what was expected and cause students to revise their ideas. You take one step, encounter new information, evaluate it, maybe revise your understanding based on what you learned, and then plan the next step toward the target condition accordingly. By repeating this—as rapidly as possible—you are simultaneously investigating and moving forward, because your experiments help you see what you need to do to get closer to your target condition. Experiments allow you to be action-oriented, but without too quickly jumping to solutions.

• Not every step will bring measurable progress toward the goal. Some steps do and some don’t. Keep in mind it is finally achieving the target condition that brings the benefit, not the individual steps.

• Encourage students to keep their Experimenting Records in a binder or folder, organized in date order, so that it is easy to look back and review the details and learnings.

• Once you become familiar with the document, feel free to modify the terminology to suit your classroom, but do maintain the 4-phase pattern.

Checklist for Evaluating the Results of an Experiment

❑ To check the results of an experiment, you should observe and measure several cycles. One data point is rarely enough.

❑ You can make a run chart with the data from your experiment. It can also help to stratify your data by time, person, item, machine, etc. Avoid using averages.

❑ Evaluation has two phases. Be sure to maintain a clear distinction between recording the facts or data and interpreting the results:

1. Compiling the facts and data from the experiment. (This is column 3 in the Experimenting Record.)
2. Forming conclusions based on interpreting the facts and data. (This is column 4 in the Experimenting Record.)

❑ There are several possible outcomes of an experiment, for instance:

- The results support your prediction
- The results do not support your prediction. (Interesting!)
- The results came close, and you can see what you have to try next.
- You can't tell and need more information.

❑ It is not unusual for more than 50 percent of your experiments to have results other than what you expected. The benefit you get is learning what you need to focus on and do to overcome the obstacle on the way to your target condition.

❑ It's a good idea to also reflect on what you could have done differently to improve your experimental procedure, so you can become an even better experimenter. The educator can ask, "What did you learn about how you were working?" "What do you want to do differently next time?" "What skills do you want to work on next?"