Adaptive Expertise Thinking

Idea In Short

Expertise usually means doing familiar things quickly and without error. Yet the people who matter most in a crisis, a new market, or a failed process are those who can also invent a new approach when the old one stops working. Giyoo Hatano and Kayoko Inagaki drew this line between routine experts and adaptive experts in the 1980s, and later work has tested it in classrooms, hospitals, research labs, and outdoor settings. This article explains the difference, the skills behind it, and how leaders can develop experts who stay accurate on routine tasks while remaining curious, flexible, and ready to change their methods.

Two sushi chefs work side by side. One makes every piece perfectly, in the same few styles, night after night. The other makes the classics well and also creates new menus when ingredients change. Both are experts, and a customer would struggle to tell them apart on a quiet Tuesday. A supplier failure on Friday would show the difference at once.

Two kinds of expert

The idea comes from Giyoo Hatano and Kayoko Inagaki. An encyclopedia summary explains that they described routine expertise, which involves mastering procedures so as to become highly efficient and accurate, and adaptive expertise, which requires conceptual understanding that allows the expert to adjust. The entry uses the two sushi chefs as an illustration.1

The same entry stresses that the split is not a strict dichotomy. Expertise can be viewed as a continuum, with practitioners ranging from routinely skilled to innovatively competent, or from artisans to virtuosos. The framing helps managers, because it avoids sorting people into two boxes.

Routine expertise is not a lesser form. It delivers reliability, safety, and speed, and organizations depend on it. The point is that reliability alone may fail when the situation

shifts.

What lies underneath

Researchers have tried to name the parts. A study of expert outdoor instructors describes adaptive expertise as having three components: domain-specific skills, metacognitive skills, and innovative skills. The authors note that domain-specific and metacognitive skills are shared between adaptive and routine expertise.2

That structure has a practical meaning. The adaptive expert starts with strong fundamentals, so routine mastery is the base. Metacognition, which is the habit of monitoring and steering your own thinking, then lets the expert notice when a method no longer fits. Innovative skill supplies the new method.

A cognitive science site contrasts two schools of thought. Ericsson's emphasis on repeated, deliberate practice suits routine expertise well, while Hatano and Inagaki described people who could perform with understanding, which pushes beyond repetition.3

Evidence from schools

Education research offers measurable results. A study of multidigit arithmetic found that adaptive experts used flexible strategies in at least one third of all tasks, while routine experts never used them. In mathematics, the adaptive group outperformed the routine group, and in reading the gap was smaller but still positive.4

Children who master one algorithm can compute reliably, but a child who understands why the algorithm works can choose a faster path for a given problem. The same logic applies in a finance team that knows how a model works, rather than only where to enter data.

Be careful about stretching school results into the office. The setting differs, and flexible strategy use in arithmetic is not the same as strategic innovation in a firm. Still, the pattern fits the theory, and it suggests that understanding pays off.

Evidence from teams

Adaptive expertise is not only individual. A study of a large research team at NASA tracked

behavioral data over time and found that both routine and adaptive expertise increased significantly, while novelty fluctuated randomly. The authors argue that their measure of adaptive expertise is distinct from both novelty and routine expertise.5

This finding matters because it separates adaptation from mere novelty. A team can generate new ideas at random and still fail to adapt. Adaptive expertise means reusing what works, recombining it, and building new procedures in a deliberate way.

Leaders should therefore ask a sharper question than "Are we innovative?" They should ask whether the team can reuse what it knows when the context changes, and whether it can retire methods that no longer fit.

The risks of routine mastery

Efficiency can become a trap. Highly practiced routines run on autopilot, and autopilot hides changes in the environment. Imagine a claims team that processes cases in minutes may not notice that a new fraud pattern has appeared, because the routine never asks.

Success also breeds attachment. People who have been rewarded for a method defend it, and they treat questions as threats. Leaders must separate respect for the method from loyalty to it.

A balanced culture rewards both. It celebrates accuracy and speed on regular work, and it also rewards the person who spots a failing assumption early.

Evidence from medicine

Medical education has taken up the concept because clinicians face both routine cases and surprises. A Harvard thesis on plastic surgery describes adaptive expertise as the ability to solve problems efficiently in routine scenarios while also innovating when faced with the unexpected, and it studies how surgeons develop, maintain, and teach that ability.6

The setting highlights a theme that applies to business too. Experts do not only perform adaptively. They also teach and model it, and the way senior people talk about uncertainty influences whether juniors learn to treat it as normal.

A senior leader who says "I am not sure, here is how I will test it" teaches more about adaptation than a polished lecture. Juniors watch how experts handle the edge of what they know, and they copy it.

Building adaptive experts

Teach concepts alongside procedures. When people learn a step, explain why it exists and what it assumes. Then ask them to predict what would break if an assumption changed.

Vary the problems. Practice on cases that differ in size, constraint, and context, so that learners must decide which tools apply. Add reflection time after each case, and ask what they would do differently.

Create safe stretch tasks. Give experts problems with unclear answers, and protect them from penalty if the first attempt fails. Pair them with colleagues from other fields, since outside views challenge habits.

A hypothetical example

Imagine a hypothetical hospital pharmacy where technicians prepare standard medication orders quickly and without error. When a supplier recalls a common ingredient, the routine breaks down, and orders back up. The pharmacy lead creates a monthly drill in which a key input is removed and the team must find a safe workaround, with a pharmacist reviewing the plan.

After a few drills, technicians start to explain why each step exists, and they suggest alternatives earlier. When a real shortage occurs, the team adapts within a day. The example is invented, but it shows how deliberate practice with change builds flexibility without sacrificing safety.

Hiring and promotion signals

Selection systems often reward only the first kind of expertise. Interviews that test recall of known procedures find routine experts, and promotion criteria that reward error-free output discourage experiments. Add questions about the last time a method failed, what the candidate did, and what they changed afterward.

Look for evidence of conceptual understanding too. Ask candidates to explain why a standard method works, and to describe when they would not use it. Strong answers show an understanding of assumptions and limits, which is the root of flexible practice.

Cautions

Do not use adaptive expertise as a reason to skip rules. In safety-critical work, deviations need review, and innovation must pass checks. The aim is flexible judgment within boundaries, and every change should leave a record that others can review and learn from.

Avoid rewarding novelty for its own sake. A new method is only better if it works, so test changes and keep records.

Finally, remember that measures remain imperfect. The research uses different tools in different settings, and findings from schools or labs may not carry over fully. Treat the framework as a guide for observation and development, and check it against what you see in your own organization.

- 1Adaptive expertise
- 2Adaptive expertise in outdoor instruction
- 3What is expertise?
- 4Routine and adaptive experts: individual characteristics and their impact on multidigit arithmetic strategy flexibility and mathematics achievement
- 5Reuse and recycle: the development of adaptive expertise, routine expertise, and novelty in a large research team
- 6Adaptive expertise in plastic surgery: the plastic surgeon experience of developing, maintaining and teaching adaptive expertise

Summary

Adaptive expertise thinking pairs speed and accuracy on familiar work with the ability to build new procedures when conditions change. It rests on deep conceptual understanding, metacognitive skill, and a willingness to innovate. Studies in education, medicine, and research teams suggest that these abilities can be observed and developed. Leaders should

protect time for routine mastery and also create regular chances to face unfamiliar problems with support. Choose one process your team performs flawlessly, and ask what would happen if a key input changed tomorrow. Then run a small drill to find out, and record what the team learned from the exercise.