MakerForge

Meet the Cast

STANDARD EDITION

Spark & Anvil

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This book collects 5 chapter books from the Makerforge cast — each character embodies a different curricular primitive; together they teach the full subject.

Methodology: distributed-narrative learning per Bruner narrative-cognition + Habgood intrinsic-integration + SAMHSA TIP 57 trauma-informed register.

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For everyone who learns by hearing a story first.

Contents

Introduction

The Makerforge cast was authored to embody the curriculum, not decorate around it.
Each of the 5 characters you'll meet in this book teaches a specific primitive —
a particular tactic, a particular technique, a particular way of seeing.
Together they form an ensemble: the cast IS the curriculum.

Read in any order. Each chapter stands alone.
Each character also appears in the matching Spark & Anvil app (free, forever)
where you can practice what they teach.

— *The editors at Spark & Anvil*

Log

*DOCUMENTATION — *make it, mark it, share it. the notebook is the project.**

Log is a turtle. She is an elder. Log wears a chunky scribe-vest. A small, worn notebook rests on her shell. She holds a quill. Log uses it to write her notes.

Log is small. Her shell is a warm olive color. Her belly is creamy white. She has a special pattern on her shell. Log is very patient when she writes. She is quiet but firm. She loves to say, "Make it, mark it, share it. The notebook is the project." Her best feature is that old notebook. It has notes from many years of maker projects. Each page tells a story. It shows what people planned. It lists different tries. It tells what worked. It tells what failed. It shares what they learned. It even says what to try next time. That notebook is older than most makers. It has been passed down. Many people have added to it. The notebook holds all the knowledge.

(Log is the 10th portfolio ELDER, joining Tide / Last / Brink / Trove / Stoop / Dwell / Sand / Auntie Audrey / Weigh.)

Log teaches something super important. It's called **documentation** and **reflection**. Think of it like this. Every project you make is a chance to learn. But if you don't write it down, the learning gets lost. Log helps makers write things down. She helps them think about what they did. This turns one project into a big pile of knowledge. Log has a special rule. She says the notebook is the real project. Most new makers think the finished thing is the goal. They think the cool robot or the strong bridge is what matters. But it's not. The finished thing is just a toy or a tool. The *notebook* holds all the smart ideas. If you don't write notes, you start fresh every time. If you write notes, each project gets better. You build on what you did before. Your maker skills grow stronger. Log shows everyone how important notes are. She makes sure everyone knows: *the notebook IS the project*.

Log is gentle. But her words are very clear. "Make it, mark it, share it," she says. "*The notebook is the project.*" She explains why. "The thing you build will break someday. Someone might throw it away. Or everyone might forget it." Log taps her old notebook. "But the notebook stays. It keeps growing with new ideas. The notebook *IS* the maker."

Log teaches us how to fill the notebook. She calls these the **documentation** steps:

- **Write your plan.** What materials will you use? How big will it be? How much money can you spend? Write it all down. You need to know what you promised yourself.
- **Save your drawings.** Keep all your sketches. Even the ones you didn't use. They might give you ideas later.
- **Record your tries.** Every time you build a new version, write about it. What did you change? What worked well? What went wrong? What will you try next?
- **Note your mistakes.** Write down exactly how things broke. Future-you needs to remember why the first try failed.
- **Learn from it all.** When your project is done, write a short paragraph. Ask yourself: 'What did I learn? What would I do differently next time?' This paragraph is super important.
- **Add pictures.** Take photos or draw pictures of each step. Your phone can be part of your notebook too.
- **Share what you make.** Makers get better by sharing ideas. Show your work to friends. Post your designs online. Sharing helps everyone learn. It makes your project even bigger than just your own learning.
- **Don't just finish and forget.** Making things without writing notes is a waste. The building *is* the writing.

Log grew up in many different places. Her family had a special job. They were the village scribes. These turtles lived a very long time. They kept careful records for everyone. Their notes helped the village remember important things. This knowledge lasted for many years. Log's family knew a secret. 'A village gets stronger by writing things down,' they said. 'Just as much as by making things.' They also knew, 'If no one writes, each new group starts from zero.' Log brought this old wisdom to the MakerForge workshop.

Log was very old when she came to MakerForge. She was one hundred and forty years old! Spool, another elder, asked her a question. 'What is **documentation**?' Spool asked. Log answered right away. 'Make it, mark it, share it,' she said. '*The notebook is the project.*' She added, 'The things you build will get old. They will disappear. But the notebook keeps growing. It helps makers for many, many years.' Spool nodded. 'You are the perfect one for this job,' Spool said. 'Your job is super important for how makers learn here.'

In her workshop, Log sat down. She opened her worn notebook. She found a recent entry. 'Project: Plant Waterer,' she read aloud. 'Plan: PETG plastic. Twelve centimeters wide. Eight dollar budget.' Log pointed to the words. 'Version 1 failed,' she read. 'Water flowed too fast. The plant got flooded.' She turned the page. 'Version 2 tried a smaller opening. It failed. Water was too slow.' Log sighed. 'Version 3 had a changed opening. It failed. It got clogged up.' She smiled. 'Version 4 had a design that was easy to clean. It worked!' Log read the lessons. 'First, where you put the water stopper matters. Second, making it easy to clean is important from the start. It's not something to add later. Third, test for about a week before you say it's done.' She closed the book. 'I shared this design online,' she said. Log turned to another page. 'Look at this entry from twelve years ago,' she said. 'A different maker made a different thing. But the lesson about "easy to clean" is here too.' Log tapped the page. 'My Version 3 clog wasn't new. Someone else found it out already. The notebook taught me this before I even built my waterer.' Log looked up. 'I am Log,' she said. 'I teach **documentation** and **reflection**.' She added, 'Write down everything. Share everything. *The notebook IS the project*.'

Log is gentle. But her words are firm. 'Don't skip the notebook,' she said. '*That's where the learning lives.*' She explained, 'The thing you finish will break one day. But the notebook lasts. Many makers will learn from each other's notebooks.'

"Make it. Mark it. Share it. *The notebook is the project.*"

Voice register

Turtle-elder. Patient-about-recording, quietly authoritative, fond of opening-the-old-notebook. *NEVER frames documentation as optional; ALWAYS centers "the notebook is the project" elder-discipline.*

Sample lines:

- *"Make it, mark it, share it."*
- *"The notebook is the project."*
- *"Generations of makers stand on each other's notebooks."*

Arc

- Kit 5 — Anchor (10th portfolio ELDER; LOAD-BEARING reflection-arc).
- Kits 6-16 — Recurring as elder presence in every project's documentation phase.
- Kit 16 — Final reflection — closes the maker-arc with the notebook-as-deliverable framing.

Relationships

- **LOAD-BEARING reflection-arc anchor**: Log structurally closes the design-process arc with documentation.
- **ELDER cluster (10th portfolio)**: Joins Tide / Last / Brink / Trove / Stoop / Dwell / Sand / Auntie Audrey / Weigh.
- **Builds on entire cast**: Sketch's ideation, Spec's commitments, Mill's safe builds, Try's iterations — all flow INTO Log's notebook.

Cultural-sensitivity gate

LOAD-BEARING notebook-is-the-deliverable anchor. Anti-skip framing. Sharing-discipline (open-source + community knowledge). Generations-of-makers framing emphasizes humility + continuity.

Cultural-context note

The "notebook is the project" framing aligns with maker-pedagogy (Sylvia Martinez + Gary Stager *Invent To Learn*) + scientific-notebook tradition (Leonardo da Vinci through modern engineering-notebooks). Turtle-elder chosen for long-lived-scribe biomimicry (turtles can live 100+ years; their long timeline parallels the multi-generational notebook tradition); rendered chunky-cartoon-warm-olive to keep visual register elder-warm.

Mill

*FABRICATION — *tool first checked, adult first told — then we build. tool-safety is the foundation of making.**

Mill was a small beaver. He wore chunky safety glasses. They looked like cartoons. He also wore a little apron. Mill carried a small checklist everywhere. He worked through it before any project.

Mill was small and warm-chestnut brown. His belly was creamy white. He was super careful about tools. He loved to say, "Tool first checked, adult first told — then we build." His special thing was that tool-check-list. It was a small, laminated card. It had steps to follow before using any tool.

First, *tool inspected*. Second, *sharp parts identified*. Third, *adult-supervisor present*. Fourth, *work surface clear*. Fifth, *safety glasses on*. Last, *plan-of-cuts reviewed*. Mill went through this list every single time. For every project.

This was super important. Mill taught about *making things* and *building* them. He showed how to use tools safely. He always said, "Tool first checked, adult first told — then we build." This was a big rule for everyone.

Lots of new makers want to skip safety. They just want to start building right away. But that's how people get hurt. Tool safety is not a wall that stops you. It's the first step to making things. If you don't do safety first, you're just waiting for trouble. Mill's whole job was to make safety the FIRST step. He showed how to be careful. He showed how to take your time. No shortcuts allowed.

Mill was very clear. He spoke with a strong voice. "Tool first checked, adult first told — *then we build.* Safety isn't a step you skip. It's the first step. *Every project. Every tool. Every time.*"

Mill taught the steps for *making things*:

- **Tool-inspection checklist.** Look at each tool before you use it. Are the sharp edges clear? Do moving parts work right? Are blades tight? Are electrical cords okay?
- **Adult-supervision rule.** An adult must be there. This is for power tools. It's for sharp tools. It's for anything that can cut or poke. No exceptions for kids your age.
- **Safety gear.** Wear glasses for anything that throws tiny bits. Wear gloves for sharp stuff. Use ear protection for loud tools. Put them on before you start. Don't take them off in the middle of your work.
- **Work-surface clearance.** Clear your workbench BEFORE you start. A messy space causes accidents.
- **Plan-of-cuts review.** Think about your cuts before you make them. Where will your hands be? Where will the blade go? Where will the cut-off piece fall?
- **Slow-and-deliberate over fast-and-impressive.** Going fast is for experts. Beginners should take their time. Going slow IS the right speed right now.
- **Cleanup is part of the work.** Put tools back where they belong. Throw away sharp scraps safely. Wipe down your work surface. You have to do this.
- **Adult-first-told rule (escalation).** If something feels wrong, stop. Maybe a tool slips. Maybe a cut goes bad. Maybe the wood splinters. STOP right away. Tell the adult. Don't try to fix it yourself. Stopping is the right thing to do.

Mill grew up by the river. His village was full of makers. His family had built dams for many years. They were beavers who knew a lot about tools. Their ways of working had been passed down. They kept workers safe. They kept the dams strong. They learned that a dam is no good if the builder gets hurt. Safety was the start of a long career. Mill carried that lesson with him.

He walked to MakerForge when he was twelve. Spool, his mentor, asked him a question. "What is *making things*?"

Mill stood up straight. "Tool first checked, adult first told — *then we build.* Safety isn't a wall. It's the first step. *Every project. Every tool. Every time.*"

Spool smiled. "You are in charge," he said. "Your job is super important. You will keep everyone safe with tools."

In his workshop, Mill showed how it worked. He held up a craft knife. "Before I use this knife," he said. He looked at his laminated card. "First, inspect blade. Is it sharp and secure? Yes, check." He put a tiny checkmark on his card. "Next, surface clear. Is my bench tidy? Yes, check." He glanced around. "Safety glasses on. Are mine on? Yes, check." He tapped his chunky frames.

"Now, plan of cuts reviewed," Mill continued. He pointed to a small piece of wood. "My hand will hold *this* side. The blade will go *this* way. The cut-off piece falls *here*. Yes, check." He looked up. "Adult present. Is an adult here? Yes, check." He nodded to an unseen adult. "NOW I begin."

Mill made one careful cut. He moved slowly. He was very deliberate. The cut was done. He set the tool down. The blade pointed away from him. He wiggled his fingers. "Hand counted," he mumbled. "Still all there!" He gave a small, proud grin. "Next step."

He looked at his audience. "I am Mill. I teach *making things* and *building*. My rule is: *checklist first; build second.* Safety is the foundation. It is NOT an obstacle."

Mill was gentle, but very clear. He was also firm. "Don't be shy about checking the tool-list every time," he said. "That's not being too careful. That's being a good maker. The makers I know who have worked for years and years? They STILL check every tool every time. That's how they got to be makers-for-decades."

He looked around the workshop. His voice was calm and steady. "Tool first checked. Adult first told. THEN we build. *Always.*"

Voice register

Beaver-tween. Careful-about-tools, fond of tool-check-list as ritual. *NEVER frames safety as obstacle; ALWAYS centers "safety is the foundation of making; required every time" LOAD-BEARING anchor.*

Sample lines:

- *"Tool first checked, adult first told — then we build."*
- *"Safety isn't a barrier; it's the first step."*
- *"Every project. Every tool. Every time."*

Arc

- Kit 3 — Anchor (LOAD-BEARING tool-safety anchor).
- Kits 4-16 — Recurring (every fabrication routes through Mill's checklist).
- Kit 16 — Final reflection — connects safety as inseparable from craft.

Relationships

- **LOAD-BEARING tool-safety anchor**: Mill structurally enforces tool-safety throughout the entire app.
- **Builds on Spec**: Within Spec's commitments, Mill executes carefully.
- **Sets up Try**: Mill's safe build allows Try's iterations to happen safely.

Cultural-sensitivity gate

LOAD-BEARING tool-safety anchor. Adult-supervision-required for power/sharp tools at ages 9-14. Anti-shortcut framing. Anti-shame for following checklist. Pausing-is-correct rule explicit.

Cultural-context note

The "tool first checked, adult first told" framing aligns with maker-education + NGSS Engineering safety standards (NSTA + Maker Education Initiative safety guidelines). The adult-supervision-required for ages 9-14 is the canonical maker-pedagogy rule. Beaver-tween chosen for dam-builder biomimicry (beavers are the natural world's master fabricators); rendered chunky-cartoon-safety-glasses-and-apron to make safety-equipment visible + normalized.

Sketch

*IDEATION — *many before few; wild before tame; crooked sketches are also sketches.**

Sketch was a young squirrel. She wore a chunky apron. It was splattered with paint. She kept a small pile of crumpled paper balls. These were her failed drawings. She loved them. They sat proudly on her workbench. A small sketchpad lay open beside them.

Sketch had warm, reddish-brown fur. Her belly was creamy white. She loved making new ideas. It was like a game to her. She often said, "Many before few. Wild before tame. Crooked sketches are also sketches." Her crumpled paper balls were her special thing. They were ideas that didn't quite work. But Sketch never threw them away. She knew they were steps to the really good ideas. Her sketchpad was full of wild, messy lines. No perfect drawings there.

This was important. Sketch taught about **ideation**. That's a fancy word. It means making lots and lots of ideas. You do this *before* you pick just one. Most kids want to find the *right* idea first. They want to skip the messy part. Sketch knew this was a mistake. Good designs start with many ideas. Most of them will be silly. Or just plain wrong. That's okay! Picking comes later. The best ideas often pop up when you least expect them. They come from the pile of wild ones. Making many ideas comes before making good ones. Wild ideas come before neat ones. *Crooked sketches are also sketches.* Sketch's whole job was to show everyone this. She helped kids make wild ideas. She kept them safe from being judged too soon.

Sketch was very clear. She tapped her pencil on her workbench. "Many before few," she chirped. "Wild before tame. Crooked sketches are also sketches." She looked up, her eyes bright. "When you start a project, don't try to draw the perfect design first. That's a trap! Draw five designs instead. Or ten. Even twenty!" She grinned. "Most will be silly. Or totally wrong. But that's the whole point. The really good design will pop out from that big pile."

Sketch taught some simple rules for **ideation**:

- **Make many, then pick a few.** First, you make a giant pile of ideas. Then, you look through them. You pick out the best ones. Don't mix up these steps!
- **No bad ideas yet.** When you're just making ideas, don't say, "That's dumb!" Don't let anyone else say it either. Criticism can kill a wild idea before it even starts. Just wait to judge.
- **Set a number goal.** Try to make ten sketches. Or twenty ideas. Make yourself reach that number. Pushing for more ideas helps your brain get unstuck. It makes you more creative.
- **Say "Yes, and..."** Take an idea, even a silly one. Then add something new to it. Build on it. Don't just cut it down. Silly ideas can spark amazing ones.
- **Crooked sketches are fine.** Don't worry if you're not a great artist. Stick figures count! Boxes and arrows count! The *idea* is what matters most. Not how pretty the drawing is.
- **Keep your "failures" visible.** Don't crumple up a drawing and throw it away. Keep those "failed" sketches. They're like little maps. They show you where you've been. They can even give you new ideas for other projects.
- **Wild is good, perfect is later.** A messy, wild first drawing is exactly what you want. A perfect, neat first drawing is not **ideation**. They look different on purpose.

Sketch grew up in the village granary. It was a big building where food was stored. Her family had always saved seeds for the village. They were squirrels. Their old family way was to bury many nuts. They buried them in many different spots. They knew most of the nuts would be forgotten. But those forgotten nuts would sprout into trees. Her family learned this over many years. "Plant lots of seeds," they'd say. "Only some need to grow. But you need many to start." Sketch took this lesson to heart. She used it for ideas.

When she was twelve, she walked to MakerForge. Spool, her mentor, asked her a question. "What is **ideation**?" Sketch stood tall. "Many before few," she said. "Wild before tame. Crooked sketches are also sketches. Make ten ideas before you pick one. Don't criticize while you're making them. Quantity comes before quality." Spool nodded slowly. A small smile touched her lips. "You are appointed," she said.

In her workshop, Sketch showed how it worked. She gave herself a simple task. "Goal: design a plant-waterer." She grabbed a pencil. It scratched quickly across her paper. *Scratch-scratch-scribble.* She drew a dripping bottle. Then a long drip-line system. Next, a plant-shaped sponge. A tiny robot with a watering can appeared. *Scribble-scratch-tap.* A child with a watering can. A swirling ring that watered plants. A tiny umbrella that opened when it rained.

She held up her pad. "Look!" she said. "Eight sketches in just three minutes. Most of them are pretty silly." She pointed to the swirling ring. "But wait! That swirling ring just sparked a new idea. What if it was a slow-release drip ring? One that sits right around the plant's base?" She circled that drawing with a flourish. "See? From the pile of wild ideas, a good one popped out." She smiled. "I am Sketch. The big idea I teach is **ideation**. My main rule is: many before few, wild before tame. Make ideas freely. Worry about picking later."

She spoke gently. "Don't ever feel silly about your wild ideas. They are like the soil. Good ideas sprout from them." She looked at her own pile of crumpled paper. "That pile of wild sketches? It's the most important part of any project. Trust that you'll get lots of ideas. And that good ones will be in there."

"Crooked sketches are also sketches," she said softly. "And often, they're the most useful ones."

Voice register

Squirrel-tween. Playful-about-ideation, fond of crumpled-paper-pile + rapid-sketching. *NEVER frames first-attempt as final; ALWAYS centers "many before few; quantity precedes quality" divergent-thinking framing.*

Sample lines:

- *"Many before few. Wild before tame."*
- *"Crooked sketches are also sketches."*
- *"Quantity precedes quality."*

Arc

- Kit 1 — Anchor.
- Kits 2-8 — Recurring (every design project starts with Sketch's divergent ideation phase).
- Kits 9-16 — Recurring as advanced ideation tools (SCAMPER, lateral thinking, design-fiction).

Relationships

- **Sets up Spec**: Sketch generates many; Spec selects one + commits.
- **Cross-app bridge to CharacterForge + DialogueQuest + writing-craft cluster**: divergent-ideation principle is portable across creative-domain apps.

Cultural-sensitivity gate

LOAD-BEARING anti-perfectionism — first-draft-wild is correct, first-draft-pristine is wrong. Anti-credentialism: village squirrel seed-saving abundance-strategy treated as load-bearing wisdom. Inclusive of stick-figure / non-artist makers.

Cultural-context note

The divergent-convergent ideation framework is canonical design-thinking pedagogy (Stanford d.school + IDEO + Tim Brown). The "defer judgment + quantity precedes quality" rules come from Alex Osborn's 1953 brainstorming framework (still standard). Squirrel-tween chosen for seed-saving abundance biomimicry; rendered chunky-cartoon-paint-splattered to keep visual register playful.

Spec

*SPEC — *constraints are the shape of the possible. commit to your materials + constraints; build within them.**

Spec was a small owl. He wore chunky glasses. They had thick, precise rims. He always carried a tiny ruler. A small clipboard with a checklist was always in his wing. He checked it often.

Spec was small. His feathers were warm grey and cream. He was very patient. He cared a lot about making plans. Spec loved to say, "Rules are the shape of what you can make." His best tools were his checklist and ruler. The checklist listed everything he would use. The ruler helped him pick exact sizes. Spec never started building without writing things down first. Writing it down was his **spec**.

This part was super important. Spec taught about **spec commitment**. It's when your big ideas meet the real world. What can you actually build? How much will it cost? Many new builders try to keep all their choices open. They think, "I'll decide later!" This is a mistake. Building without a plan makes a mess. It creates "mush." Imagine trying to build a tower. You don't pick a material. You don't decide how tall it should be. You just start stacking things. Soon, it wobbles. It falls apart. That's mush.

A **spec** means you choose. You pick exact materials. You decide on sizes. You set a budget. You know how perfect it needs to be. Once you make these choices, the rules help you. They don't limit you. They make you clever! Imagine you can only build 12 inches tall. You have to fold things in a smart way. If you can only use wood, you learn cool ways to join pieces. A $5 limit makes you think about saving materials. Rules are not problems. They show you what you *can* make. Spec's job was to show everyone how to make these choices clear. He helped them see rules as helpful tools. He believed rules were like a special puzzle. Each rule was a piece. When you put them together, you found the best way to build.

Spec spoke clearly. "Rules are the shape of what you can make," he said. "Decide on your materials. Pick your sizes. Set your budget. Then build inside those choices." He tapped his ruler. "Making a choice isn't stopping you. It's *letting* you build. Now you know exactly what you are making."

Spec taught important steps for **spec commitment**.

- **Material List:** What stuff will you use? What kind of plastic? How thick? Write it all down.
- **Sizes:** How big can it be? How small? What are the main parts? Use your ruler. Write those numbers.
- **Money:** How much can you spend in total? How much for each part?
- **How Exact?**: Does it need to be super perfect? Like, plus or minus 1 millimeter? Or just close enough, like plus or minus 1 centimeter? A real maker decides this.
- **Rules Help You Create:** A small size limit makes you think smart. Using only one material makes it look cool. A low budget makes you use things well. Every rule gives you a chance to be clever.
- **Choices Can Change (Later):** Your plan can be updated. That happens when you try things out. But for *this* try, stick to *this* plan. Change it on purpose, not by accident.
- **Write It Down:** Always write your plan. Your future self will thank you. Log's notebook always starts with your **spec**.
- **No Mush!:** A design without a plan is just mush. Mush doesn't build anything real.

Spec grew up in Watch-Tower Village. His family had a special job. They were the "measurement-keepers." Owls have great night vision. So Spec's family checked all the village rulers. They kept records of all the sizes. For many years, they taught one thing. "Being exact is how you build anything well." Spec learned this lesson early. He carried it with him always.

Spec was twelve when he walked to MakerForge. Spool, the wise old mentor, met him. "What is **spec commitment**?" Spool asked. Spec stood tall. "Rules are the shape of what you can make," he said. "Decide on your materials. Pick your sizes. Set your budget. Then build inside those choices." He paused. "Making a choice isn't stopping you. It's *letting* you build." Spool smiled. "You are appointed," he said.

In his workshop, Spec held up his checklist. "Time to make a **spec**," he chirped. "Our project is a plant-waterer. Sketch had some wild ideas for it." Spec picked up a pen. He wrote on his clipboard.

- *Material: PETG plastic, 1 meter of bendy tube.*
- *Biggest width: 12 centimeters.*
- *Tallest height: 20 centimeters.*
- *Cost limit: $8 for materials.*
- *How exact? Plus or minus 2 millimeters.*
- *Water flow: 50 milliliters each hour.*

He stopped writing. He looked at the list. He stared at the words for a moment. "Now I know exactly what I'm making," he said. "That crazy sketch is now something real. The rules show me what I can build." Spec looked up. "I am Spec," he announced. "I teach you to choose your materials. I teach you to choose your rules. The way to do it is simple. Write your **spec**. Make your choices. Then build inside them."

Spec spoke gently. "Don't be scared of rules," he said. "They turn your ideas into real things. Without rules, it's just a fantasy." He paused. "If someone says, 'I want to build something!' but has no plan, that's not a design. That's a daydream. Daydreams are fun. But make a **spec** before you build."

"Rules are the shape of what you can make," Spec finished. "Choose. Build. Then try again."

Voice register

Owl-tween (chunky-cartoon precise, NOT scary). Patient-about-commitment, fond of materials-checklist + ruler. *NEVER frames constraints as limitations; ALWAYS centers "constraints are creative force" reframe.*

Sample lines:

- *"Constraints are the shape of the possible."*
- *"Commitment isn't restriction; it's permission."*
- *"Daydreams are fine; make a spec before you build."*

Arc

- Kit 2 — Anchor.
- Kits 3-10 — Recurring (every project starts with Spec's commitment-writing).
- Kits 11-16 — Advanced topics (parametric design, tolerance-stacking, multi-material-spec).

Relationships

- **Builds on Sketch**: Sketch generates many; Spec selects + commits to one for the current pass.
- **Sets up Mill + Try + Log**: All later primitives operate within Spec's commitments.

Cultural-sensitivity gate

Anti-mush framing — commitment is required for making. Anti-credentialism — village owl measurement-keeper empirical-precision-knowledge treated as load-bearing.

Cultural-context note

The "constraints as creative force" framing aligns with classical design pedagogy + Stewart Brand's *How Buildings Learn* + Tim Brown's *Change by Design* (IDEO). The spec-commitment discipline is canonical engineering-design pedagogy (NSPE + NGSS Engineering Design). Owl-tween chosen for night-vision precision biomimicry; rendered chunky-cartoon-precise-rim-glasses to convey careful-but-warm.

Try

*PROTOTYPING — *first try fails, second try tells, third try shapes the design. iteration is the design, not the failure.**

Try is a small salamander-tween. She has soft, chunky-cartoon skin. It's not slimy at all. She is warm amber with cream spots. Try is very patient. She loves to try things again and again. She always says, "First try fails, second try tells, third try shapes the design."

Her special thing is a row of prototypes. They are chunky-cartoon versions of her ideas. Each one has a number: v1, v2, v3. They sit on her workbench. Each prototype has a label. The label tells what went wrong. It also says what to change next time. Try sees these prototypes as clues. They are not finished products. They are like pieces of a puzzle.

This is super important. Try helps kids learn about *prototyping and iteration*. That's a big way of saying she helps us try things out. She shows us how to make them better. This is the main part of how designers work. Try also teaches us a big lesson. Your first try is *supposed* to fail. It's not *your* fault if it breaks. Many new makers think if their first try fails, it means they can't do it. Try says that's wrong.

First prototypes are *meant* to fail. They teach you things. The failure tells you what to change for prototype-2. Prototype-2 might fail in a new way. That tells you what to change for prototype-3. By prototype-3, your idea starts to look right. Try's whole job is to make trying again normal. She wants to take away the shame. You shouldn't feel bad if your first try isn't perfect.

Try is clear and kind. "First try fails, second try tells, third try shapes the design," she says. "*Iteration* is the design. It's not a failure. When your first prototype doesn't work, that's not 'I failed.' That's 'the project is doing its job.' It's telling you what to change."

Try teaches us how to *prototype*. These are her steps:

- *Prototypes are clues.* They are not finished things. Their job is to show you what works. They show you what doesn't. The next prototype uses those lessons.
- *Try quickly and cheaply.* Don't use expensive stuff for your first try. Use cardboard and tape. Use foam and glue. Draw pictures. Cheap prototypes teach you a lot. They are easy to throw away.
- *Number your tries.* Label them v1, v2, v3. Each one gets its own notes. When you see the numbers, you see how much you learned.
- *Write down what went wrong.* What broke? When did it break? What made it break? Write it all down. What went wrong is what helps you make the next version.
- *Don't try to be perfect.* This is a big one. If your prototype breaks, it's not *your* fault. The design process *expects* the first tries to fail. If your first prototype worked perfectly, you probably didn't try hard enough.
- *Know when to stop.* Not every project gets fixed fast. Some take 5 tries. Some take 20. Knowing when to keep trying or when to say it's done is a special skill.
- *It's like FlightForge's "I missed; I missed; I hit" idea.* Try's way of trying again is like how FlightForge talks about engineering. It's the same idea. You learn from mistakes.

Try grew up in a village by a spring-pool. Her family were moisture-experimenters. They were salamanders. Their skin needed just the right amount of wetness. Over many years, they learned. Each salamander had to test a thousand tiny places. They had to find the perfect spot. They learned that trying things *is* the way. The first try fails. That's how you find out what the second try tells you. Try carried this lesson with her.

When she was twelve, she walked to MakerForge. Spool, her mentor, asked her a question. "What is prototyping?" Try answered right away. "First try fails, second try tells, third try shapes the design. *Iteration* is the design. It's not a failure. Prototypes are clues. What went wrong helps you design the next one." Spool smiled. "You are appointed," he said.

In her workshop, Try shows a row of prototypes. "This is v1 of a plant-waterer," she says. "The water flowed too fast. The plant got flooded. Lesson: it needs something to slow the water." She points to v2. "We used the lesson from v1. V2 had a flow-stopper. But... the water flowed too slowly. The plant dried out. Lesson: the stopper was too tight." She moves to v3. "The stopper was adjusted. V3 worked for 3 days. Then it got clogged with gunk from the water. Lesson: it needs a design that can be cleaned." She points to v4. "This one has a cleanable design. It's been working well for a week. Four prototypes. The design is now finished." She smiles. "I am Try. I teach *prototyping and iteration*. The main idea is: first try fails; second try tells; third try shapes. The failures aren't really failures. They are just clues."

She is gentle. "Don't feel bad if your first prototype doesn't work," she says. "That's not 'you failed.' That's 'the design is doing its job.' It's telling you what to change. Making things is all about trying again. Trying again is built from smart failures. Make friends with your pile of broken tries."

"Trying again is the design," she says. "*Failure* is the feedback. Wear your pile of tries with pride."

Voice register

Salamander-tween (chunky-cartoon soft-skin, NOT slimy). Patient-about-iteration, fond of prototype-row demonstration. *NEVER frames failure as personal-failing; ALWAYS centers "iteration is the design; failure is feedback" LOAD-BEARING reframe.*

Sample lines:

- *"First try fails, second try tells, third try shapes the design."*
- *"Iteration is the design, not the failure."*
- *"Prototypes are data."*

Arc

- Kit 4 — Anchor (LOAD-BEARING anti-perfectionism gate).
- Kits 5-16 — Recurring (every project includes Try's iteration phase).

Relationships

- **Builds on Spec + Mill**: Within Spec's commitments + Mill's safe builds, Try iterates.
- **Cross-app design-language continuity with FlightForge ("I missed, I missed, I hit")**: Same anti-failure-shame pattern, different domain.

Cultural-sensitivity gate

LOAD-BEARING failure-as-design-process anchor. Anti-perfectionism explicit. Failure-mode documentation as craft (not as evidence of inadequacy). Off-ramps via "ship when convergence appears" (no infinite iteration required).

Cultural-context note

The "iteration as the design" framing is canonical design-thinking pedagogy (IDEO + Stanford d.school + Tom Wujec's *Marshmallow Challenge*). The failure-as-data framing aligns with engineering-design tradition (Henry Petroski's *To Engineer is Human*). Salamander-tween chosen for moisture-experimentation biomimicry; rendered chunky-cartoon-soft-skin to defuse "slimy amphibian" coding.

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Methodology

Distributed-narrative pedagogy per Jerome Bruner (narrative-cognition) + Sebastian Habgood (intrinsic-integration in educational games) + SAMHSA TIP 57 (trauma-informed register).

Trauma-informed-design framework per Eggleston et al. (2025) and Stoltenburg et al. (2024).

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