Build, Explain, Improve

Give a useful design problem a second classroom of curious collaborators.

Learning goal and inspiration

Learners will define a need, test a model against a criterion and explain one revision using evidence. Project Kakuma describes solar-light making and exchanges with Belgian learners. This is a Champions of Learning adaptation inspired by Koen Timmers and collaborating educators and learners, not their verified lesson plan or an endorsed resource.

Suggested: Grades 6-10 science, design and communication. **Estimated:** Three 45-minute sessions plus 45-60 minutes of preparation. Paper models can use existing supplies at no added cost; optional classroom kits require local pricing and safety review.

Prepare a safe, useful challenge

Use paper, pencils, clean cardboard and a teacher-approved LED light to explore a stable reading-light stand or shade. Optional: an age-rated low-voltage solar-light kit used exactly as instructed. Define one measurable criterion, such as stability or readable text at a fixed distance. Arrange a partner class or exchange between groups in your room. This is a model-design task, not a device deployment project.

Safety: Adult review and supervision are required. No mains electricity, battery modification, soldering or improvised charging. Use only compatible enclosed components and manufacturer instructions; keep liquids away. Adults handle sharp cutting. Paper-only designs are a full alternative.

Try it in four steps

1. Define (15 min). Discuss who would use the model and what they need. Choose a criterion and constraint; sketch and label a proposed design. Do not assume another community needs your solution.

2. Build and test (45 min). Build a paper/card model or use the approved kit. Record the test conditions, result and limitation. Keep conditions the same when comparing versions.

3. Exchange (30 min). Share an anonymous sketch and test record with partners. Explain a choice, ask one question and offer specific feedback. Exchange paper copies if live video is unavailable.

4. Improve and explain (45 min). Revise one feature and repeat the test. Show the before/after evidence and credit partner contributions. Reflect: What did another viewpoint help us notice?

Access and evidence of learning

Offer large-print diagrams, tactile models, oral explanations and roles chosen for access. Younger learners can compare paper shapes; older learners can analyze repeated trials. Assess the stated need, fair test, evidence-based revision and collaborator credit. Collect an exit explanation, not just a finished object. Use school-approved sharing; omit names, faces and personal details from exchanges.

Three AI Prompts for Teachers

Optional support, not evidence that Koen or collaborators used AI. Replace brackets, use a school-approved tool and review every output.

1 Plan and adapt

Plan three [length]-minute sessions for [grade/subject] to design a reading-light stand or shade using [approved materials]. Include a paper-only route, one measurable criterion, a fair test and feedback with [partner class/in-class group]. Adapt for [access needs]. Keep electrical work limited to teacher-approved kits used as instructed. Flag safety and factual checks; do not invent community needs.

Teacher check: Confirm suitability, materials, supervision and partner access before use.

2 Create materials

Create a printable design-and-test sheet for [grade] using [teacher-approved task]. Include need, sketch, criterion, test conditions, result, limitation, partner question and one revision. Add an oral-response option and a brief feedback protocol. Do not supply wiring, charging or battery-modification instructions. Keep learner information anonymous.

Teacher check: Check readability, test fairness and compatibility with approved equipment.

3 Reflect and improve

Review these anonymous class-level findings: [test results, explanations, feedback and access barriers]. Our learning goal was [goal]. Suggest two changes to the next lesson and explain which evidence supports each. Distinguish observations from inference. Do not claim causal impact or infer learner traits. Identify what further evidence would help.

Teacher check: Compare suggestions with actual work and preserve uncertainty and shared credit.

Credits and research

Project context: Project Kakuma: Solar Light Project. Credit local educators, learners and partner classes. Research context: project-based elementary science study (2023). Its broader curriculum findings support structured inquiry as a design rationale; it did not evaluate Kakuma or this guide.