

The MacLeamy Curve: teacher script

Students predict, tour and redraw the four-line chart architects use to argue for deciding early, then name the next commitment on a real project and the decision to check before it.

Before class: open bigfloorplans.com/macleamy-curve on the projector and find "Take the tour". Print the two-page student worksheet for each student. No login, nothing is saved or sent.

Min	Step and what to do	Ask	Listen for
0-2	Hook Project the page. "A family wants a bigger kitchen island. When is the cheapest moment to change it?"	Hands up: while it is a sketch, after the drawings, after the cabinets are ordered, or after they are installed?	Most say "while it is a sketch". Do not confirm yet.
2-4	Predict (tour step 3, first part) Students draw their guess of line 2, the cost of a change, in Box A and circle how sure they are. Silent, 90 seconds.	What shape did you draw, and how sure are you?	Any shape is fine. The point is to commit before seeing it.
4-5	Step 1: time runs left to right Start the tour. Point at the strip of seven stages along the bottom.	Which stages are still only on paper?	PD, SD, DD and CD: the first four.
5-6	Step 2: line 1, power to shape the result Reveal line 1.	Why does this line only ever fall?	Each decision closes a few doors; nothing re-opens them.
6-8	Step 3: line 2, cost of a change Reveal line 2. Students compare it with Box A, then write one sentence in Box B: why would a change cost more late?	Who was close? What did you miss?	Early, a change is mostly design work; later it means re-approving, re-ordering or tearing out finished work.
8-10	Step 4: where lines 1 and 2 cross Drag the slider to draw one line smaller. Watch the crossing move.	If the crossing moves when we redraw a line, is it a deadline?	No. The chart has no scale, so the crossing is an accident of the drawing.
10-11	Step 5: line 3, traditional design work Reveal line 3.	Where does most of the design work happen?	Inside construction documents, where changes already cost more.
11-12	Step 6: line 4, preferred design work Reveal line 4. Optional: open "Move the design work earlier" and drag the slider from 27% to 82%.	What does line 4 change: how much design work, or when?	When. CURT calls it "a new distribution of design effort".
12-14	Step 7: recall Hide line 2 (Test yourself). Students draw it from memory in Box C, without looking.	Compare Box C with Box A. What changed in your thinking?	Line 2 gets steeper and never levels off.
14-17	Check yourself Run the four quiz questions on the page. Students answer on the sheet first, then click to reveal.	Which question split the room?	Q2 (the 100 times claim) usually splits it.
17-20	Exit ticket Students complete the exit ticket. Collect.		

The seven stages (bottom of the chart)

- **PD** Pre-design: goals, budget, site and needs
- **SD** Schematic design: first sketches of the layout

- **DD** Design development: the design firms up
- **CD** Construction documents: detailed drawings for permits and pricing
- **PR** Procurement: bids, contracts and orders
- **CA** Construction administration: the building goes up
- **OP** Operation: the building in use

Chart: Construction Users Roundtable (CURT), White Paper WP-1202, 2004, as traced on bigfloorplans.com/macleamy-curve. The chart is a model of decision timing, not a measured cost curve: neither axis has a scale.

Teacher notes

Three common misreadings

- **Students may think:** The chart proves late changes cost 10 or 100 times more. **Address it:** Neither axis has numbers. Point at the axes and ask what the units are.
- **Students may think:** Early changes are free. **Address it:** They cost less, not nothing: design, engineering and approval time still count.
- **Students may think:** The crossing point is a deadline. **Address it:** Drag the step 4 slider: the crossing moves when one line is redrawn.

Optional floor extension (+15 min)

Tape out a kitchen island at full size (for example 3 ft by 6 ft) with a 42 in aisle on one side and a 36 in aisle on the other, or roll out a 1:1 printed kitchen plan. Two students act as cooks and pass each other with the dishwasher door open. Then tell the class: "The cabinets are ordered next Monday." Teams decide whether to change the island now, and say what the change would disturb if it came after the order. This is the chart's idea, a decision checked before its commitment, on the floor.

Supports

- **Learning support:** give the four line names as cards; students match each card to a line before step 3.
- **Multilingual learners:** pre-teach commitment, order, permit and procurement with the stage strip; allow Box B in any language.
- **Extension:** students pick a real project at school (a new lab, a gym floor) and list its next three commitments.

Standards connections

- **NGSS HS-ETS1-3:** evaluate a solution against prioritized criteria and trade-offs
- **CCSS ELA RST.9-10.7:** translate information shown in a chart into words, and back
- **Perkins V (CTE: Architecture & Construction):** design and preconstruction career pathway practice

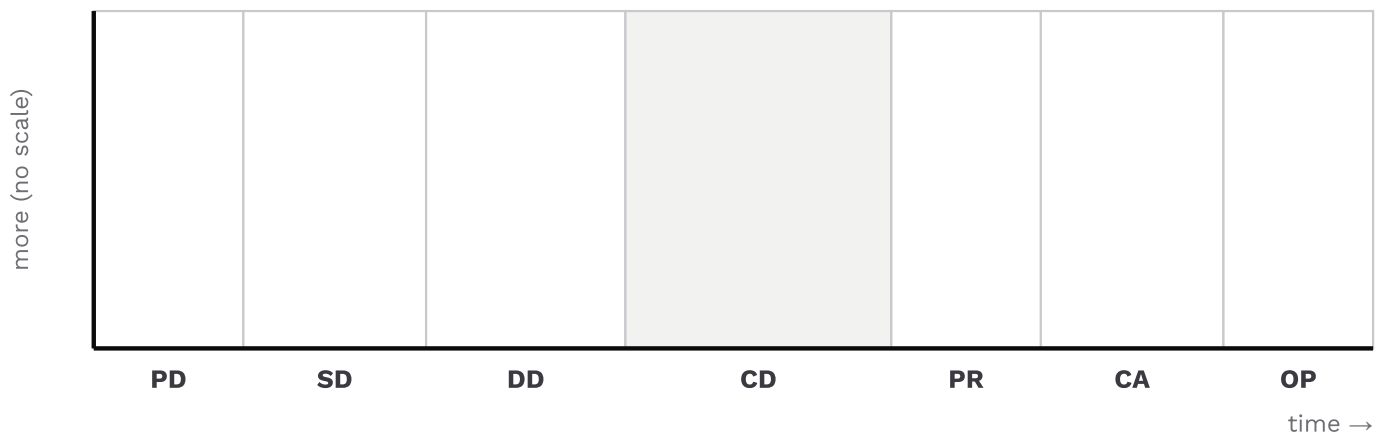
Why this sequence

- Predicting before seeing an answer improves learning, especially when the result surprises students. *Brod, G., Hasselhorn, M., & Bunge, S. A. (2018). When generating a prediction boosts learning: The element of surprise. Learning and Instruction, 55, 22-31.*
- Recalling material from memory (here, redrawing line 2) strengthens long-term retention more than restudying it. *Roediger, H. L., & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. Psychological Science, 17(3), 249-255.*

STUDENT WORKSHEET • THE MACLEAMY CURVE

Name _____ Date _____

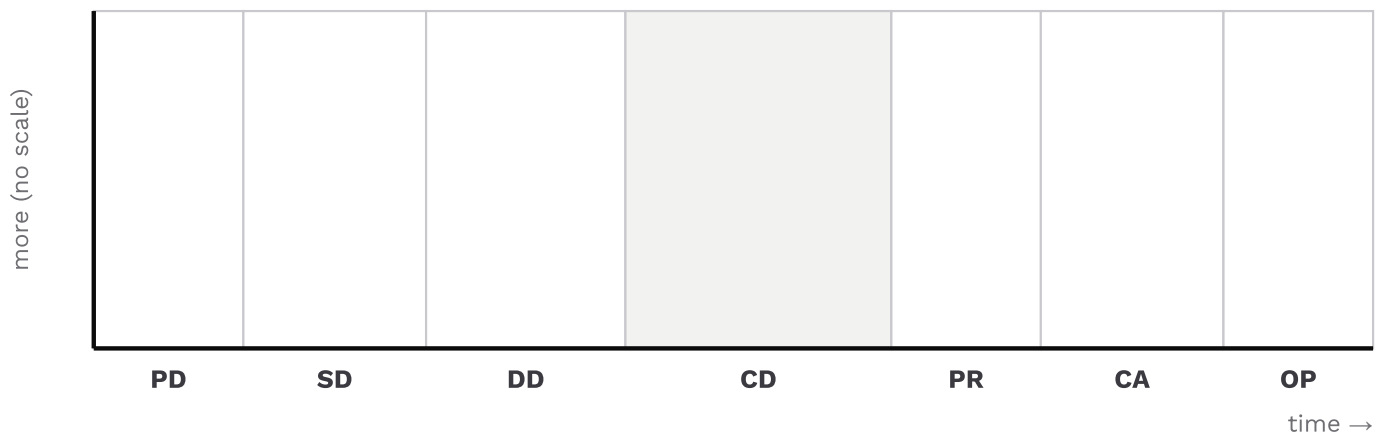
Box A. My prediction: draw how the cost of a change moves over a project.



How sure am I? ☐ Just guessing ☐ Fairly sure ☐ Very sure

Box B. Why would a change cost more late in a project?

Box C. From memory: draw line 2 again, without looking.



Check yourself

1. Which line is the proposal the 2004 paper was making?

2. A colleague says this chart proves late changes cost 100 times more. What is wrong with that?

3. In the drawing, where does the traditional process (line 3) do most of its design work?

4. Your cabinets will be ordered next week, and you are unsure about the kitchen island size. When is the best time to check it?

Exit ticket

1. Name one commitment on a building project that makes a change harder to undo.

2. Name one decision you would check before that commitment, and how you would check it.

3. True or false: the point where lines 1 and 2 cross is a deadline. Explain in one sentence.

On the floor (if your class did the extension): Would your team change the island before the order?
What would a change after the order disturb?

Answer key

Boxes A and C: line 2

Rises slowly, then fast: it gets steeper and never levels off. Box A can be any shape (it is a prediction). Box C should rise and steepen to the right.

Box B

Look for: early, a change is mostly design work; later it means re-approving, re-ordering or tearing out finished work.

Check yourself

1. Which line is the proposal the 2004 paper was making?
Line 4, preferred design work. Lines 1 and 2 describe the problem; line 4 moves design work earlier, while changes cost less.
2. A colleague says this chart proves late changes cost 100 times more. What is wrong with that?
The chart has no numbers on its axes. No multiplier can be read off it. The 100:1 figure is usually traced to software-defect studies.
3. In the drawing, where does the traditional process (line 3) do most of its design work?
Construction documents. Nearly two-thirds of line 3's drawn effort falls there; line 4 is the one that peaks early.
4. Your cabinets will be ordered next week, and you are unsure about the kitchen island size. When is the best time to check it?
Now, before the order. Before the order a change is mostly design work; after it, re-ordering or rework.

Exit ticket

1. Name one commitment on a building project that makes a change harder to undo.
Look for: Any real commitment: signing off the layout, issuing permit drawings, placing an order, pouring a slab.
2. Name one decision you would check before that commitment, and how you would check it.
Look for: A specific decision tied to that commitment, checked before it (e.g. island size before the cabinet order, by walking it at full size).
3. True or false: the point where lines 1 and 2 cross is a deadline. Explain in one sentence.
Look for: False. The chart has no scale; draw either line smaller and the crossing moves.

Scoring: 3 of 3 exit items with a specific commitment, a decision tied to it, and "false" with the no-scale reason = secure.