

Creating Space to Grow Intrinsic Motivation for ALife

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Format 20 minutes

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Three case studies on a spectrum of structure.

CASE 01 • TIGHT

Structured choice within a team project

Core first-year required course
CSSE220 • 00 Software Dev

CASE 02 • MEDIUM

A flexible incentive system

ALife-adjacent elective
CSSE314 • Bio-Inspired AI

CASE 03 • OPEN

Portfolio-based assessment

ALife-centered pilot survey
CSSE290 • Artificial Life

Students are *optimizers*. How do we grow intrinsic motivation when grades are the loudest signal?

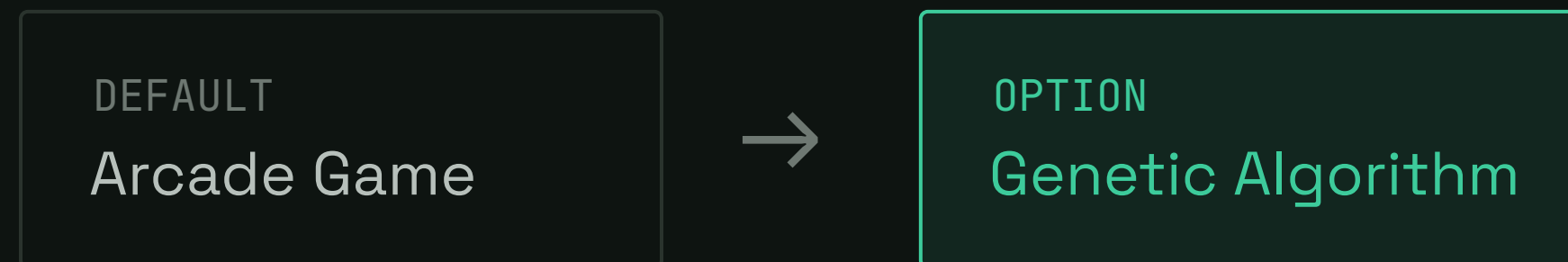
FIGHTING REWARD SYSTEMS — TURNING INWARD

CSSE220 Object Oriented Software Development

Problem. The traditional required class is completely packed. Limited flexibility. How can we fit ALife in at all?

Replace, don't add.

Alternative to an existing arcade-game project for a genetic algorithm project.
Nearly same workload. Same slot. The original option stays on the menu.



Pitch it as the **harder** option.

Market it honestly: more difficult, research-flavored. Self-selection works. The students who lean toward "harder + research" are the ones you want to find early.

harder

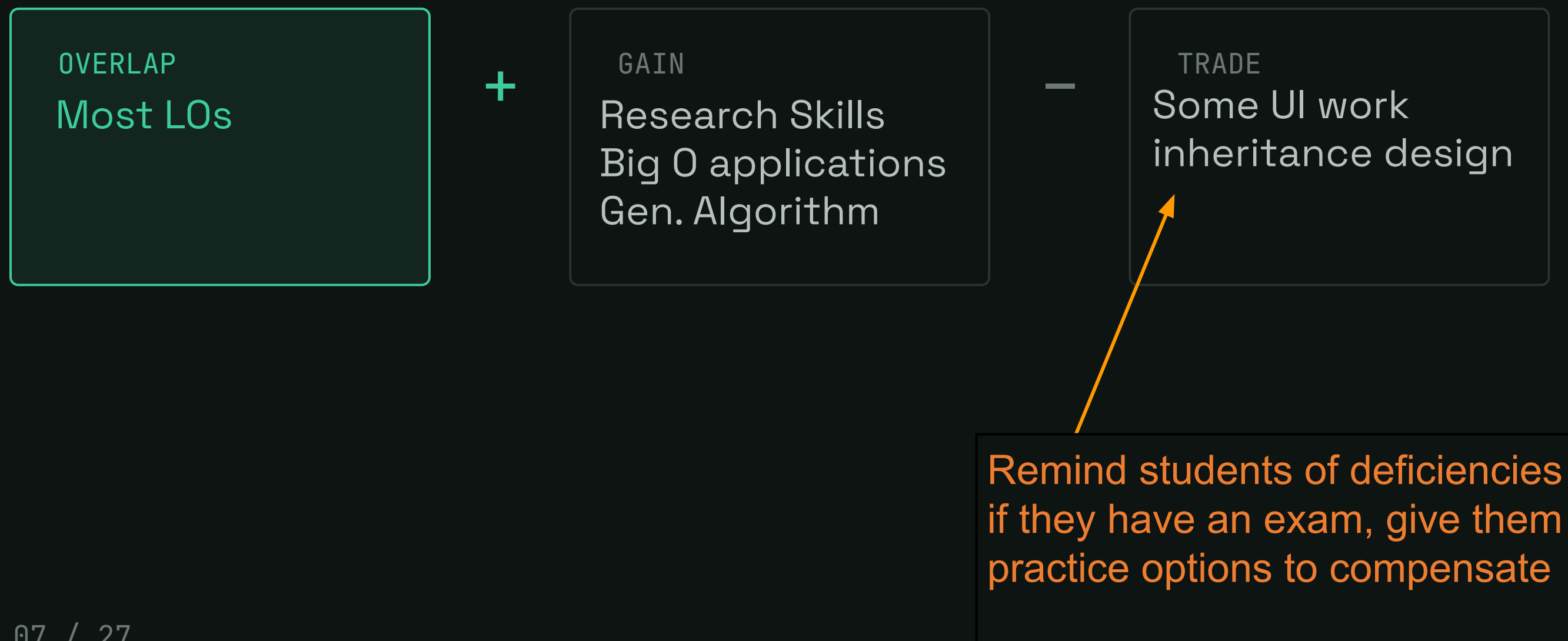
research-related

open-ended

not for everyone

Learning outcomes **don't need to be *identical*.**

Get close — not identical. **Some boxes get checked harder.** Some get checked lighter. Waiting for perfect alignment means this never happens.



Require experimentation.

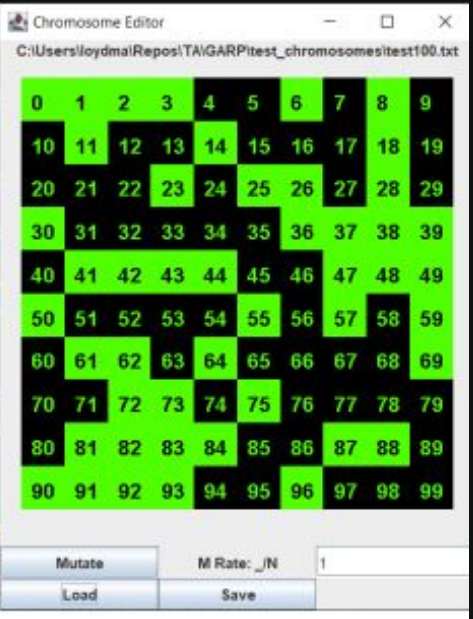
Tweak a parameter. Run it. Write down what happened. Exploration isn't an extra — it's part of the deliverable.

```
mutation_rate = 0.01 → run → log  
mutation_rate = 0.05 → run → log  
mutation_rate = 0.20 → run → log → what changed?
```

e. CASE 01 – TIGHT STRUCTURE

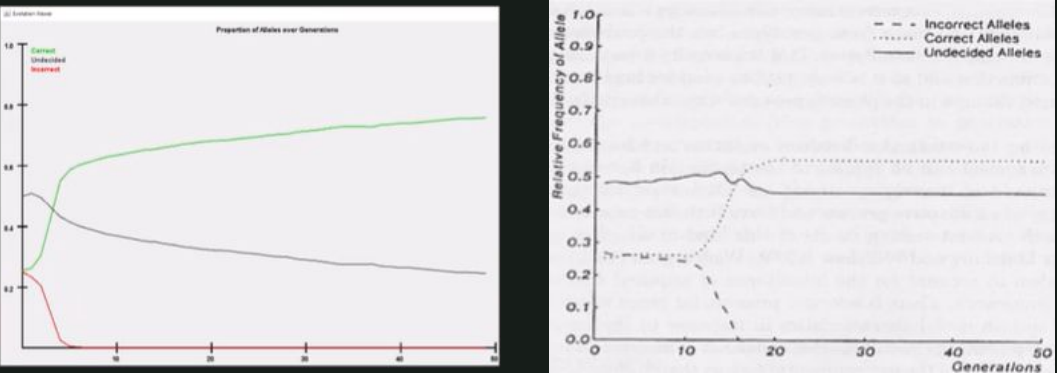
Give them **multiple avenues**.

Same GA underneath, three ways to be interested in it.
Students take ownership.



LANE 01

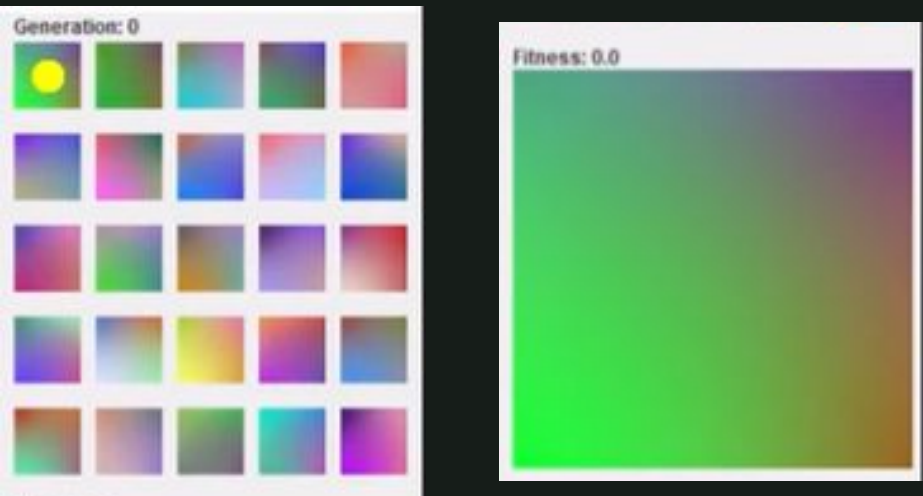
Science



Reproduce work from *How Learning Can Guide Evolution*. Measure, plot, write up findings.

LANE 02

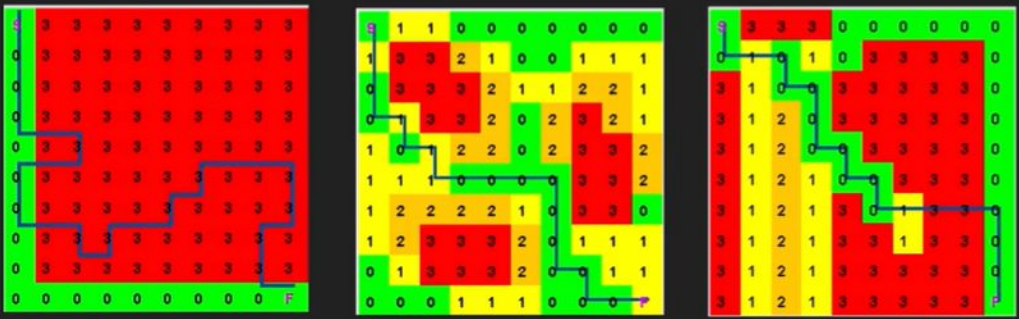
Art



Evolved aesthetics, generative output, human- in-the-loop fitness.

LANE 03

Engineering



Solve a problem with a GA. Path-finding with variable terrain with associated costs.

The pipeline.

dozens

of first-years exposed to ALife each year

1st

year recruitment pool for research

Hands down, my most fruitful endeavor and greatest recruitment pipeline.

CASE STUDY #02 • MEDIUM STRUCTURE

CSSE314 Bio-Inspired Artificial Intelligence

Problem. An elective — you have more control. How do you get students to grow intrinsic interest, not just chase the grade?

a. CASE 02 — MEDIUM STRUCTURE

10% of the grade is theirs to choose.

Small enough that nobody panics. Big enough to take seriously.

90%

conventional graded coursework

10%

student-directed — they decide what counts

*Personal fun branding:
“Awesomesauce Points”*

Incentive points. No ceiling.

100 points = 10% — but students can go above 100%. Once that clicks, the entire framing changes.

0% ===== 100% ===== 130%+ ▶ baseline the ceiling is gone

Students demonstrate learning flexibly, can recover from poor exam scores
Basic criteria require for passing the course

Giving Up Control. Evaluation criteria are negotiated.

The student tells me what they did or created and what criteria they would like it to be evaluated by.

- 01 Student submits work via form — topic, scope, deliverable (could be done via email if you prefer)

- 02 Follow-up with questions to evaluate — scope, rigor, evidence of learning.

- 03 Effort and quality based grade — details captured, point value estimated (~5-10 points per hour)

Hand them a **starting menu**.

Don't leave them in the desert. Assignments come with a menu of ideas and starter structure — the flexibility is real, but the cold-start problem is already solved.

Reproduce a paper

Extend a class demo

Build a visualization

Run a parameter sweep

Compare two algorithms

...or propose your own

Present for more points.

Show what you learned — to the class, to peers, to an outside group. Presenting forces synthesis. And other students see ideas they wouldn't have found alone.



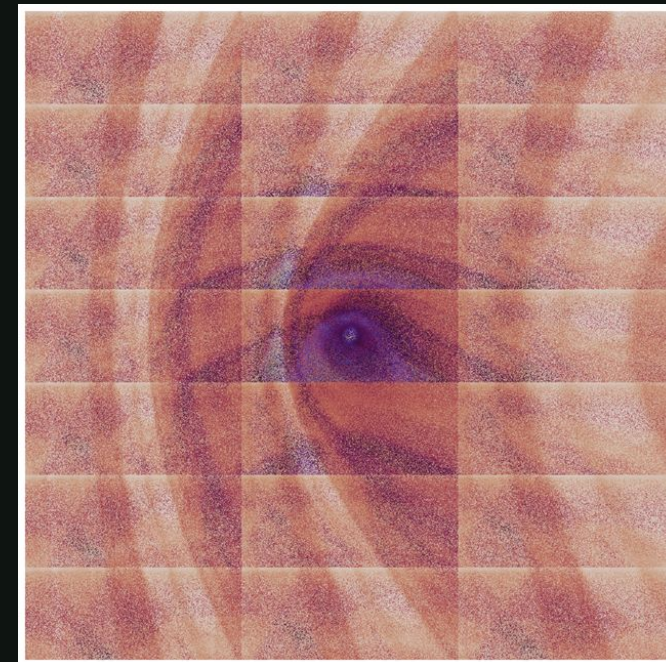
I am surprised **every** term!

- Unexpected extras — work I didn't ask for, didn't expect, can't stop thinking about.
- Research proposals — student ideas that became real projects.
- Publications — even a few that grew into peer reviewed papers!



L-System generated Doily pattern
(and the student even knit it!)

A few especially
artistic submissions!



CPPN interactive visualization
"Eye of the Beholder"
Printed in campus Art Magazine

CASE STUDY #03 • OPEN STRUCTURE

CSSE290 Artificial Life Survey Course

Problem. Maximum flexibility. How do you still actually assess them?

Wide Open course. Curated weeks.

Each week, a theme. Papers, videos, demos — a curated menu around that theme.
The menu is the structure.

10 weeks

Science of Alife

Physics, Entropy, Information, Computation, Dynamical Systems Theory

Artificial Chemistry and Origins of Life

Evolution and Self-Replication

Development

Learning Systems

Agency and Adaptivity

Open-Ended Evolution, Artificial Ecosystems and Societies

Artificial Consciousness

Divide. Conquer. Teach each other.

Nobody reads everything. Each student picks a slice of the week's material — then comes back and teaches the rest of the class what they found.

pick

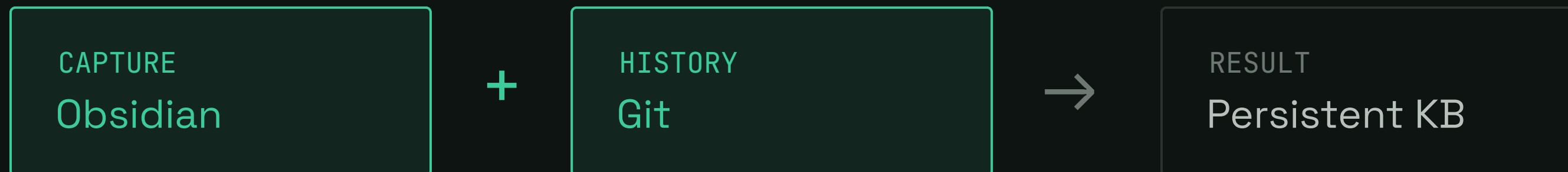
read deeply

teach back

coverage emerges from the group

The notes stack: Obsidian + Git.

Every student keeps a personal knowledge base, version controlled. It scales, it persists past the term, and it's a real artifact.



Weekly Reflections

What did you learn from the other student presentations on the Week X topic?
How does it connect to what you learned from your own work?
What would you like to learn more about?

Present **every week**. Get creative.

Each week, they teach back. Demos, sketches, live coding — **whatever fits the material**. The presentation is the assessment moment.

FORMAT

Demo

Run a system, narrate what's happening, take questions.

FORMAT

Visual

Sketch, diagram, short video, or annotated screencast.

FORMAT

Live

Write code in front of everyone. Break it. Fix it.

The grade **is the portfolio**.

Notes, presentations, demos, write-ups — accumulated over the term. **No exam**. The portfolio is what gets graded.

notes

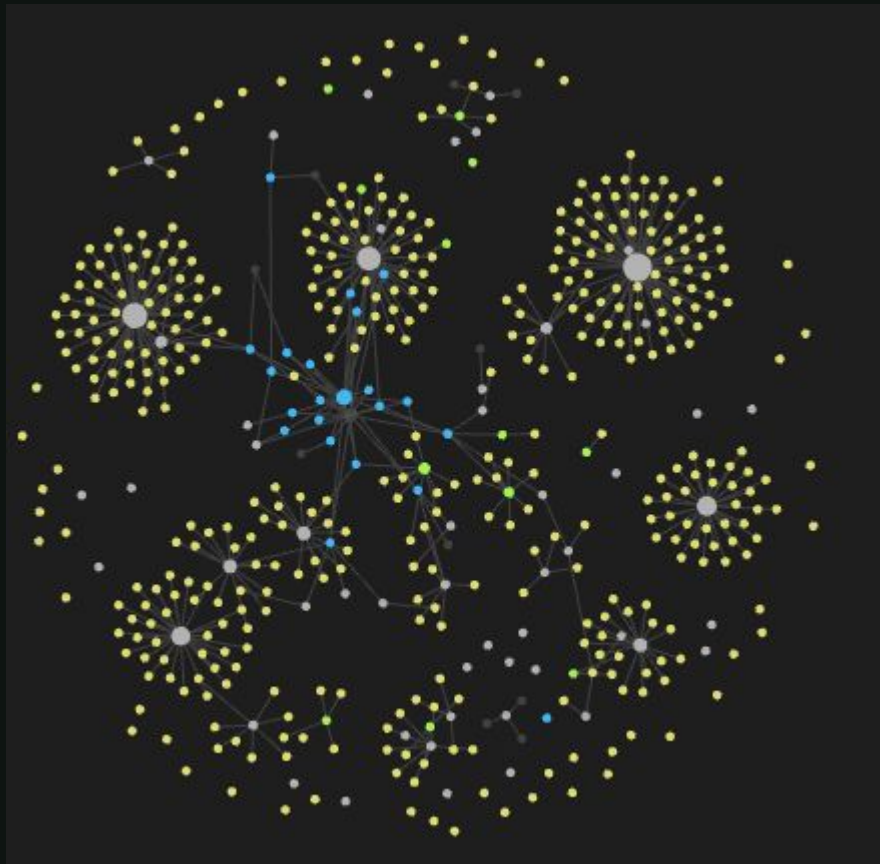
slides

demos

write-ups

code

accumulating, term-long



<- Example Graph View of Student portfolio

Early, promising.

- Depth on unexpected topics — students chase what catches them.
- Real artifacts — portfolios they can show people after the class ends.
- Next steps — general offering to more students, test scalability (peer feedback)

We have **more control** than we admit. The harder move is **giving some of it away**.

Structure, incentives, framing — those are knobs we own. Interesting work shows up when students get room to follow their own curiosity. **You might not always like what they pick, but they also might do something that exceeds your vision for what they can do.**

Three points on the structure spectrum.

Pick the level that fits the students and freedom you have. More structure requires more development, but also is the most supportive for students.

TIGHT

CSSE220 Obj.Or. Soft. Dev.

Structured choice inside a required team project.

MEDIUM

CSSE314 Bio-Inspired AI

Flexible incentive system inside a graded elective.

OPEN

CSSE290 ALife Survey

Portfolio-based assessment in an open course.

THANK YOU • QUESTIONS

Take **one idea** home- and improvise!

SPEAKER

Jason Yoder

AFFILIATION

Rose-Hulman CSSE

DISCORD

@Jason Yoder

CHANNEL

#talk-yoder-creating-space-to-grow...

Example resources from these shared on Discord, feel free to ask for more if you have interest.