An Expansively-framed Unplugged Weaving Sequence Intended to Bear Computational Fruit of the Loom

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Non-STEM instructors

As Maker education expands to new audiences, it also reaches new instructors without STEM backgrounds. For the past two years we have worked with middle school and rural librarians to help them implement Maker and STEM activities in their libraries. Using the EfU model enables these instructors to lead successful Maker activities and improves the learner experience.

Case Study with Antoinette

- Instructor (a middle school librarian) was familiar with weaving and excited about the Looming Code activity.
- She felt comfortable approaching this Maker activity with little STEM background.
- She successfully created both paper and Scratch versions of weaving designs and began weaving her own design.

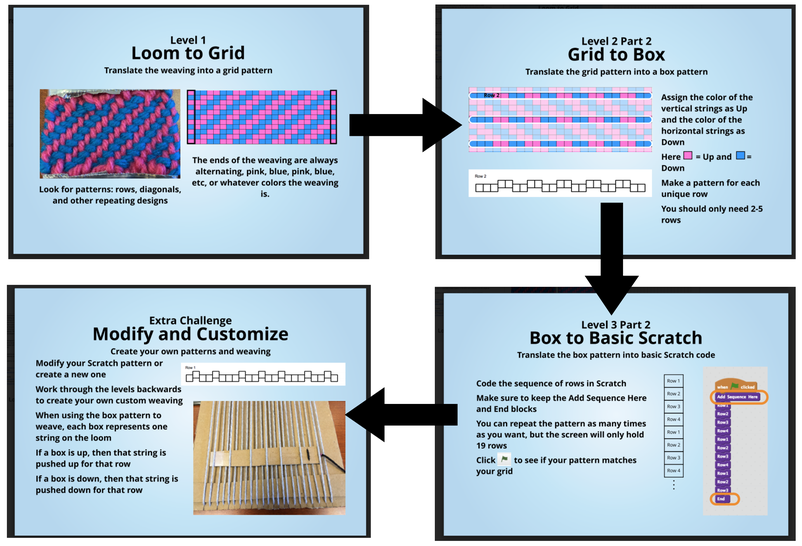
Design Realizations

- repetition in copying design by hand becomes tedious
- using pencil and eraser before using markers enables learners to easily correct mistakes
- need for criteria in establishing equivalence across paper, Scratch, and loom; how do learners know if they are "doing it right"?

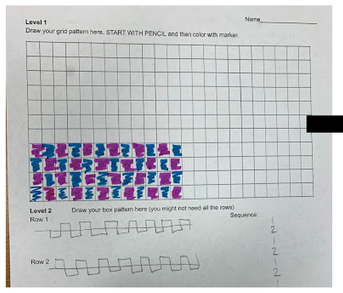
References

[1] Randi A. Engle, Diane P. Lam, Xenia S. Meyer, and Sarah E. Nix. 2012. How Does Expansive Framing Promote Transfer? Several Proposed Explanations and a Research Agenda for Investigating Them. Educational Psychologist 47,3 (2012), 215-231. https://doi.org/10.1080/00461520. 2012.695678

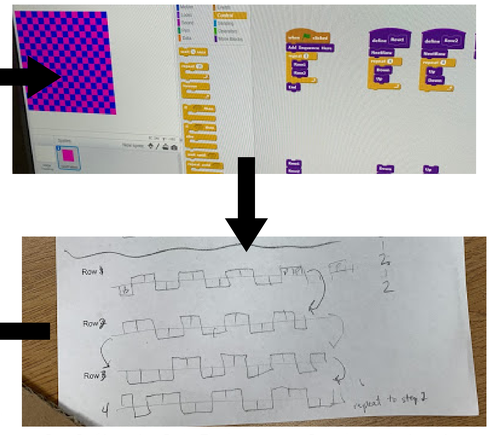
Looming Code Program: Intended and Actualized Results



Step 1 of Looming Code. The learner makes a grid of the weaving pattern with colored markers, then analyzes each line to create the string of up and down boxes, as well as the overall row sequence of the pattern.



Step 2 of Looming Code. The learner uses a skeleton Scratch program to input their lines and row sequence for their weaving pattern, then uses repeat blocks to optimize the code.



Step 3 of Looming Code. The learner uses Scratch and the Looming Code worksheet to modify the existing pattern or create a new one.

Step 4 of Looming Code. The learner weaves the new or modified pattern on a cardboard loom.

Looming Code program materials can be found at library-making.usu.edu

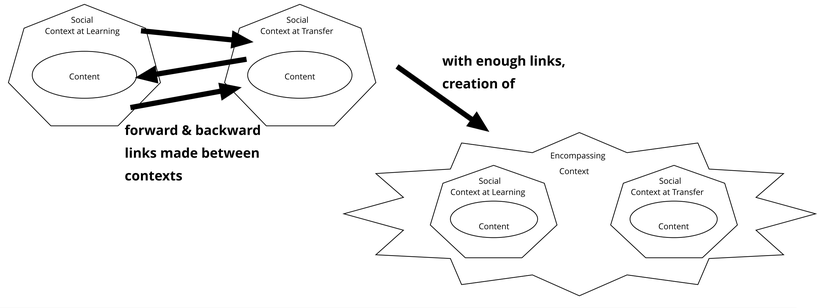
What is EfU (Expansively-framed Unplugged)?

A model for Maker activities that draws on Expansive framing [1] and Unplugged ideas.

Step 1: Analyze a physical craft to create a paper-and-pencil pattern.
Step 2: Use Scratch to create a digital pattern.
Step 3: Create a custom pattern on Scratch.
Step 4: Construct the physical product.
Step 5: Share designs with others.

Why EfU?

- Understanding that coding and computational thinking skills are not just for computer programmers
- Links to real-life experiences, prior or future
- Student authorship of material to increase engagement, learning, and impact
- Low threshold activities for instructors and learners
- Connections to prior knowledge, experiences, and hobbies, such as crafting, gaming, etc.



Next Steps

- Determine criteria for establishing equivalence across media for the Looming Code program.
- Test program with small groups of students and work up to full activity size.