Constructionism, Supporting Learners

Today

- Constructionism, another learning theory
- Supporting learners
  - Zone of Proximal Development
  - Scaffolding
  - Learning Strategy

Constructionism: Critical Elements beyond Constructivism

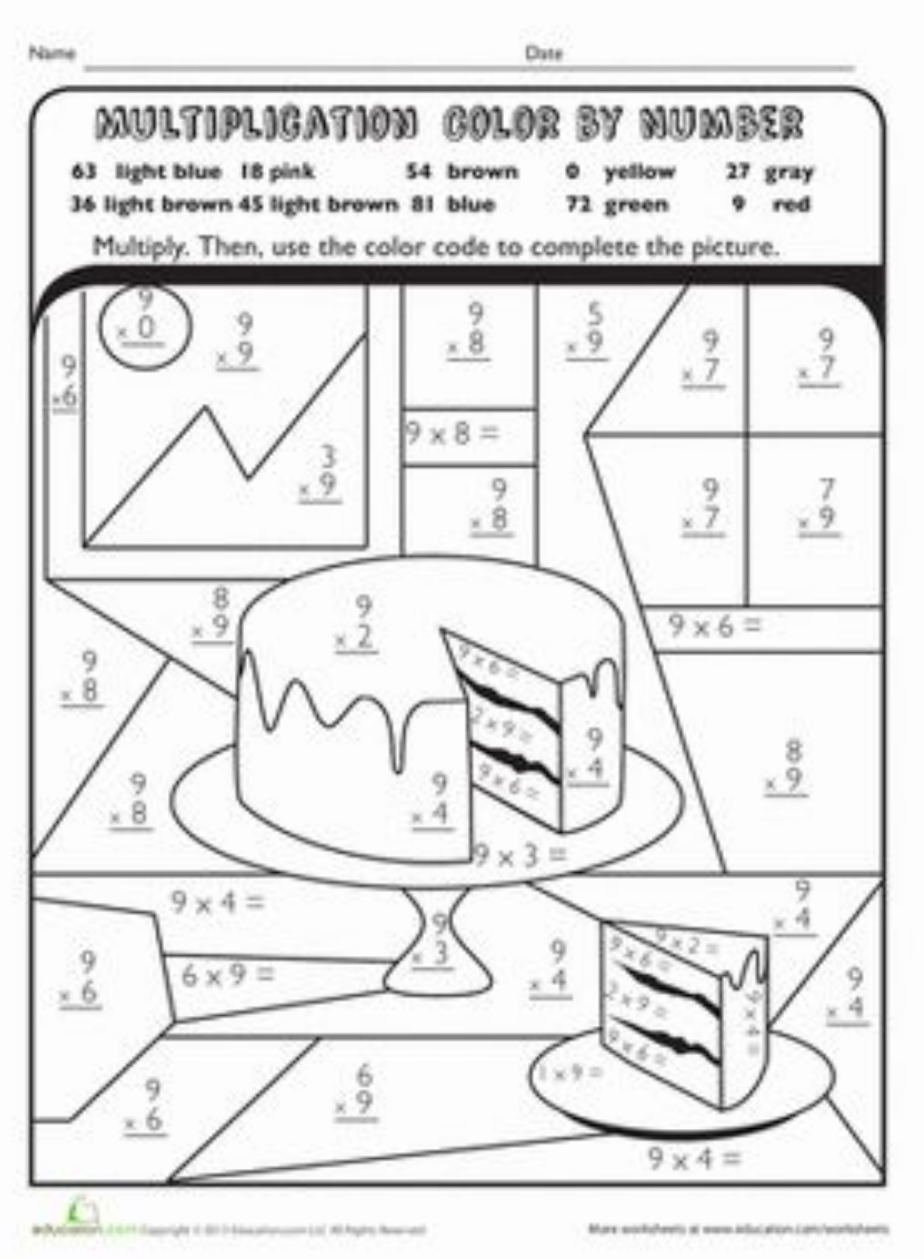
Constructi**vism**: individuals construct knowledge through *experiences*

Constructio**nism**:

- Project-based learning
- Self-directed
- Creation of artifacts
- Public viewing of the completed artifact

Constructionism:

Constructionism?



Name _____ Date _____

MULTIPLICATION COLOR BY NUMBER

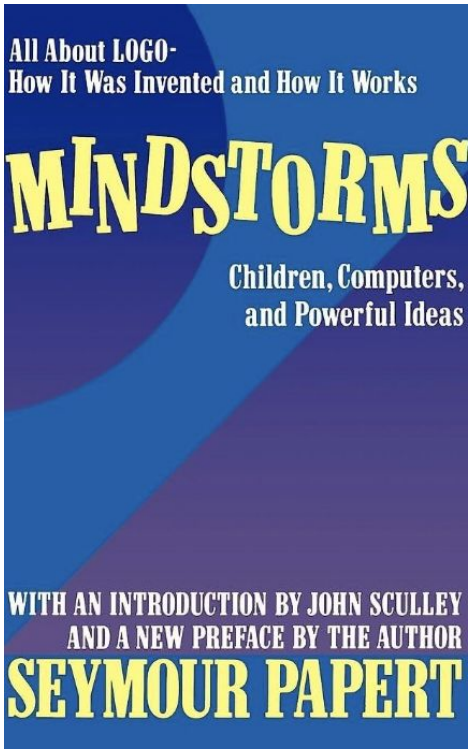
63 light blue 18 pink 54 brown 0 yellow 27 gray
36 light brown 45 light brown 81 blue 72 green 9 red

Multiply. Then, use the color code to complete the picture.

9 × 0 | 9 × 9 | 9 × 6 | 3 × 9 | 9 × 8 = | 9 × 8 | 9 × 8 | 5 × 9 | 9 × 7 | 9 × 7 | 9 × 7 | 7 × 9 | 9 × 6 = | 8 × 9 | 9 × 2 | 9 × 8 | 9 × 4 | 9 × 4 | 9 × 3 = | 9 × 4 = | 6 × 9 = | 9 × 3 | 9 × 4 | 9 × 4 | 9 × 6 | 6 × 9 | 9 × 4 =

“Gears” experience defined

- Entirely passionate and driven by the person
- Nothing to do with school
- No external motivation or rewards
- Helps later on in school



“Gears” experience

- Applied to a lot of different things – how you think about it rather than that context
- Paradigm or framework for understanding more complicated ideas
- Entirely passionate and driven by the person
- Nothing to do with school
- No external motivation or rewards

Guided Reciprocal Peer Questioning

- Share with your neighbor your **motivations** for your learning (gears or in school): 8 min

Guided Reciprocal Peer Questioning

- Share with your neighbor your **motivations** for your learning (gears or in school): 8 min
- Identify **similarities** and **differences** between your group members' learning motivations, record in Gradescope (individually if possible): 4 min

Constructionist Strengths

- learning by doing, through experience
- concrete output to demonstrate learning
- sharing leads to feedback and growth
- self-guided lets students learn at their own pace
- personal interest -> internal motivation -> more learning
- experience, learning in practice -> interest in the field

Constructionist Strengths

- Builds Identity
- Ability to create artifacts leads to self expression
- Flexible to student passions – some students go all in!
- Motivation is more built in
- More active learning because it's hands on
- Validation from peers
- The structure built in can be considered scaffolding
- They finish to a higher level of completeness

Constructionist Challenges

- hard to design for all students interests
- could be harder to design self-driven curriculum for all subjects
- harder for younger students to self-motivate
- harder to assess learning when students are doing different things
- figuring out when to provide scaffolding
- might take more resources, especially to create artifact
- public presentation could lead to comparison, anxiety or embarrassment

Constructionist Challenges

- Holes in student knowledge
  - If project didn't need it, they didn't learn it
- Choosing project of appropriate difficulty
  - Often choose projects far too hard
- They may build it but not understand it
  - They could get help from others, "remix" code from a website, etc.

Downsides of Constructionism

- Students with anxiety
  - Adjust “public” sharing – smaller groups
  - Find out what level of sharing would be motivating
  - Create a positive, not competitive, environment
- Students not motivated through the task
  - Make projects about themselves
- Parents may step in
  - Scaffolding so students can do it
  - Provide plenty of work time in class to get it done (discourage doing it at home)

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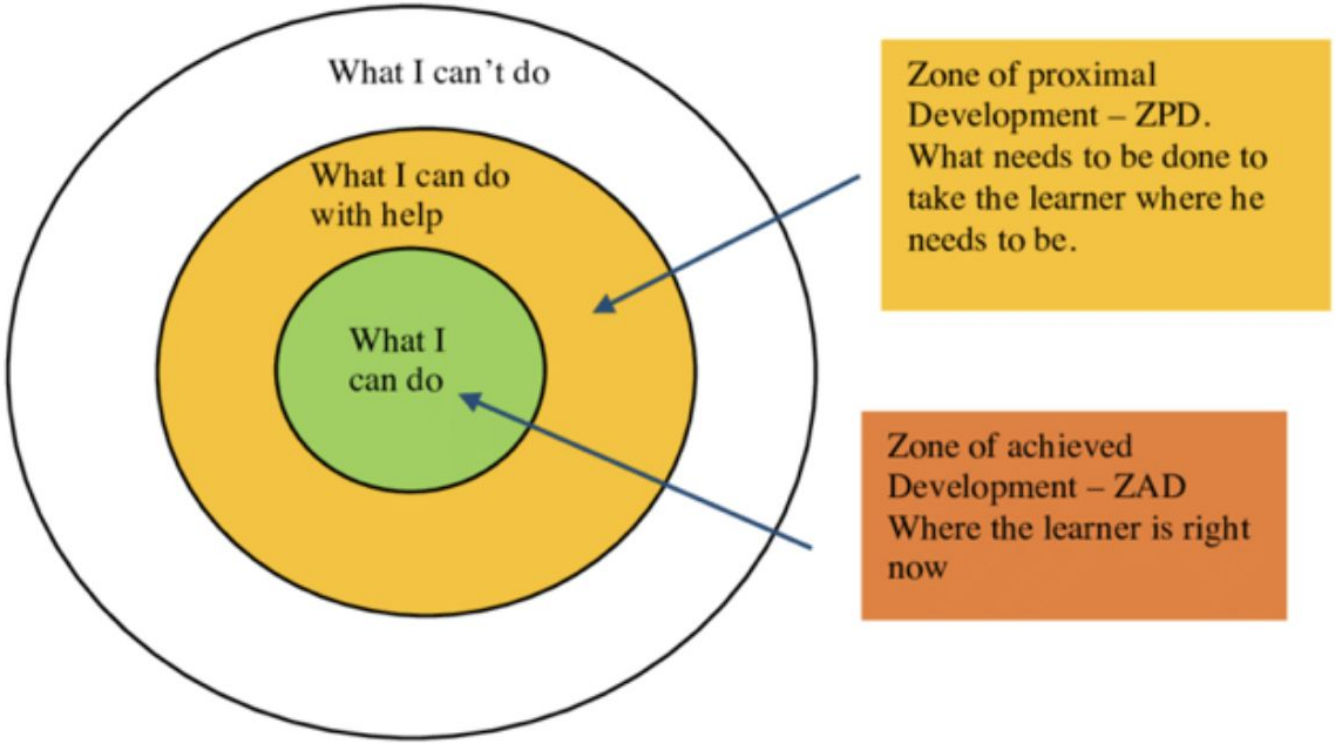
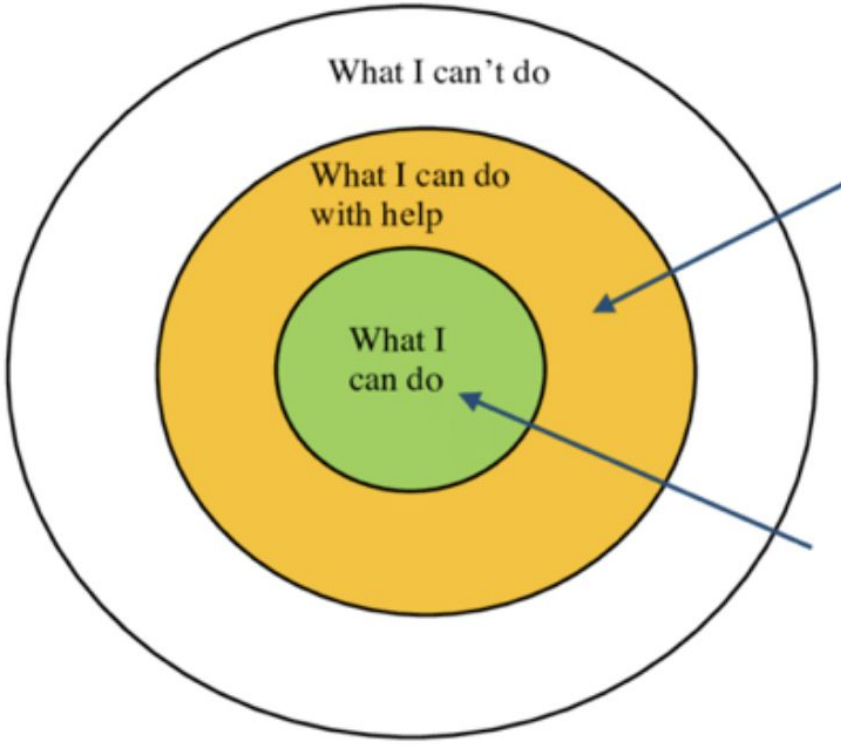
Zone of Proximal Development



zone of proximal development diagram

Zone of Proximal Development



zone of proxima

Moving target:

- Not so hard that the student becomes frustrated or cannot learn from it
- Not so easy that it is covering only skills they have already mastered

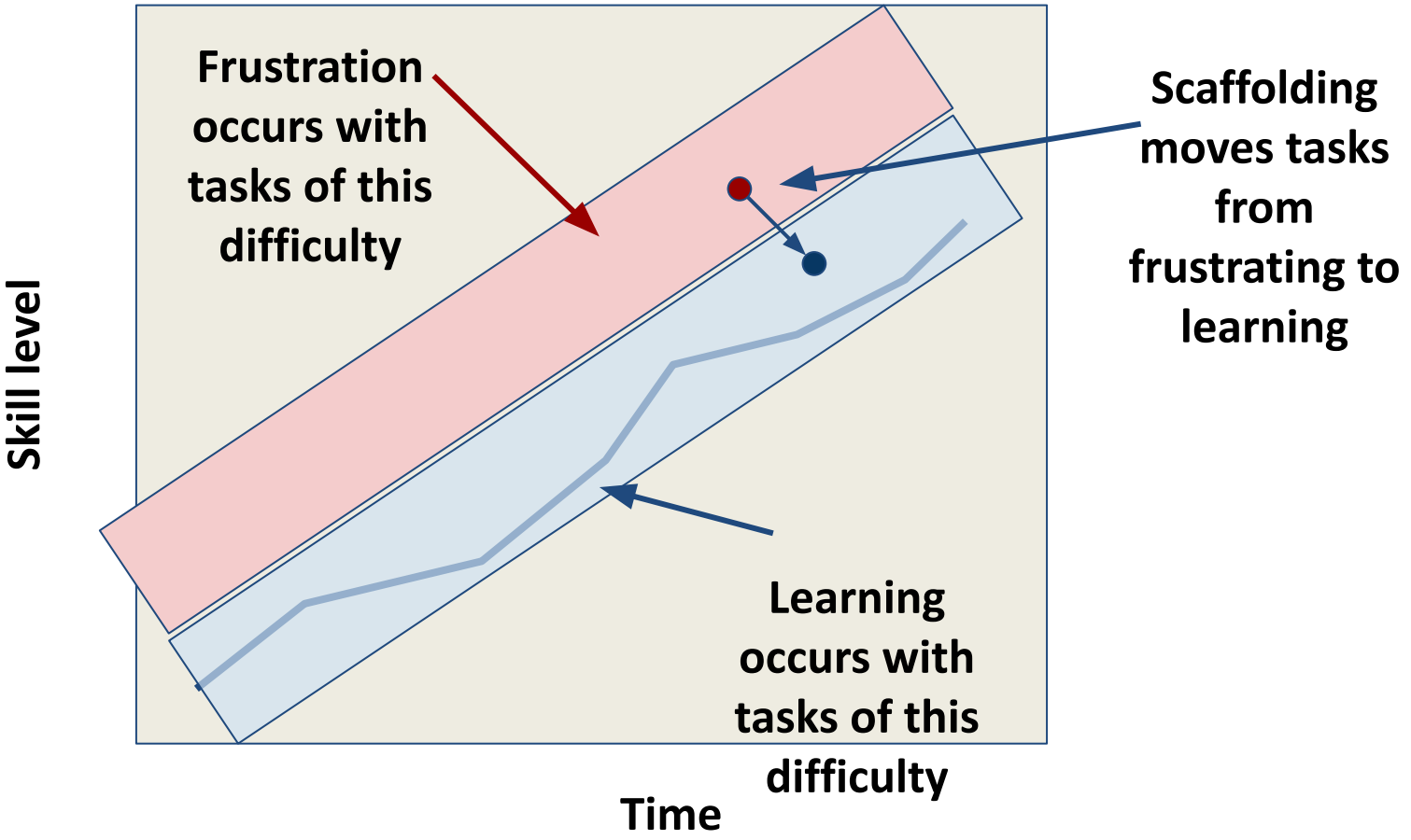
Zone of Proximal Development: ZPD

- The Goldilocks view of problem challenge
  - Too hard – student gets frustrated, learns little because material is out of reach
  - Too easy – student gets bored and isn't being given material that will teach
  - Just right – student learns
- Challenge:
  - As student learns, that zone changes!

Scaffolding

- Temporary
- Removable
- Helps with the activity
- Specific learning goal

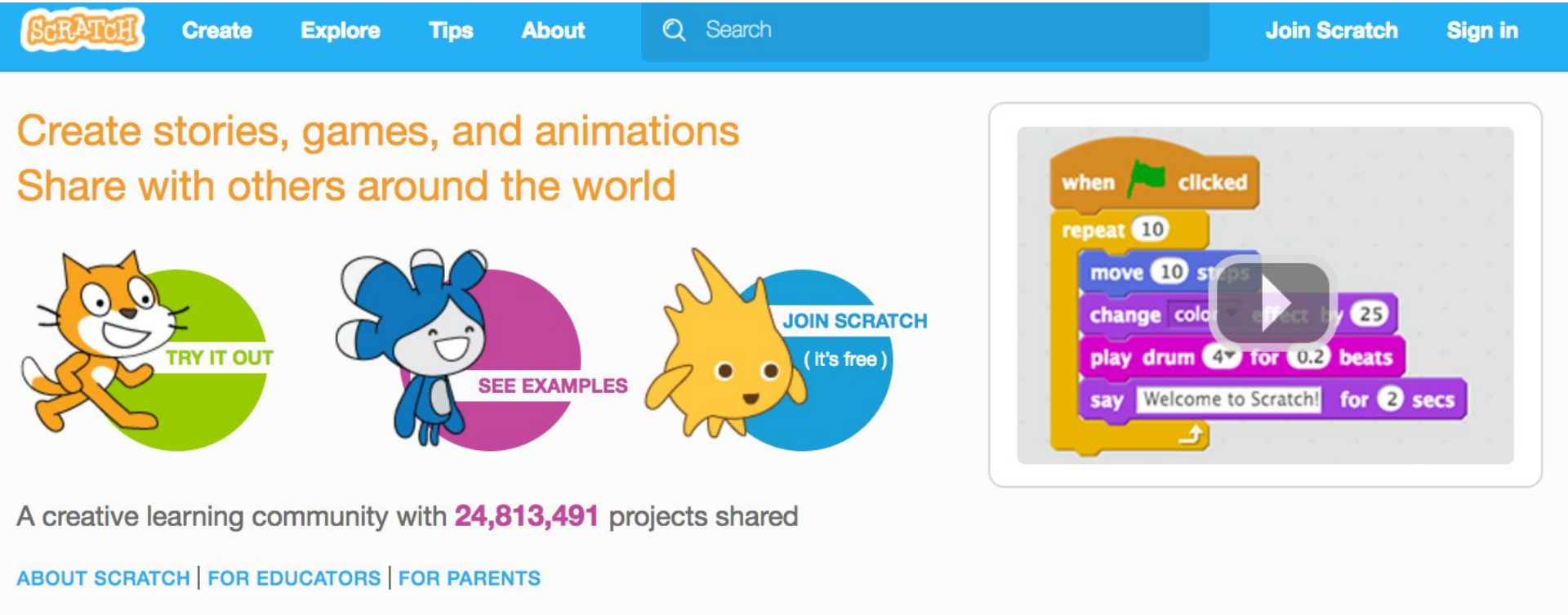
Zone of Proximal Development / Scaffolding Relationship



Metacognitive Learning Strategies

- Some cognitive processes lead to learning
- Scaffolding can make explicit the cognitive processes successful learners use

scratch.mit.edu

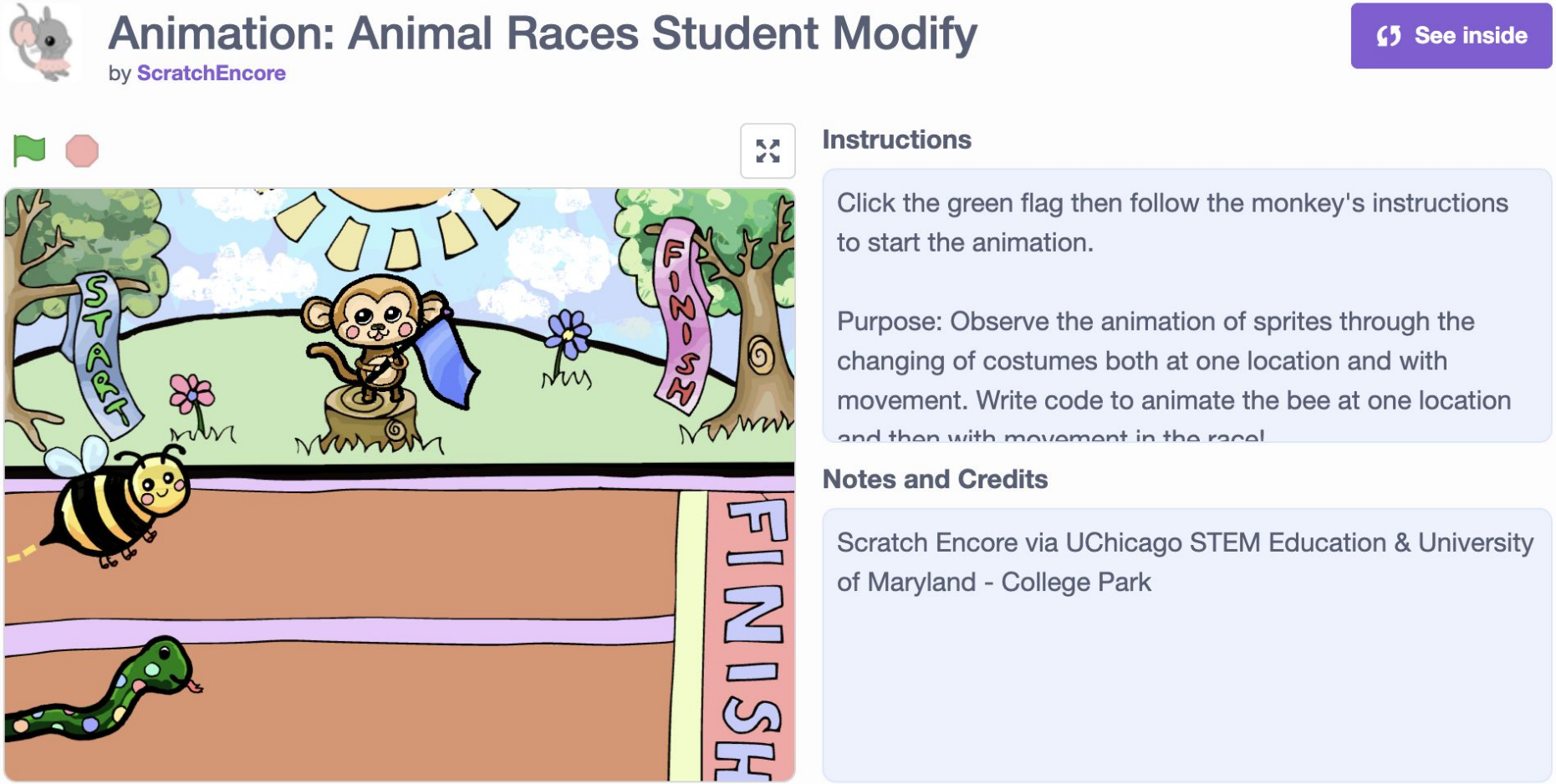


Scratch demo!

https://scratch.mit.edu/projects/236148182

Scratch Activity

Follow the instructions on Gradescope



Scratch Activity Reflection

- Is this Constructionism? Why or why not?

No: not much creation or self-directed learning

Yes: learning by doing

Scratch Activity Reflection

- Where was the Constructivism?

Learning by doing

Incorporates pre-existing knowledge about races, etc

Pre-existing knowledge about coding blocks

Scratch Activity Reflection

- Where was the Scaffolding?

Worksheet!

Scratch Activity

- Where was the Constructivism?
  - Building on your existing programming knowledge
- Where was the Scaffolding?
  - Worksheet to
    - Familiarize you with environment
    - Show steps to navigating an existing codebase
  - Simpler environment before going to Java

Announcements

Readings for Wednesday are in the textbook

Milestone 1 due Wednesday – can submit as a group

Switch to Games

Let’s explore what motivates us to play / keep playing games!!

What are different game genres?

- First / Third person shooter
- Platformers (mario bros)
- rhythm games
- City building / simulation games
- Strategy
- Sandbox games - e.g. minecraft
- board games
- role-playing games - final fantasy
- puzzle games
- Horror action games

Small Group Discussions (10 min)

- Break up by favorite genre
- What do you like about that genre compared to other genres?
  - Be as specific as possible.
- What are your favorite games within the genre?
  - Be as specific as possible. We want to figure out not *what the game did well* as much as *what aspect you like about games*