Anishinaabe Arcs Lesson Plan Summer 2017, Marquette, Michigan

Title: Anishinaabe Arcs: Bending the Virtual and Physical

Lesson Summary: Students will learn basic computer programming and selected math topics by simulating wiigwaams, longhouses, canoes, among other Anishinaabe structures. Students will then creatively extend these heritage algorithms to their own designs, and finally physically render their virtual simulations using materials representing one of three career paths: 1) sustainability; 2) design; 3) engineering. Finally, students will create short narratives describing how these structures and materials might relate to their personal interests and goals.

Time: 3 Hours

Vocabulary:
Math: 3D Cartesian coordinates, geometric transforms (rotation, translation, reflection, scaling), percentage (in translation); parabolic curves.
Computing: iteration, variables, algorithms, initial values
Anishinaabe: zhopshkaa, epiichiiyimigak, naagidewnjigon

Resources: community.csdt.rpi.edu (social network; cultural background; tutorial; 3D software); vocabulary printouts; share-out (career path) narrative sheets.

Materials: 16 6x6 pieces of MycoFoam; 16 6x6 pieces of Pine board; 16 pieces of plastic board; ¼" flat oval of reed rings; 15 rings of electroluminescent wire w/ power sources.

Tools: 12 computers;1 color printer; 4 drills; 8 glue guns with glue sticks.

Learning Outcomes: Ability to recognize and use the Anishinaabe knowledge that intersects with computer programming, mathematics, and engineering.

Lesson 1: - 1.5 hours

Pre-test -- 5 minutes

Introduction - 10 Mins

Introduce students to the goals and outcomes of the "Anishinaabe Arcs: Bending the Virtual and Physical" workshop. Students will use simulations to "translate" from traditional Anishinaabe math, engineering and computing concepts to their analogous counterparts in contemporary classrooms. They will "reverse engineer" traditional arc-based structures (wiigwaams, longhouses, canoes, among others), and extend these traditions with their own innovations. They will then physically render their virtual designs using materials for one of three career paths: 1) sustainability; 2) design; 3) technology. At the end of the workshop, students will

create short narratives describing how their structures and materials and potential career paths related to their personal interests and goals.

Pass out the vocabulary list and ask students to read through each of the words.

Go around the room to have youths and adults introduce themselves.

Direct students to the community site and have them register.

Cultural Background - 15 Mins

Direct students to the CSDT community site and specifically to the Anishinaabe Arcs page. Together read the Introduction. Ask students what they know about arc-based Anishinaabe dwellings and structures.

Direct students to the “culture” tap on the website. Break students up into groups of 3-4 and assign them each a topic on the culture page: History; Why Arcs?; Materials; Structure.

Ask students to read through their sections, discuss the section in their group, then decide how they will share the information they learned with the rest of the class.

Ask students to share what they learned with the class.

Guided Practice - 25 Mins

Direct students to the tutorial page on the Arcs website. Have students complete the tutorial and then move onto the Wiigwaam challenge.

Activity - 30 Mins

Students have the rest of the time to work on creating their own arc dwelling and structures.

Wrap-up - 5 Mins

Have students save their work to the community site. After students leave, mentors or teachers will need to print out each of their designs, so it is very important that they properly save them!

Interlude: Instructors will print out coordinates for students’ designs.

Lesson 2: - 1.5 hours

Introduction - 5 Mins

Remind students what they did yesterday: learned how to program Anishinaabe Arcs. Ask students to define the vocabulary from the previous day: Cartesian coordinates, arcs, variables. Introduce the remaining vocabulary words and read through them as a group.

Cultural Background and Guided Practice - 10 Mins

Tell students that they will be physically rendering their virtual simulations. To do this they will choose from one of three career paths: 1) sustainability; 2) design; 3) technology.

Direct students to the teaching materials on the website, have them explore the different career paths.

You may want to introduce each path if time permits.

Explain that sustainability focuses on keeping biological systems healthy, productive, and diverse. Introduce the MycoFoam material and reeds. Explain some of the Ojibwe uses of mushrooms: food, perfume, hair products, medicine, and starting and transporting fire. Show students how to put the reeds into the MycoFoam.

Explain that design focuses on constructing objects or systems to support a specific type of human interaction. Introduce the pine board and reeds, plus a flathead screwdriver and hammer. Explain some Ojibwe uses of design with bark and wood: rope and floor mats for dwellings. We will drill holes for those who do not want to use the drill; otherwise, we will show students how they can drill safely to create divots for the reeds.

Explain that the technology focuses on anything from engineering to electronic arts. Introduce pine boards, wires, and reeds, plus drills, flathead screwdriver, and hammer. Explain Ojibwe uses of engineering: snowshoes, canoes, sleds and more. Show students how they will need to drill and thread the wire through the pine board. TELL STUDENTS TO NEVER CUT OR CRIMP THE WIRE!

Activity - 55 Mins

Students will choose one of the career paths. They will receive print out coordinates for where they placed their virtually simulated arcs from the instructors.

Students will collect their materials and physically render their designs.

Share-Out - 15 Mins

In 1-2 paragraphs describe your arc structure or dwelling. How does it relate to your chosen career path? Your family or community? And, your own interests and future goals?

Give students 5 min to respond to the prompt in writing. During the next ten mins go around the class and have students vocally respond to the prompt.

Post-test - 5 mins