American Indian Storytelling with Alice

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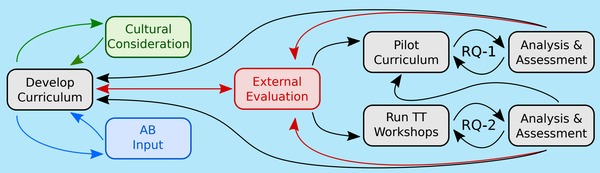
Introduction

Research suggests that introducing students to computational concepts at a young age improves the likelihood that they will become interested in computer science later on in life (Super, 1953). As such, it is becoming increasingly important to develop lessons for K-12 students that include computational thinking (Barr, 2011). The storytelling project at Montana State University integrates computational thinking skills into the Indian Education for All (IEFA) curriculum for middle school students in Montana.

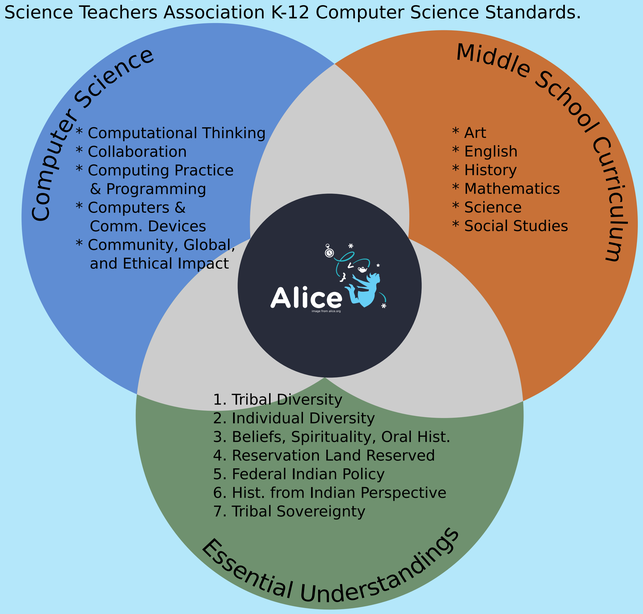
Photo courtesy of Adrian Sanchez Gonzalez

We work to develop lesson plans, plan outreach events, and find relevant literature to satisfy the content standard requirements as well as the essential understandings associated with IEFA. Furthermore, we strive to integrate basic computer science concepts into these lessons to help pique student interest in programming and computational thinking. This is done using the Alice software, a drag-and-drop programming environment that allows students to use computational thinking in a beginner-friendly interface to create animations.



Lesson Plans

Developing lesson plans using Alice helps bring stories to life and stimulate interest in both Indian education and computational concepts. The lesson plans must tie together the following three components: subject-area content standards, IEFA Essential Understandings, and the Computer Science Teachers Association K-12 Computer Science Standards.



Plateau Indian Beaded Bags

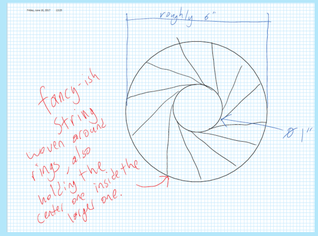
Period 1: discussion of the history and culture relevance of the beaded bags.

Traditional bead bag art used in Plateau Indian Beaded Bags lesson plan (Cooper, 1930).

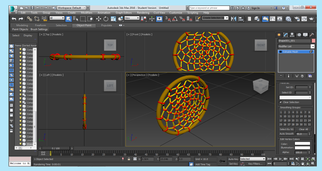
Period 2: students animate events following the scene depicted in the bead art.

Model Development

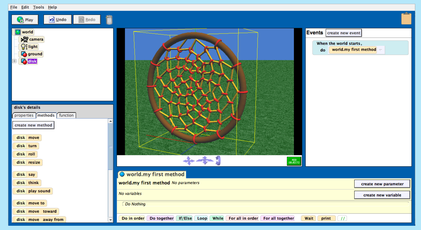
1. Identify an object not in Alice and needed for a lesson.
2. Develop rough draft and provide to the model developer.



3. Develop model in 3Ds max.



4. Add model to world, and add methods as needed.



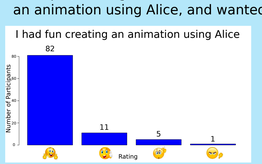
5. Gather feedback from students and instructors.

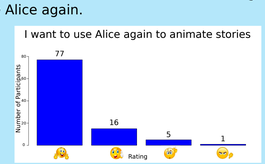
Outreach Events

Sequence of activities for one of our outreach events:

1. Introduction to what an algorithm is.
2. Animate a scene from a comic strip or childrens story.
3. Steps programmed in Alice are reflected in animation.
4. Allow students to demonstrate their animations.
5. Summarize algorithms and applications to animation.

Students filled out surveys at the end of each outreach in which they answered a short series of questions to evaluate the success of the outreach event. For example, among 99 Middle School students, almost all of them had fun creating an animation using Alice, and wanted to use Alice again.





Assessment and Evaluation Techniques

Assessment

classroom discussions, short answer questions, quizzes, etc.

Pre-Assessment

Assessing Previous Knowledge:
- Content Standards
- IEFA Experiences
- Computer Science Concept(s)

Lesson One
- Assessing Content of Lesson

Lesson Two
- Assessing Content of Lesson

Post-Assessment
- Assessing Knowledge Acquired:
  - Content Standards
  - IEFA Experiences
  - Computer Science Concept(s)

Evaluation

multiple choice, short answer, interviews

Students
- Student interest in Lesson
- Student interest in Alice
- Student interest in Storytelling
- Student interest in Computer Science

Teachers
- Ease of Lesson Plan Implementation
  - Content Standards
  - IEFA Essential Understandings
  - Computer Science Concepts
- Resources Provided
- Description of Computer Science Concepts to a Non-CS Teacher

References

Barr, V., & Stephenson, C. (2011). Bringing computational thinking to K-12: what is Involved and what is the role of the computer science education community?. Acm Inroads, 2(1), 48-54.

Cooper, J. (n.d.). Plateau beaded bag, ca. 1930 [Photograph found in Fred Mitchell, Montana Historical Society, Helena]. Retrieved from http://mhs.mt.gov/Portals/11/education/ABeautifulTradition/tradition%20design%20color%20brochure.pdf

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