

## 2016 Advancing Informal STEM Learning (AISL) Principal Investigator (PI) Meeting

Bethesda North Marriott Hotel in North Bethesda, MD

February 29th - March 2nd, 2016

Concurrent Session Notes

**Date:** March 1, 2016

**Session Name:** Cyberlearning and Computer Science

**Session Leaders:** Wendy Martin

**Morning Session Speakers:** Wendy Martin, Tamara Clegg, Jim Diamond, Andee Rubin

**Afternoon Session Speakers:** Michael Horn, Marti Louw, Paul Phamduy

### Summary:

- Informal audience survey
  - understanding what cyberlearning is (almost all) , who has computer science in project (smattering), how may have cyberlearning or some tech (most), how many want to include cyber learning in the future (all)
  - institutions - small number work with cultural institutions and community-based organizations
  - interests in citizen scientists, 3D technology, youth community maker spaces, exhibits
- Cyberlearning definition - informed by learning science, cyberlearning is the use of new tech to create new learning experiences that were not possible before
- CIRCL - had provide a variety of support for people who are interested in cyberlearning, for more information go to [circlcenter.org](http://circlcenter.org) - including resources, mentoring, meetings, webinars etc.
- Session leaders/speakers give overview of CIRCL Resource Center and introduce specific projects
- Small groups discuss how to build capacity, work together, move ideas forward
- Participants discussed cross cutting themes relevant for cyberlearning. e.g.:
  - technology to enhance community
  - creating experiences for youth to become computational creators
  - developing innovative ways for learners to engage with information

### Overview of Session Main Ideas, and Discussions Points:

Currently many different cyberlearning approaches taken and activities conducted in the ISE field. Many are concrete tools, games, and activities that can be shared with audiences on a programmatic level. As we implement these activities and work with parents/teachers, there is a need to connect these skills to higher thinking skills and social contexts in order to develop a skilled STEM workforce and future leaders.

And as the field of cyberlearning grows it has become evident that we need to spend time organizing and classifying projects and questions that practitioners introduce.

### Morning Session (10:30-12:00):

Tammy Clegg, UMd

- “Scientizing” in daily life - will discuss social and mobile technologies
- ScienceKit for Science Everywhere - Social Media App
- “How can we design new tech to bring entire neighborhoods together?”
- Children are given iPods that they can use in their community on the science everywhere app
- Partnering with communities in MD and Seattle, WA
- Trying to understanding what practices are needed to get children connected, to science because tech

is not enough

- Currently are analyzing the posts the children are making, next step is to create larger scale displays in their communities

Jim Diamond, EDC

- Speaking on ITEST funding proposal - iDesign, in 3rd year
- Using cultural-based pedagogy methods to look for issues in immediate community and express interest in video game design, uses computational thinking
  - decomposition
  - pattern recognition
  - abstraction
  - algorithms
- Goal: Create curriculum for afterschool computer club houses, worked with teachers that have varied background
- Provide PD to the teachers, using scratch program
- Think in terms of translation - how do you move from a topic (many children wanted to explore gun violence), then children engage in research (what are the issues on this topic that are worth representing to others?), then represent the topic in terms of gameplay, then how to represent those algorithmically
- Steps
  - Children start with storyboard, then think about game elements
  - Concurrently they are beginning to learn to program in scratch
  - finally they create a game
- Suggested discussion topics:
  - What kinds of developmental challenges exist for young people and teachers when doing this kind of thinking?
  - How can we scaffold the translation process for both?
  - How can this type of work help build connections between social sciences, the humanities and STEM learning?

Andee Rubin, TERC

- Series of 3 NSF grants, started with science journalism, 2nd project included infographics in high school students, current looking more careful at the text and quantitative aspect of infographics
- They are working with high school students, in paid internship at St Louis and at U Colo there is a 1-week summer program run by grad students
- How do provide supports that differ between different contexts?
- They use existing tools, you don't have to create new tools, but instead look at the socio- technical supports
- They are using [venngage.com](http://venngage.com) and [codap.concord.org](http://codap.concord.org)
- What people to understand what a data exploration tool really looks like (not excel)
- [scijourner.org](http://scijourner.org) - is place to publish the infographics

Afternoon Session (1:45- 3:15)

Marti Louw, Carnegie Mellon:

- "A sociotechnical system to support taxonomic Identification in volunteer-based water quality biomonitoring"
- Look at resources for learners that are trying to do identification work- how these tools are being used in classrooms vs. what experts use

- Learners had to create/recreate a number of tools to make it work for them
- They created tool online that use high def images and multimedia overlays ([www.macroinvertebrates.org](http://www.macroinvertebrates.org))
- Citizen scientists were the ‘sweet spot’ for the audience served
- Embedded evaluation with high school students during camp
- Recently received an NSF grant- partnering with Carnegie Mellon University, Clemson University, Carnegie Museum of Natural History, and others- a mix of advocacy groups and diversity of practices/audiences
- For future- want to connect to social media or communities of practice

Michael Horn, Northwestern University :

- Tangible Interaction and Cultural Forms- Supporting Learning in informal Environments
- How to create computational literacy experiences, how we can shape a 30 sec interaction into a 10 min or lifetime experience
- What brings diverse groups of people in and what shapes their experiences (in museums, specifically)?
- Tern Tangible Programming- When they swapped computer mouse with blocks, found many girls interested
- Interaction designers can build on - use of physical artifacts can evoke cultural forms
- Trying to prove claim that physicality attracts people and builds investment in the activity
- Strawbees- strawbees.com- physical tiles interfacing with tablet to build a path for a monster
- Computational Literacy Sticker book for pre-literate kids- see steps coming alive in a book
- -age-appropriate computational learning experiences that can be done in informal settings, including the home
- Green Home Games- build games that encourages full-family discussion on greening
- How do we design comp learning materials that align with existing pedagogy?

Paul Phamduy, NYU, Tandon School of Engineering:

- Robotic Fish- modeled after Atlantic scup fish, kids go to aquarium and can design plastic model to turn into a robotic fish
- Fish follows path
- Interactive modalities using iDevice- manual, semi-autonomous, autonomous
- Natural bodily gestures to drive robotic fish and collect water temperature- visitors can control it
- Deployed it at festivals, museums, and aquariums
- Learning goals for visitors: learn something about fish
- Compare to real fish movements and paths through side-by-side paths

### Discussion Groups:

The morning session broke into three discussion groups:

1. Technology to enhance community
2. Creating experiences for youth to develop computational thinking skills
3. Developing innovative ways for learners to interact with content and information

Discussion points:

- Tech to enhance community
  - Program has children from 5 - 15 because siblings would want to be involved, the

- elementary children were originally the most interested, but new kitchen science content is attracting the middle schoolers, so barrier of entry is changing
- What are the process and procedures that are being developed to establish a culture - connected practice + technology design
- Challenges with how to work with mixed grade groups,
- Consider facilitation and leadership tracks
- Developing innovative ways for learners to interact with content and information
  - Who is attracted to these programs that combine art and science - for the summer program once recruiting place is a high school of art and design, kids can match their strengths and are very social, which is especially important with high school kids
  - These types of social interactions can also happen with adults - communications professionals and musicians were both cited
  - After-school environment is good for encouraging collaboration because does not end in individual assessment

Afternoon session stayed in one group and discussed these points:

- Pixar exhibit- comparing how you do a scene/movement in a physical movie vs. an animated movie; creators talked about the steps of creating the movie and incorporated math
- Robot turtles- game board, sequencing tiles
- Code.org- take common characters that kids know and can control the movements with specific goals; includes videos of professional animators and how they created sequences for characters/movies
- What differences have we seen with gender and screen vs. physical manipulatives? Participants found daughters lean toward physical interaction
- How to introduce computational thinking/coding: train on a track, sequence of exercises, help teachers own this language because they may not understand they are already doing computational thinking
- Are we not thinking broadly enough? Are we focusing too much on just coding? What is the long-term trajectory of teaching this thinking? For example, you can work on categories and themes (that relate to databases).
- Workforce development- Being good at technology and math needs to be paired with good social skills to be successful; who is willing to fund projects that develop both these (especially social skills) with kids who need this (those who are autistic)?; looking for people who can recognize problems in a system (critical thinking skills emphasized)
- Are kids learning the flexibility that they need to be good thinkers? How are we fostering this?
- How do we move students beyond being interested in STEM to being qualified for STEM jobs?
- How do we reorganize/order cyberlearning projects to share the discrete foci? Use tags on [circlcenter.org](http://circlcenter.org). Take a project-learning approach. Look at International Society for Technology in Education (ISTE) for possible tags or topics.
- What are the genres of activity to organize around? Perhaps we ask a program officer or other expert to help lead a talk or meeting on this conversation.

## Q&A:

Q: What about IRB concerns with children on social media?

A: Tamara Clegg - we have not encountered problems yet because we have a good relationship with the principal at the school. They are thinking about how to promote safety with the large displays to make sure that the children are not bullied or harassed. They are making the anonymous posting.

Andee Rubin - there are blog posts on [informalscience.org](http://www.informalscience.org) that help with consent documents and other information in out of school environments (<http://www.informalscience.org/news-views/going-through-institutional-review-board-irb-process-informal-education-organizations> )

Q: Do you curate onto the community bulletin board?

A: -T.C. We are in the 2nd year and we are beginning to figure this out now. Want to be able to give rights to the kids. Audience member suggests that Whyville is a good model of children self-policing.

Q: In your community, what venues have you used?

A: T.C. - we partner with a local church in MD community, to leverage an already existing connection. The connections are different in WA, which is at a school.

Q: Have there been any IRB approvals based on an experimental model, different from norm, that is more familiar with this type of work?

A: Audience suggestion to look at NYC school district.

Q: From project working with kids to make kids about climate change, are they using what is available and are their examples of the games?

A: Jim Diamond- Using what is available and yes

Q: From national writing projects, all of these projects could be at National Writing Project meeting - there are interesting connections to DML, YouMedia Labs etc. (Elyse Eidman-Aadah)

Q: Was the example infographic made in Venngage?

A: Andee Rubin- No, was made in illustrator

Q: How do you work with the children to determine what to display and what not to display?

A: A.R.- They have guidelines and lessons that help to teach this.

Q: What about the difference in visualization for infographics versus visualization for scientific discovery, do you get into this?

A: A.R.- We have both data exploration and canvas tools, first play around the data as they move to decide what to display. You can do this in a different tool to try to separate these concepts

Q: How difficult is it to integrate what you are doing into different disciplines?

A: A.R.- It is up to the teachers to determine how to focus students work. We are agnostic in terms of content. They have a wide range of teacher topics.

Q: How much are the program and what is the learning curve?

A: A.R.- Cost is \$100 per class, the teachers sometime have a bit of a learning curve on Venngage (takes a couple of class periods)

Q: What are the language and operators you are expecting in the pre-literate audience?

A: Michael Horn- Sequence blocks have an order and can be repeated, you can ask yes and no questions, you can combine individual steps

Q: What are the differences between the different modes of the robotic fish?

A: Paul Phamduy- Manual- full control of movements; Semi-autonomous- make path and then observe the movement; Autonomous- just observe. We found manual and semi most popular.

**Follow up Topics:**

- A recommended next step is to look closely at themes and trends in the field and how we can share our knowledge of cyberlearning.
- Attend June 5-6 is Cyberlearning 2016 meeting at Westin Arlington (VA)!
- How do we work on reordering cyberlearning themes/activities and create communities of practice?