

Cross-community Breakout Group Notes

- Attendees:
 - Phillip Long (Moderator)
 - Linda Pittinger
 - Myra Halpin
 - Elizabeth Quigg
 - Kristin Ciesemier
 - Victor Sutton
 - Duane Hill
 - Mary Jo Daniel
 - Julia Barnathan
 - Jamai Blivin
- Phil: iLabs seems like a bootstrap operation
 - Intent of session is to mix up groups from yesterday, and use this as new way to foster partnerships and directions
- Partnerships (Driving question 2)
 - Fermi Education Office, Quarknet-I2U2 with MIT
 - MIT students can use their software to write their theses
 - Fermi has the educational scaffolding and students can come from institutions
 - Giving access to equipment like cosmic ray detector
 - Next best thing to having the equipment
 - Fermi with Adler Planetarium
 - Adler partners with Notre Dame in using instruments
 - Could bring remote operation to this instrument – making the cosmic ray detector an iLab *
 - This equipment is at the Adler Planetarium right now
 - Will need another layer to drive it
 - Phil: There is a cosmic ray detector in a closet at MIT, and should take it out, can find student to write the software, etc.
 - One at Roxbury Latin – is the same one that Elizabeth is talking about
 - Need these incremental steps to make this happen
 - Museum of Science in Boston (Duane Hill)
 - What could museums utilize in a broader sense?
 - No shortage of opportunities – interested in all of these collaborations
 - Cosmic Ray Detector
 - **Having museum being the *convener* - linking industry who wants to be involved but doesn't know how to be involved in education**
 - Providing that link to the larger community
 - Make use of partnerships that exist in museums
 - CAISE project – Ellen McCallie
 - Working on clearing house on their website

- National Science Board pushing for Tera Grid centers to look for capacity getting into outreach opportunities
- How to use 'spare' capacity
- Linking with State Depts of Education
 - NM (Mary Jo) – source of good connections
 - Good way to centralize efforts so as to not bombard teachers from too many different directions
 - Also good way to have this make sense for teachers
 - Linda: Also something that CCSSO could explore
 - People come together to talk about different needs from each state
 - Way to pull this together at a higher level to share information and share best practices
 - State Science supervisors – a bit smaller than CCSSO in focusing on science
 - Finding ways to tap into things that already exist
 - National Science Teachers' Association
- Partnerships in Illinois (Kristin)
 - Informal science providers – along the lines of museums that also includes academies like IMSA
 - New teachers
 - **This is prime time to make new teachers aware of technology like iLabs – online technologies**
 - INTC (Illinois New Teacher Collaborative)
 - Specifically have resources pooled for new teachers to access
 - Duane: Be mindful of the fact that avenues toward new teachers are the state, individual districts
 - In Boston, the city district is very closed – if it doesn't fit with city-approved curriculum, than new initiatives won't happen
 - **Direct partnerships with large school districts**
 - **DOE Pre-service Teacher Programs**
 - Phil: Targeting this group shields from politics later on when teacher have been teaching a long time
 - **Pre-service institutions**
 - **Associated Colleges of Illinois**
 - *Major umbrella to contact other teachers
 - IMSA does summer workshops for Golden Apple Foundation
 - Best and brightest teachers
 - Hosting one specifically for math and science teachers
 - Should have specific workshop for iLabs
 - *These teachers remain in teaching longer, which is why targeting these teachers is so important

- *This will be different in different states and areas of jurisdiction (Duane)
 - Also working with Senator Durbin
 - Could be a lot of groups who work to link formal and informal education that could be worthwhile partnerships
 - Kristin from IMSA is working on this specifically – to work on partnerships for IMSA
 - NC school does not have a comparable position like this
 - NM has created databases of STEM programs and outreach
 - Very difficult to identify programs given the large amount of land and small amount of people
 - Strategic plan to bring partners together and have state-wide conversation about STEM
 - Really difficult to know who all the partners are – will be an ever-present problem
 - Need a central person to maintain network of relationships and partnerships
 - Linda: Asked National Governor’s Association for contact people in states who work on STEM task force at the governor level
 - They were struggling a lot – they have a list, but know it’s not right
 - Knows about the business clusters, but not exactly the people
 - First identify the clusters and then drill down to the person-level
 - Illinois DCEO and State Board of Education in working with IMSA
 - Massachusetts Biotech Research Council
 - Very interested, but limited in knowing existing opportunities
- Specific initiatives
 - George Lucas Educational Foundation – could they make a video on what iLabs are doing (Victor)
 - This foundation has a set of videos that are downloadable from their website (edutopia.org)
 - Can approach Milton Chen, director of GLEF)
 - Thornburg Center for Space Exploration (Victor)
 - After school curriculum
 - Is a virtual center
 - Concerned with technology in education, which aims to implement 3 year after school or elective curriculum involved in space exploration, getting students interested in STEM futures
 - Don’t want to compete with in-class curriculum
 - 1st year – Earth to the moon, 2nd year solar system, 3rd year universe and galaxies
 - 7500 after school programs going on at one time in the U.S.

- But with enough interest, this could compete with those
 - Will charge schools to acquire the curriculum, need start up funding now
 - Will point schools to where they can get content, they will not provide the content of the curriculum
 - Pointing schools to existing resources
 - If museums have resources, they'd love to know about it
 - **Partnership - Association for Nuclear Science or Energy – follow up with Mary Jo about it (Mary Jo)**
 - **Atomic energy workshops**
 - **Brings Geiger counters around to conduct workshops**
 - In Massachusetts – can't use live mammals in primary or secondary schools
 - Could be use for remote labs
 - Research institutions fall under different regulations
- Next steps
 - Identify and maintain network of relationships
 - Linda: iLabs is more approachable than many issues in STEM education
 - People can see the need for it more readily
 - We still have to figure out what the driver is for the community – what is the message, how will we know it's successful
 - Be more tightly aligned about the message – the three or four take-home points
 - Otherwise will continue to get diluted
 - Elizabeth: Have to have the killer instrument that really grabs people
 - The existing ones are important for their context, but not great for the general audience in grabbing people
 - Myra: Have to have four “killer instruments” so that everyone finds their niche
 - Need to have something for biology, chemistry, in addition to physics
 - **So all groups see there is an application for them
 - Some of these are much harder to do because of live specimens (Elizabeth)
 - Lots of applications (Myra)
 - Remote microscope, Superfine at UNC has a microscope that you can log on to and borrow a set of joysticks to actually move it around
 - Chemistry – scanning electron microscopes, looking at materials on atomic level
 - Bugscope and chickscope are existing implementations of this
 - If we want to attract people, need to have something that they can relate to from many subsets of STEM
 - Phil: At undergraduate level, looking at major textbooks and look at major experiments that identify key understandings in science content

- Look at these experiments and see how many of them are instrument-able through iLab technology
- How could we do this for chemistry, biology, physics? Are they tractable?
 - Not a panacea to all labs – and don't have an interest in pretending that it is
 - What does fall in the scope is valuable and worth attending to
 - Many things that seem out of scope actually are within scope
 - Shake table in civil engineering
 - Can also have programmed earthquakes – simulations of past earthquakes on physical building associated with this lab (in smaller scale such as shake table)
- What is the significant difference between iLab and simulation? – To reiterate Randy Phelps' question (Mary Jo)
 - Phil: **Main difference is that there is variation in the outcome with real equipment EACH TIME**
 - Not replacing simulations
 - But simulations can lead to misconceptions in understanding real phenomena
 - Aren't models for every phenomena – the underlying phenomena are too little understood
 - **Want to give students the messiness of real data, compare it with the simulation**
 - ****Must be a criteria for iLabs so that students do get this actual experience (Mary Jo)**
 - **Need to make this VERY clear in making the argument for iLabs**
 - Simulations are cheaper, well-understood, and consistent in outcome every time
 - It always works
 - But in real life, science is experimentation
 - Using only simulations only allows us to study very well-understood principles
 - In theoretical science, the challenge is to build the model and then test it (Elizabeth)
 - Need to articulate our message – what's the point of a real lab, why can't we simulate the world and just be done with it?
 - Mary Jo: Especially important when it is so close to a simulation from user experience
 - Phil: Webcams are on every iLab
 - Students at MIT really requested it – not that they use it every time they run the lab, but they need it at

- the very beginning to build the authenticity bridge for students
 - Students don't believe it if there's no webcam
 - Mary Jo: Question – how do you know the lab is real?
 - Phil: Students believe it if it's on the web, that's the way kids are
- Computational science (Myra)
 - Becoming major research effort, and is now getting into the high school level
 - If expt is not going well, the students resort to making a model because they know they'll get data from it
 - Pharmaceuticals do all their work originally with models before performing trials
- Phil: What are the pivotal action items that help iLabs move forward in a valuable way?
- **Elizabeth: Get together a group of teachers and scientists to make a list of characteristics that we would need in iLabs that would make them useful in education**
 - Not all instruments will be appropriate
 - Teachers know where the pain-points are
 - *Need to publicize the results of teacher design teams so that people know the needs of classrooms that iLabs are meeting
 - Duane: **The different needs from all the audiences must be addressed for the use of iLabs**
 - Want to use iLabs for families and larger groups beyond just schools
- Jamai: If iLabs can spark ideas for future workforce, this would be a great marketing tool for iLabs
- OCW – Open Course Ware
 - Has done work to link its course material
- Radioactivity lab
 - Could shielding be done with this? This would be more interactive for students to figure out how radioactivity changes with different absorbers.
 - Can advertise relevance of radioactivity lab such that the material cannot be used in classroom in person
- Goal of project: To demonstrate efficacy and reusability of doing online labs over and over again
 - Then thought there were more implementations of iLabs, hence the reason for the conference
 - Ideas for future grants to go after when we figure out what is needed based on the ideas had at the conference

Major Themes of Group Discussion:

- iLabs could be used to bring educational expertise and scientific (and computer science) expertise together in the lab and museum communities
 - o In specific areas such as Supercomputing, Terra Grid
- Utilize existing infrastructure such as museums as linkages and State Depts of Education to disseminate iLab technology
- Target new teachers and preservice teacher education programs as place where iLabs could be well-received and strategically implemented
- Important next steps:
 - o Carefully craft an argument/message for iLabs that clearly explains why it is useful, and particularly why it is advantageous in comparison to using simulations
 - o Need to make sure that curricular materials that surround iLabs are specifically relevant to the needs of both:
 - Formal education settings
 - Informal education settings, which target both youth and adults