

APPENDIX A:

NM EPSCoR Innovative Working Group:
Developing An Online Network for Teacher Professional Development in Computational Science /
Modeling and Simulation.
February 9-12, 2012

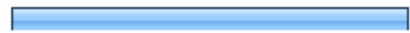


Innovative Working Group Participants:

- 1) Irene Lee, Santa Fe Institute, Project GUTS / Supercomputing Challenge
- 2) Barbara Kimbell, Santa Fe Institute
- 3) Kersti Tyson, UNM College of Education. (no overnights)
- 4) Kristin Umland, UNM College of Education. (no overnights)
- 5) Terri Hansen, NMSU STEM education / Project GUTS.
- 6) John Paul Gonzales, Santa Fe Institute, Project GUTS / Supercomputing Challenge.
- 7) Carl Bogardus, GUTS club leader, Gadsden Public Schools.
- 8) Celia Einhorn, Supercomputing Challenge.
- 9) Patty Meyer, Project GUTS / Supercomputing Challenge.
- 10) Susan Gibbs, GUTS facilitator, formerly of Santa Fe Public Schools.
- 11) Philip Arguello, GUTS club leader, Las Cruces Public Schools.
- 12) Juanita Arguello, GUTS club leader, Las Cruces Public Schools.
- 13) Betsy Frederick, Project GUTS / Supercomputing Challenge. (videoconf only)
- 14) Wendy Huang, MIT researcher from StarLogo dev. group.
- 15) Scott Dynes, GUTS y Girls social network analyst, online community builder.

**Note: Tyson and Umland will not be staying overnight.
Frederick will be participating by video conference only.


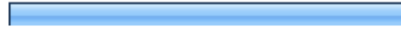


APPENDIX B: GUTS Community Member “Online PD Network” Survey Results

Data collection occurred at two GUTS PD workshops on 1/7/12 and 1/14/12. 32 surveys were collected.

1. Do you think you would use a GUTS online network?			Response Percent	Response Count
Yes			75.0%	24
No			18.8%	6
Maybe			6.3%	2
Comments:				15
answered question				32
skipped question				0

Q1. Do you think you would use a GUTS online network?		
1	Great idea!	Jan 29, 2012 12:04 PM
2	Yes, support is always great.	Jan 29, 2012 11:56 AM
3	It should include some of the above for students to access and use	Jan 29, 2012 11:53 AM
4	It would be easier for kids to give feedback	Jan 29, 2012 11:52 AM
5	when dealing with limited and decreasing resources, i.e. travel and lodging time and money, this is the way to go.	Jan 29, 2012 11:50 AM
6	I don't text, social network. I email when I have to. Email would be best.	Jan 29, 2012 11:46 AM
7	useful and informative	Jan 29, 2012 11:45 AM
8	also depends on work schedule; a credited online course would be great!	Jan 29, 2012 11:44 AM
9	to communicate problems students have	Jan 29, 2012 11:43 AM
10	With our network most sites are blocked from networking	Jan 29, 2012 11:39 AM
11	Checked both YES and NO; when I have time on issues or have needs for conversation - may be just another place to read sometimes.	Jan 29, 2012 11:38 AM
12	It would be nice to hear about other people's experiences.	Jan 29, 2012 11:34 AM
13	smiley face	Jan 29, 2012 11:30 AM
14	Depends on how useful and easy to use it is, as well as peer dynamics	Jan 29, 2012 11:25 AM
15	I like the website that is being used already.	Jan 29, 2012 11:24 AM










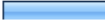

2. If yes, what do you think you would use it for?

		Response Percent	Response Count
Socializing		34.8%	8
Professional development		73.9%	17
Sharing stories		47.8%	11
Learning to program		95.7%	22
	Other (please specify)		15
answered question			23
skipped question			9

Q2. If yes, what do you think you would use it for?

1	All of it.	Jan 29, 2012 12:04 PM
2	Communicating with my team	Jan 29, 2012 12:01 PM
3	Sharing worksheets, developed to go with units.	Jan 29, 2012 11:58 AM
4	any, all	Jan 29, 2012 11:56 AM
5	Resources for GUTS.	Jan 29, 2012 11:50 AM
6	Sharing ideas, problem solving	Jan 29, 2012 11:48 AM
7	Solving problems	Jan 29, 2012 11:44 AM
8	Asking for help or guidance	Jan 29, 2012 11:42 AM
9	Asking how others do something	Jan 29, 2012 11:38 AM
10	Tips for new club leaders, curriculum discussion, GUTS questions and answers.	Jan 29, 2012 11:36 AM
11	Not socializing but all others	Jan 29, 2012 11:34 AM
12	I don't think I would use it very often.	Jan 29, 2012 11:33 AM
13	Networking, information portal, how-tos	Jan 29, 2012 11:27 AM
14	knowing how other groups are doing	Jan 29, 2012 11:24 AM
15	Curriculum discussion	Jan 29, 2012 11:21 AM

3. What are the top three features you would be interested in?

		Response Percent	Response Count
Chat and messaging		23.8%	5
Videos to post, view, and comment on		14.3%	3
Posts such as interesting articles on learning		4.8%	1
GUTS Questions and Responses		28.6%	6
Curriculum discussion (what worked / didn't, ideas for making a unit better)		38.1%	8
Lessons learned		14.3%	3
Helpful tips for new club leaders		4.8%	1
Profile updates		4.8%	1
Learn to program videos or webinars with regular challenges and hints		52.4%	11
Ask a computational scientist		23.8%	5
Kids say the darndest things! (insight into the middle school mind)		0.0%	0
Forums		14.3%	3
Other (please specify)			13
answered question			21
skipped question			11

Q3. What are the top three features you would be interested in?





1	Sharing and professional development	Jan 29, 2012 12:00 PM
2	downloadable resources, sharing stories (successes and challenges) and PD	Jan 29, 2012 11:58 AM
3	Professional development, sharing stories	Jan 29, 2012 11:53 AM
4	Sharing, programming	Jan 29, 2012 11:52 AM
5	Discussion area (Skype), file storage, curriculum area,	Jan 29, 2012 11:50 AM
6	programming games for kids	Jan 29, 2012 11:45 AM
7	Professional development	Jan 29, 2012 11:44 AM
8	Professional development	Jan 29, 2012 11:43 AM
9	usual problems, any program weakness.	Jan 29, 2012 11:42 AM
10	Sharing stories, sharing programs	Jan 29, 2012 11:30 AM
11	Forum, FAQs, and networking	Jan 29, 2012 11:27 AM
12	Webinars	Jan 29, 2012 11:25 AM
13	professional development, socializing, learning how other clubs handle the material	Jan 29, 2012 11:24 AM

4. How often are you online per day?

	Response Count
	31
answered question	31
skipped question	1

Responses	Number	Percent
Less than 1 hour a day	1	3%
1-2 hours a day	12	39%
3-4 hours a day	5	16%
5-6 hours a day	5	16%
7-8 hours a day	4	13%
9-10 hours a day		
11-12 hours a day	1	3%
13-14 hours a day		
15+ hours a day	1	3%
2-3 times per week	1	3%
A lot, I don't want to think about how many	1	3%
Total	31	100%

5. How often do you use social networks?

		Response Percent	Response Count
Daily		46.4%	13
Once a week		7.1%	2
Once a month		10.7%	3
Once a year		0.0%	0
Never		35.7%	10
Other (please specify)			5
answered question			28
skipped question			4

Q5. How often do you use social networks?

1	2 tiems/week	Jan 29, 2012 12:04 PM
2	only at home; SNS blocked at school.	Jan 29, 2012 11:39 AM
3	2 times per year	Jan 29, 2012 11:34 AM
4	3-4 times per week	Jan 29, 2012 11:33 AM
5	1-2 times per week	Jan 29, 2012 11:27 AM

6. To what extent do you use the Internet / web resources for personal learning or professional development? (vs. face-to-face or reading books, articles, etc.)

Responses	Number	Percent
None of the time	1	4%
0-24% of the time	2	7%
25-49% of the time	3	11%
50-74% of the time	12	43%
75-100% of the time	10	36%
Total	28	100%

Conclusions:

- 1) 75% of 32 respondents felt they would use an online GUTS PD network.
This is not surprising due to the technologically focused nature of the GUTS program and the teachers it attracts. Two respondents asked about plans for students' access to the network. One respondent state that access to social networks was blocked by their school district. Credit for an online course was suggested by one respondent. One respondent said that their usage would depend on ease of use and quality of "peer dynamics" on the network. I take this to mean the social or collegial feel of the network.
- 2) 95% of 23 respondents to question #2 said they would like to use the network for "learning to program". "Professional development" was the second most selected item followed by sharing stories. Professional development can mean many things to many people so I think we need to clarify what was meant by professional development.
- 3) Top three features respondents were interested in were:
Learn to program videos and webinars (52%),
Curriculum discussion (38%), and
GUTS questions and answers (28%).
- 4) The majority of respondents reported being online at least a few hours per day.
39% reported being online 1-2 hours per day;
16% reported being online 3-4 hours per day;
16% reported being online 5-6 hours per day;
13% reported being online 7-8 hours per day;
- 5) On the use of social networks, respondents seemed to be split into two categories; either they used social networks daily or not at all.
- 6) Most respondents said that they already use the internet or web resources for personal learning or professional development.

APPENDIX C: Project GUTS Website hits (projectguts.org)

GUTS website feature list and statistics (hits)				
Search				
Calendar				
Upcoming events				
Cookbook pages	8213			
Quick links				
How to join a club	15222			
Application form				
Video tutorials	10645			
Download software				
Club leader contacts	2658			
Club schedules				
Navigation Block			Mission/Vision	2120
Home	311093		Overview	2249
About Us*	11475		Our Clubs	2644
Join Project GUTS	15222		Partners	2369
NM Map	6372		Research	2153
Recent posts			Our Staff	2794
Create content*				
My Blog				
My account				
Administer*				
Logout				
Resources Block				
Announcements	9577		Contact list	
Publications	9773		CL Survey	
Science pages	10536		Start a club	1809
Teacher Club leader resources*	5855		Curr & Tools	5262
Facilitator resources	1125		Attend & demog	445
Student mentor resources	849			
Video interviews	830			
Video tutorials	10645			
Glossary	4456			
NSFAYS files	1216			
Reporting Block				
Club leader logs	1537			
Facilitator logs	389			
Student investigations	1259			
Student mentor logs	248			
View investigation results	372			
PINK	means access does not require login. Web crawlers may be in these counts.			

APPENDIX D: Notes from NSF CE-21 Community meeting on Best Practices in Teacher Professional Development in Computer Science

CE 21 10:15 am session PD for K-12 teachers / best practices

Speaker #1: Anthony Petrosino of UTeach and VaNTH

His message was to ground teacher PD in learning theory

- 1) “How people learn” (Branford). How do the explicit ideas of how we learn transcend into our PD? We need to detect and address preconceptions participants in the PD have of how the world works? (Use formative assessment). The Legacy Cycle (Schwartz, Lin, Brophy, Bransford, 1999) uses external scaffolding based on How People Learn.
- 2) How to develop expertise. (The progression from Newbie to Expert) To develop expertise one needs facts, concepts, retrieval and application (transfer). What do we know about attaining each? In general, we over emphasize the attainment of factual knowledge at the expense of building conceptual understanding. For pre-service teachers, factual knowledge is necessary but not sufficient. Meta cognition (learning about our learning) is necessary for the development of expertise. Meta cognition requires: reflection, acquisition and integration, participatory practice (Collins, etc.) Leverage reflection, integration and participatory practices during Professional Development workshops. Experts recognize patterns, the organization of content knowledge, and how knowledge that is conditioned. Adaptive expertise is the goal, not static knowledge.
- 3) Communities of practice. Becoming a member of CoP- starts with peripheral participation. The classroom is the setting for social and cultural action. Presentation of work is important within communities of practice.

Examples from Petrosino’s work:

1) In UTeach (University of Texas Austin part of a collaboration between Schools of education and Schools of engineering. Participants in workshops act as designers, they engage in curriculum development, designing materials for classroom implementation, and in developing anchor videos that show scientists in action. They develop the structured questions ask during interviews of scientists.

2) In UTeach Engineering’s MS Program in an Engineering concentration they collaborate with the Austin school district, the UT School of Engineering, and Natural science departments at UT Austin. Texas instituted a 4X4 requirement in science. They developed a model HS engineering course, offer teacher PD workshops and a summer teacher institute. Projects include Aeronautical engineering, robotics, NASA Mars mission (includes risk analysis), and engineering ethics. The goals are to attract multiple disciplines to engineering, raise awareness of engineering as a profession, build habits of mind, design solutions, and solve problems. The main concept is that in their TPD, teachers are developers of curriculum. Teachers are asked to develop curriculum. Research question they seek to answer is “how does student knowledge co-develop across STEM disciplines”.

3) In VaNTH Bioengineering - NU, UTex, Harvard/MIT – the Legacy cycle is used as a scaffold.

Speaker #2: Gail Chapman – UCLA’s Exploring Computer Science (ECS)

ECS is conducting a 3-year qualitative research study. Interviews with participants and discussions with their community led to a series of findings about professional development in Computer Science.

1) Belief system issue came up. What is CS? Course offerings vary between schools. While the AP CS Course participation was goal (especially participation by women and underrepresented groups), they found that they needed a better entree to CS.

2) They implement a three-pronged model: the three prongs are policy, teachers, and curriculum. Gail diagrammed it as a triangle with policy, teachers, and curriculum as the vertices. Curriculum includes CS concepts, teaching and learning through inquiry, and developing an equitable classroom culture (three parts of the puzzle). In the curriculum they stress the creative nature of computing and computing as a tool. The curriculum consists of 6 topical units that get at the breadth of CS (taught in Scratch). Teachers become facilitators of classrooms rather than a sage on stage. They use the 5 E’s framework within ECS (Engage, explore, explain, elaborate, and evaluate).

3) ECS’s PD model. First and foremost, pay attention to how you set up of the room so it is conducive to PD. Cultural understandings are necessary for PD. Allow time for participants to be true participants. What can we do

to change the content so that everyone can be jazzed about it? Whatever framework you have is just notes on the page. Teachers bring it to life. Pedagogy and content are given a 1:1 ratio. ECS supports teachers in learning the curriculum, strengthening teachers' instructional approaches, and create a learning community. NOT teacher training. NOT lock step.

4) ECS is building a CoP so teachers can reflect and grow. Pedagogy is more critical in her opinion. Their 2-year PD model starts with a Summer Teacher Institute. They work in groups, plan lessons, work on lessons then come together to discuss strategies, what works, for whom, in what context. Key questions are: "How do students create their own learning?" and "In the process of creating their own learning, what are equitable practices?"

5) During the year they host quarterly Saturday follow-up sessions. During these sessions participants learn more content and pedagogy then reflect on practices and further build their community. Developing reflective practices and pedagogy is what helps teachers own the material and become leaders of community. Within workshops they talk about the issues. Trust is of utmost importance. The participants are free to say "that activity bombed".

6) What they (ECS) are learning - teachers are more comfortable in year 2. In year 1, they don't have the big picture yet. In year 2 they teach more strategy and pedagogy. ECS recommendation is to integrate an inquiry-based pedagogy from the beginning! New participants need a lot of coaching and instruction so they pair novice and experienced teachers. Ongoing support, community gatherings, and coaching are necessary components. Not going to extend that in the model instead they need to build that support system within schools. (How? Through having more than one teacher per school offering ECS?)

Speaker #3: Barbara Ericson of Georgia Tech

Barbara Ericson represents the Institute of Computing Education at Georgia Tech. AP CS A was initially offered through and within business depts. ICE's goals increase the quantity and quality of AP CS teachers over time. Students too. Barb stated "students who take AP CS A are 10 times more likely to become CS majors." The challenge is how to convert tech/ keyboarding teachers to computer science teachers. It is too hard for many of these teachers, they couldn't jump into Java, and Python was difficult for them too, Scratch was easier for them (they teach it as if they were teaching Microsoft Office apps). These teachers ended up making assessments based on the Scratch interface, rather than on the programming or CS concepts. In GA there was a revision of the courses offered. 4 courses in a sequence: Computing in the modern world, Beginning Programming (basic Java), Intermediate Programming (GUIs and SE), and AP CS.

Teacher professional development took place over 4 weeks. (one week was focused on each course / level)
For Computing in the Modern world 1 they taught CS Unplugged activities, PicoCricket, Lightbot 2.0, and Scratch.
For Beginning Programming: Walk a flowchart. Alice and Media computation, current research in computing
For Intermediate Programming: CS Unplugged, Appinventor, and Greenfoot.
For AP CS, Complexity, Gridworld, arrays and lists
One day workshops are also offered throughout the year: Hands-on robotics, web development, HTML 5,

ICE Results - 475 teachers participated representing 274 schools. Students of teachers in the workshops became students enrolled in CS at Georgia Tech. They saw increase in teacher confidence in pedagogical skills, and an increase in teachers teaching programming and AP CS. Teachers appreciated hands-on, sharing with other teachers, resources. The number of AP CS exam takers went up. The increase included women, Hispanics, and African Americans.

Lessons learned:

Teach things the teachers want to learn. Provide materials: slides, worksheets, projects, grading rubrics, videos, poster, books, online sites. Provide incentives: stipends, lending libraries, competitions, summer camps, professional learning credits, endorsements and certificates. Hands-on activities at PDs motivate teachers. Beginning CS teachers focus on content not pedagogy – even though instruction is offered using the pedagogy. To develop a community of teachers - find a leader in each school district. The leader is able to modify curriculum for the district, be the champion. Work with the leader to get the software installed across the district. (Often have to go to the district level to make the request for software installation.)
At PD Workshops: allow the participants to get to know you, get to know the breadth of CS, show teachers how to recruit. Set aside time for teachers to share. Leaving early is a reward. Have many assistants ready to run around and help with questions, bugs, participants may be having. Pay for every thing. Repeat all your instructions 3 times.

Roadblocks

Teachers believe stereotypes. Teachers resort to teaching what they know. Teacher comfort is important.

State PED roadblocks: Lack of teacher certification / endorsement, limited view of CS, teacher turnover.

Administrator's roadblocks: lack of understanding of CS, students are dumped into computing classes, counselors discourage students from taking CS, software installation, administrators think teachers can learn AP CS in one week. (think of it as learning another language).

Speaker #4: Fred Martin – UMass Lowell

For professional development workshops, find great students to be the teachers. Engage teachers in the research aspects so you can do research with them. UMass Lowell offers Robotics and CS4HS. Offer science educations with technology tools. Fred's advice for CS4HS is to make a nice webpage. Tell participants what they are going to be doing and excite them with what they are going to learn. Use Google spreadsheets and forms, provide stipends and return registration fees upon program completion. Pay for everything. Registration fees to get buy in/commitment - always offer scholarships. Buy swag and give equipment grants. Provide stipends for research participation.

Durations: Saturday half-day workshops, Summer 2-4 day workshops, In-service PDs of 2.5 hours.

Format: hands on, research talks (short), instruction in short bursts; focused, networking time. Act as a hub for teachers to want to get to know one another.

Ask PD participants to bring in a laptop from their school - Software installation is the first thing we teach at any of the workshops. Have teachers bring their students with them. Each teacher can bring 2 students. Parents drive them. This makes for an authentic, relaxed setting. Let teachers learn to learn, play, talk and feed them,

Most importantly: Design an event that you'd want to go to!

Speaker #5: Chris Stephenson, Executive Director of CSTA

CSTA is a great way to meet other CS teachers in your area. PD for K-12 CS teachers is critical to the long-term success of the discipline. CSTA has been in providing PD at conferences and has helped countless faculty build better professional development workshops. This has been done through partnerships and with the advisement of teachers. CSTA has 10,632 members now!

Top 10 rules:

- 1) Involve teachers in the development of the PD event or workshop from the beginning. Teachers can be planners of the agenda.
- 2) Don't assume that no return email equals a lack of interest. Often teachers are too busy to respond and need a couple of reminders to respond.
- 3) Set timelines that are realistic – take into account how much participants can take in over the course of a day.
- 4) Know and promote the ROI (return on investment) for teachers. Describe the ROI based on what they want and need. Note that they will know they need some things but they don't know that they will need other things. (There are things that they don't know they will need yet.)
- 5) There are 2 distinct audiences; those that are proficient with technology but don't have pedagogical skills (audience 1) AND those with great pedagogical skills but weak in CS content and proficiency with technology. (Pair them together)
- 6) Tie content and process to state and national standards. (Especially to the CSTA K-12 CS standards.)
- 7) Have teacher participants build the workshop website. This will support sustaining change by creating CoPs that will sustain the website.
- 8) Educational change happens after they leave the workshop. Perceptions of the need to change. Support teachers and administrators in making the change and sustaining the change. (Communities necessary)
- 9) Hand out posters at PD workshops.
- 10) Use and share great PD resources: csta.acm.org/Communications/sub/Videos.html

Speaker #6: Chinma Uche (High school teacher from Connecticut and Connecticut CSTA president).

Chinma's background is in Mathematics. At first, she felt she couldn't teach CS. She found and spent a lot of time on College Board website preparing to offer AP CS. Then she had to learn C++ and went through every sample syllabi. Though she had no technical knowledge she was willing to give teaching AP CS a try and found a mentor

who had confidence in her. Sent email to those she found on the AP CS site, looked for resources, and went to a one week workshop on AP CS A. The first two days she understood nothing, the third day she was feeling a little better, and finally, on the final two days her learning was coming together and she was gaining confidence. The next week focused on the AP CS B (no longer offered). It took 3 days to understand the new material and connect between APCS A and B. She realized she was not the only one having difficulty. The College Board did not provide opportunities for them to learn (by making mistakes).

Big ideas:

Students will benefit when teachers are well prepared. There are great models out there, ECS for example. She loved it but doesn't know how to get it into her State. She needs funds to pay for ECS training. NSF CPATH/RET (research experience for teachers) model for partnerships between college and high school teacher participants worked for her. She was able to sit in the computer lab from 9-5 everyday programming - (heaven!) Note: this was self-paced learning time with access to mentors. CS principles pilot implementation needed signoff from administrators. Teacher releases needed. Teachers are adult learners... Sources of Motivation (from uhawaii.edu site) include social relationships, external expectations, social welfare, personal achievement, escape/stimulation, and cognitive interest.

The overriding issues in K-12 education (from a teacher's perspective) are

- 1) Supervision - monitoring and safety come first, and maintain a calm environment for learning;
- 2) Resource management – technology resources and human resources, as in who will teach my math classes while I teach CS?;
- 3) Standardized test scores are all that count (to administrators and district). Thus CSTA meetings were not well attended (12-15 people) mostly from private schools. Meetings were held after school thus they were not part of school recognized in-service professional development. Give credits or CEUs to teachers for attending CSTA offered professional development.

Moving forward:

Continue to work with schools, get commitments from schools for release time / sub pay. Offer PD workshops that allow teachers time to learn, process, and plan. Focus on partnerships with CS departments. Include incentives for schools and districts to teach CS Principles (Pre-AP CS). Provide teachers with videos they can watch outside of class – preferably less than 20 minutes long. Help with planning of competitions for MS and HS. HS teachers do not have the time to plan these. Please plan summer workshops and competitions for us.

Appendix E: Notes from CE21 session on Developing Online Communities of Practice (Falk and Drayton and Brown)

Speaker #1: Joni Falk from TERC

Topic: Dynamics that drive online CoPs. What makes Online PD Networks (OPDN) different from face-to-face professional development? OPDN lack regularity of participation and growth patterns. Designers of such communities often think of software but fail to include the people and fail to include maintaining a vision for the community. How do these incongruities get smoothed out?

The first question to ask is whether the participants in PD constitute a CoP. Figure out what it is that you want to have happen. What are the benefits and costs?

From studies:

- 1) Who are the participants? Do they constitute a pre-existing community?
- 2) Is there a practice that unites the group or is it characterized by different practices?
- 3) What are the subdivisions within the community?
- 4) Should community structure be reflected in the structure of the CoP?
- 5) What elements of the community need to be fostered?
- 6) How can you tell if you are being successful?
- 7) Are there products, if so, made by whom?
- 8) What are the resources needed? For their practice... what kinds of exchanges are necessary?
- 9) What infrastructure is necessary?
- 10) What does growth look like and how will it be supported in theory and practice?

This served as an introduction to Online Communities of Practice.

Speaker #2: Neil Brown from Greenfoot and Greenroom

Neil Brown showed Greenroom – the user community site for Greenfoot. Greenfoot is an IDE for learning to program Java for making games and simulations. (Lots of teachers use it but only a small team of developers.) Greenroom offers access to teaching materials, and peer support. The primary goal of Greenroom is to enable discussion sharing and teaching materials between teachers. (Note: narrow focus). This is an advantage to teachers because there are participants from all over the world – all online, no face-to-face professional development offered by Greenfoot.

The landing page of the site itself has a social network-like stream running down the middle of the page. The focus is on people. The Resources (accessed and promoted on the right hand side of the landing page) are seen as highlights on the landing page and a Resources main page. The resources main page has links to each resource. Each resource has its own page with feedback on resources at the bottom (comments). When users download a resource, they will be prompted (via email and pop-up window) to comment and give suggestions on the resources they downloaded two weeks post-download. Badges are used to recognize those who contribute (badges exist for site administrators, member status, creators of content, contributing to discussion, expertise, etc.) Resource pages allow for wiki style editing and fall under creative commons attribution. (Negative is that branching on lesson plans is lost and only the most current version is posted.) Monthly competitions for most comments, post and contributions are held – winners get mugs, tshirts, etc. There is no vetting of contributions prior to posting. The site is a closed site – authentication via member login is required to access materials. Advantages to having a closed site are that members are able to post solutions to assignments, it keeps communications honest and open between teachers, and helps reduce spam. Administrators are able to ban people if the need arises. Disadvantages are that login puts some people off and is time consuming. Other features include a maps mash-up that shows where user are on a map. You can zoom in on the map and find a user nearby. Local hubs, usually at universities, can announce their events. Each user has a profile and notifications posted to that profile can be viewed. Discussions can have links to similar content to encourage continued participation.

Useful hints: Know your user community – Greenfoot’s community consists of high school teachers who are very busy, they took this into account when designing their site. Set up a virtuous cycle where contributors are rewarded with love, affection and thanks. Make sure all content sharers are rewarded and recognized.

Outcomes – Greenroom has been up and running for 2 years now. What is working? Membership is climbing. They have seen linear growth (currently at 1800 members and not plateauing.) Analysis shows that resource uploading takes place in fits and starts and not much activity takes place over the summer. What hasn’t worked? Wiki style

editing not conducive to change, people don't want to mess up other people's work. There is a low sense of community because not a lot of people participate in off-topic communications. They feel that side conversations build community. Side conversations show that people have made their work with Greenfoot part of their larger identity and are willing to share other aspects of their identity with community members.

Reproducibility – Neil showed another example by the same people. BlueJay is a language used in university settings and has an online BlueJay community called Blueroom. Blueroom has shown a slower growth rate. They feel this might be because BlueJay has a course book while Greenfoot does not so a lot fewer resources are being uploaded in Blueroom.

Speaker #3: Back to Joni Falk for other examples of OPDN.

Tradeoffs and things we've struggled with in online communities in the past. Some of the communities Joni Falk has worked with/on: CSR 1995 / TEECH 1995 (NSF's Teacher enhancement Efforts), Eyes to the Future 1997 (middle school girls and scientists), LSCnet 1997, Sustainability 1999, NSF-IGERT network, NSF MSPnet, and I3.

Different audiences have different needs, different amounts of interactivity, different anticipated products. There have been changes that have influenced our design: People more savvy with technology and the internet, people are used to different interfaces, etc. so we don't just want to do the same thing over again. Some pointers: there are so many different online communities now, people don't want to join yet another online community for no reason. People tweet, blog, digest. They want to tune you out because of info overload. People want to limit the influx of data so you have to have a really good reason to join an online community. Information should be made available in digest form.

Critical mass for communities – typically 80-90% are lurkers and only 10-20% post. This posting % is high. Everyone will browse but who will post? Do constituents want to collaborate, communicate, share resources, if so, which ones?

Different types of OPDN, OCoP:

Type 1: Broadcast site, no communication.

Type 2: User groups. End users.

Type 3: Collaborative resource centers

Type 4: Collegial social networks.

What is the proper balance between these in your community? How does PD occur in these communities?

Measures:

Increased access to shared resources that the community deems important (large communities with lots of resources)

Discourse within a large collegial networks: webinars, think out louds, being in their presence.

Collaboration on shared projects. Collaboration itself does not benefit from large communities (go with smaller groups for collaborative projects)

Dissemination of results. Write up share and present

Participate in online conferences, competitions, webinars and other events.

Need events to bring people back.

Human infrastructure:

Programmers, content managers, meta data is good, etc, staff for community outreach, share resources, create events. Tech assistance. (Trial runs) Programmers need to be included in formative research.

Site 1: LSCNet 1997

Contributed, search, news clippings, reports. Focus was on district-wide reform, the PIs and coPIS served as project directors. They knew each other face-to-face and were core participants. TERC researchers were super administrators of the site. They held yearly online virtual conferences over 10 days. Their community had things in common – they all were implementing reform-based curriculum in math & Science. They were fighting same fights, math wars, skepticism, they needed each other.

Site 2: MSP network

MSPs – Math Science Partnerships were very large and had ample funding - \$32M each in early years of MSP.

There were several hundred people involved in each funded project. The audience was diverse. Each project had its

own community. The site architecture was a hub and spokes model to accommodate communities within communities. Digital libraries, working groups existed. Each project had a replica site (of the main hub) connected to the hub in the middle. The administration of the site was distributed, each community had a separate admin. Currently the site has a membership of 7000 people and 2500 subscribers that are not members. On the main site you can glance at weekly newsletter, some discussion groups across group boundaries. Online leaders administer their own sites, encourage sharing, and news from the field. There are working groups within projects. Some are completely private. Different levels of visibility exist within communities.

SITE 3: IGERT – NSF interdisciplinary graduate level research funding at \$30K per year per site.

The primary audience consists of graduate students, not faculty. The site has activity streams like facebook. Status, connections, requests and suggested connections are shown for each profile. Tags show interest in various sites. Newfeed is based on interest. All network activity is viewable in the stream. This site bends towards collegial network end rather than resource centric. The human resource is more important than their content. The end users, graduate students, are early in their careers and are making networks. They are linked by their interdisciplinary studies, they need to know how to support it, talk about it, etc. When community members create a resource the system asks who should be recognized in this resources. The authors are tagged as being part of this work.

Events are important – they have an annual poster competition posted to website. IGERT’s Online poster competition has 20 winners chosen by judges – also had some winners chosen by the community at large. At first NSF was skeptical. It was very important to them to be the judge of quality. But equally important was audience participation. The compromise was that to vote you had to be part of the community. Lots of viewers for a 5 day event. Videos will be added this year.

This begs the question “How to judge success?” Common metrics are # hits, # pages, # members. Do you turn people away? Rethink that notion because now information is distributed everywhere. Pieces of information are moving from site to site. NSF news feed is pulled in on site. Other sites like CNN know my facebook friends and pull in links that my friends have liked. We can no longer cleanly assess what end users are seeing on different sites.

Lessons learned:

When you create a site you need an intuitive structure and human infrastructure. Need to facilitate community. It’s easier to serve a community that also meets F2F. Figure out what they have in common and share. Reward sharing/ give incentives. Balance development of collaborative tools with integration of those that are commonly used. Create new rubrics to assess success.

Questions and Answers:

Q: Did you conduct design charettes with end users?

A: [Joni] No, we used advisory boards consisting of graduate students, faculty and program coordinators in design. End users = success is having more conferences streaming live. Content is going both direction. The boards serve to give ideas, grounding in reality and buy-in. IGERT was more like facebook? Web2.0 activity streams, digests. Ways for you to filter by people and by interest. Input from students was taken. Now they come to the site and see themselves. Everyone has a profile and interests. In MSP network average age is 50. They have different needs, they don’t want activity streams and digests, They want well developed newsletter. Just because tech allows it doesn’t mean that people will use it. Also need to educate them, the older crowd, about new technologies. In Merlot Input was provided for teacher resources. Some scientific journals uses the vetting process and give credit and there’s a cache to that. In merlot all the reviewers are volunteers.

A: [Neil] No, we talk to teachers about Greenfoot then we didn’t do user surveys and testing. We weren’t sure that one teacher overall. We designed what we thought would work.

APPENDIX F: Agenda and Schedule of the IWG

**NSF EPSCoR Innovative Working Group
Developing an Online Network for Teacher Professional Development
in Computational Science / Modeling and Simulation**

**Valles Caldera National Preserve Science & Education Center
Jemez Springs, NM
February 9-12, 2012**

AGENDA

Thursday, February 9 (half-day)

3:30 pm Welcome and Introductions
4:00 pm Mission and Goals of the working group (Lee & Kimbell)
4:30 pm Review of existing curricula, online site, PD, and pedagogy (Gonzales & Gibbs)
6:30 pm Dinner at SEC
7:30 pm Wrap up

Friday, February 10

8:00 am Breakfast
9:00 am Objectives and Agenda for the day (Lee & Kimbell)
9:15 am Define and provide examples of communities of practice (Umland & Tyson)
10:15 am Our GUTS/SC community (Gonzales & Gibbs)
10:45 am Break
11:00 am Characterize practitioners: What club leaders need, share, and will use.
12:00 pm Lunch
12:45 pm Review of tools and technologies that support online COP (Huang & Dynes)
1:45 pm Develop use scenarios in small groups.
2:45 pm Pin-ups report out from groups. (check for duplications)
3:00 pm Break
3:15 pm Continuation of use scenarios (Writing time)
4:00 pm Sharing/presentation of use scenarios
5:00 pm Private time
6:30 pm Dinner
7:30 pm Wrap up.

Saturday, February 11

8:00 am Breakfast
9:00 am Revisit Use scenarios--new insights/issues that came up.
10:00 am Tools and goals – Group?
11:00 am From use scenarios to interface and interaction design – Small groups?
12:00 pm Lunch
1:00 pm continuation of design and documentation.
3:00 pm Break
3:15 pm Technical design sketch. (Gonzales, Kimbell, Dynes, Huang, Lee, and others)
4:30 pm Budget, timeline, and resources needed to implement features
5:00 pm Private time
6:30 pm Dinner at Los Ojos.
7:30 pm Wrap up

Sunday, February 12 (half-day)

8:00 am Breakfast (and “check out” from rooms)
9:00 am Tech team reports out
Review cards as a review of progress made.
Revisit Guiding Questions, progress made, —complete documentation
10:30 am Next Steps – CE21 proposal
11:00 am Evaluation and Closure
11:30 am THANK YOUs - pick up boxed lunches and hit the road.

APPENDIX G: Review of existing curricula, online site, PD, and pedagogy:

The Good, The Bad & The Ugly

(Thursday, February 9th, 4:30 – 6:30 pm)

PURPOSE:

The goals of this session were to assess the current status of the GUTS materials, professional development workshops offered face-to-face, web resources provided, and tools used. The group was asked to appraise the GUTS program with a critical eye. What's good, bad and ugly? What's missing?

COMMENTS / DISCUSSION/ RECOMMENDATIONS:

Curriculum issues:

- Tie the curriculum specifically to CSTA and State and National content standards to make it easier for club leaders to validate the GUTS program to administrators and parents.
- Keep the curriculum flexible for teachers -- not too static. The curriculum should remain customizable to meet the needs of different audiences.
- Allow time for kids to experiment with models, games and coding - kids need time to replay games (make up new rules and play them again.)
- Allow time to make/draw out connections between modeling, CAS, and science topic.
- Support divergent thinking -- pose challenges where students create multiple paths to a solution. Demonstrate that there is not one right solution when it comes to problem solving using computational thinking. Encourage creativity.
- Continue to use CAST (Complex Adaptive Systems Template) in some contexts, teachers find the CAST useful and a valuable tool to build understanding. Perhaps provide alternate representations of the multiple scales of observation of complex systems such as concentric circles or other graphic organizers.
- Frontload CAS concepts in the first weeks of the unit -- create a week's lesson on CAS showing examples of complex systems from different domains such as ecosystems, flocking, and networks.
- It is hard to connect StarLogo TNG and Complex Adaptive Systems to some science concepts. For example, modeling traffic and the spread of disease is less of a leap (more concrete and less abstract) than climate change to students.
- Perhaps create a 10-week long fall semester curriculum focusing on CAS and programming, then introduce a topical unit in spring semester (one or two topics?)
- Give club leaders more responsibility to adapt curriculum by providing multiple options within units/lessons
- Curriculum may need to be more explicit for some teachers
- Curriculum should emphasize the basics: basic understand of terminology, basics of model building & basic math
- Students have a hard time visualizing problems, they can't connect - 12 year olds are just able to abstract problems.
- Provide more props for teachers to show related concepts.

Technology / Accessibility issues:

- 1) Club leaders would like the ability to upload curriculum and modify it, adapt it to their club, and share it with others.
- 2) Create video tutorials on various CAS concepts – tie them directly to models & CAST.
- 3) Update existing video tutorials -- re-record voiceovers to make them more appealing.
- 4) Enable clubs to create electronic word walls with key terminology and definitions.

- 5) Have old content on web page expire or allow for sorting by year – there are too many old student models on the site so when you try to do a search you get multiple versions of a model with the same name but each with different alterations.
- 6) Continue to require log in to gain access to the curriculum, or make this weeks', previous weeks available.
- 7) Make current base models easily accessible preferably on front page.
- 8) Provide link to download SLTNG 1.2 from front page. Some clubs/ schools are having difficulty with the latest version (SLTNG 1.5)
- 9) Provide a link to download the Spanish language version of StarLogo TNG.
- 10) Create blanket log on for club members because too much time is wasted helping students remember their logins and passwords. (Cons: if we want students to participate in discussions and social networking on the club site, then they will need individual logins.)
- 11) Some school computers can't run starlogo & webpages & video - school computers are underpowered.
- 12) Put resources on jump drives (for students)

Resources

- Some cookbook pages need to be updated
- It could be easier to find reference materials: cookbook pages and blocks guide.
- Videos should show real world applications of modeling and simulation.

Professional development workshop issues:

- 1) Allow more time for club leaders to practice programming and problem solving.
- 2) Offer different tracks for beginning, intermediate and experienced club leaders.
- 3) Participants agreed that offering quarterly PD workshops would be an improvement.
- 4) Club leader reflections are valuable. Make time for them during PD workshops.

Other:

- Some club leaders are using the investigation questions provided. Keep them.
- Some club leaders are using the logs to record what they did at a club meeting.
- Some investigation questions are binary and can be answered with a YES or NO and do not encourage reflection.
- Club leaders need paper copies of curriculum because it is hard to make color printouts at school and it is easier to show a student a color printout than to find the document and open it up on a computer to show them.
- Kids are hooked on programming, not necessarily the content (of GUTS units).
- Students do parse content, they are able to explain to others what they are doing.

CONCLUSIONS:

We can slow down and get more mileage by allowing more time for developing a deeper understanding of complex systems.

Irene asks:

Question: Do we risk being too "school like"?

Answer: (teachers) We're still in school so it's okay (?)

APPENDIX H: Summary of presentation on Communities of Practice (Tyson & Umland)

Kersti Tyson and Kristin Umland gave background on communities of practice from the research literature and discuss how expertise is developed and shared in such a community. Features of COPs and best practices for developing COPs along with their personal experiences developing /guiding COPs were shared.

Definition: Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly (Wenger, 1998).

In a community of practice:

- Meaning as locally and socially constructed (Cox, 2005)
- Identity central to learning. Lave and Wenger, 1991; Wenger, 1998)
- Allows for different interests and viewpoints (Lave and Wenger, 1991)
- 'Getting the job done' always requires locally developed understanding (Brown and Duguid, 1991)
- A group that coheres through 'mutual engagement' on an 'indigenous' (or appropriated) enterprise, and creating a common repertoire (Wenger, 1998).

[Discussion: The goal of our OPDN is to offer better support to our community members. We would like to interact with them more regularly and build their passion for computing, computational modeling. We want to support community members' learning through interaction. Meaning in a CoP is locally and social constructed. What does "locally" mean in an online community? In our online community, local will be defined both by location and by one's network. Probably more defined conceptually as one's online network since our facilitators are already distributed. Our work is Identity work – becoming something or someone – identifying with the work, becoming through the work. We need to allow for different interest, viewpoint and knowledge. Beginner to expert transition happens with all those identities in play. An example of locally developed understanding is stories repairmen tell each other. Within that CoP understanding coheres around mutual interest and passion. Mutual engagement – "what the work is" is defined by the members. Development of a common repertoire. Often a decentralized practice.]

Layers of Practice:

- *Internal*: How to organize educational experiences that ground school learning in practice through participation in communities around subject matters?
- *External*: How to connect the experience of students to actual practice through peripheral forms of participation in broader communities beyond the walls of the school?
- *Over the lifetime of students*: How to serve the lifelong learning needs of students by organizing communities of practice focused on topics of continuing interest to students beyond the initial schooling period?

(<http://www.ewenger.com/theory/>)

[Discussion: There are many layers of practice in education. Some are internal: how do our curriculum and clubs come together and make sense for individual practitioners / teacher club leaders. Some are external: how does modeling and simulation connect to what people do in their life and work. Are there after school communities of practice that deal with how to integrate between the regular school day and after school activities? How does the work transfer from the after school club to the school day? Some are over the lifetime i.e. the trajectories that people take later in life either through identity or knowledge. (Both for teachers and students.)

Communities develop their practice through:

- **Problem solving** - "Can we work on this design and brainstorm some ideas; I'm stuck."
- **Requests for information** - "Where can I find the code to connect to the server?"
- **Seeking experience** - "Has anyone dealt with a customer in this situation?"
- **Reusing assets** - "I have a proposal for a local area network I wrote for a client last year. I can send it to you and you can easily tweak it for this new client."
- **Coordination and synergy** - "Can we combine our purchases of solvent to achieve bulk discounts?"
- **Discussing developments** - "What do you think of the new CAD system? Does it really help?"
- **Documentation projects** - "We have faced this problem five times now. Let us write it down once and for all."
- **Visits** - "Can we come and see your after-school program? We need to establish one in our city."
- **Mapping knowledge and identifying gaps** - "Who knows what, and what are we missing? What other groups should we connect with?"

(<http://www.ewenger.com/theory/>)

[Discussion: Can GUTS clubs themselves be seen as communities of practice? Communities of practice generally develop their own practice whereas we (GUTS) guide students through a practice. Problem solving is a key activity in GUTS clubs and people within clubs request information from each other, or they email a facilitator. Do club members and club leaders seek answers or experience from one another? Yes, they ask each other "have you seen this problem before?" or "do you know how to code XYZ?" Another thing club leaders could share are recruiting tips. We did this at CS4HS. Teachers reuse assets – they have been rewriting / remixing our curriculum for club and in school use but we do not often see the products of this work. Students reuse assets in coursework and in participation in competitions (science fairs, challenge, etc.) Much of this remains hidden to the community. Coordination & synergy – this most often occurs around coordinating for roundtables and fieldtrips. Also happens with MIT StarLogo TNG group when considering new versions and sharing what we need in the tool. We do not often discuss developments or document our work within the community setting (could do a much better job of this.) We don't often visit between sites. Perhaps this is something we could do remotely through video conferencing. How can we make the observations of other clubs, both old and new, more available to members? We don't regularly map knowledge and identify gaps as a community. We often forget the documentation steps – how can we make this explicit?]

Affordances of participation in a CoP:

- Communities of practice enable practitioners to **take collective responsibility** for managing the knowledge they need, recognizing that, given the proper structure, they are in the best position to do this.
- Communities among practitioners create a direct **link between learning and performance**, because the same people participate in communities of practice and in teams and business units.
- Practitioners can address the **tacit** (unspoken, implicit or hidden) and dynamic aspects of knowledge creation and sharing, as well as the more **explicit** aspects.
- Communities are not limited by formal structures: they **create connections** among people across organizational and geographic boundaries.

[Discussion: We'd like participants in the OPDN to have power but we don't want to make them all site super-administrators with full site privileges. What's the right balance? We'd like them to help with restructuring the website at least to some extent. Maybe they get to customize their view into the website. We also need to think about the interface for allowing others to construct new

structures. For example, how and where do club leaders upload new curriculum pieces that they have developed? Is the a community contributed vs. standard issue curriculum? Currently learning and performance are linked via a trajectory between club leading and becoming a facilitator. In our PD workshops (face-to-face) club leaders and facilitators lead sessions based on what they have learned and what they are comfortable teaching others. Newer club leaders are often paired with more experienced club leaders to work on projects at the PD workshops. Power dynamics: community members differ in whether or not they see value in participation vs. quality. It can be a trade-off but can be managed with a certain vetting before general posting. Most of these aspects of what we do as a community are not made explicit. For example, we could make it explicit on people's profile page how they got to that level or role.]

Theory of Situated Learning: Legitimate Peripheral Participation is Continuous, Active, Engaged, Situated, Identity-forming and "Learning AS participation" (Lave and Wenger, 1991)

[Wikipedia definition of Legitimate peripheral participation: LPP describes how newcomers become experienced members and eventually old timers of a community of practice or collaborative project (Lave & Wenger 1991). According to LPP, newcomers become members of a community initially by participating in simple and low-risk tasks that are nonetheless productive and necessary and further the goals of the community. Through peripheral activities, novices become acquainted with the tasks, vocabulary, and organizing principles of the community. Gradually, as newcomers become old timers, their participation takes forms that are more and more central to the functioning of the community. LPP suggests that membership in a community of practice is mediated by the possible forms of participation to which newcomers have access, both physically and socially. If newcomers can directly observe the practices of experts, they understand the broader context into which their own efforts fit. Conversely LPP suggests that newcomers who are separated from the experts have limited access to their tools and community and therefore have limited growth.]

Indicators of Communities of Practice (Wenger, 1998, pp. 125-6

- (1) Sustained mutual relationships – harmonious or conflict-ridden
- (2) Shared ways of engaging in doing things together
- (3) The rapid flow of information and propagation of innovation
- (4) Absence of introductory preambles, as if conversations and interactions were merely the continuation of an ongoing process
- (5) Very quick setup of a problem to be discussed
- (6) Substantial overlap in participants' descriptions of who belongs
- (7) Knowing what others know, what they can do, and how they can contribute to an enterprise
- (8) Mutually defining identities
- (9) The ability to assess the appropriateness of actions and products
- (10) Specific tools, representations, and other artifacts
- (11) Local lore, shared stories, inside jokes, knowing laughter
- (12) Jargon and shortcuts to communication as well as the ease of producing new one
- (13) Certain styles recognized as displaying membership
- (14) A shared discourse reflecting a certain perspective on the world.

Activity Theory touched upon with diagrams.

Possibilities (discussion starters)

- Is anyone involved in a CoP and how do you take collective responsibility?
- What structures of CoP do you know of?

- What does it mean ideally to learn and perform in a CoP
- What is it like from day to day to participate in a CoP– and for whom? (students, teachers, teachers of teachers, others)?
- What are the tacit and dynamic aspects of knowledge creation and how to make them explicit for this project?
- How do we make and sustain these connections?

Group Discussions about Communities of Practice [Friday morning discussion – NOTES]

Trust: Cannot over-emphasize the Importance of strengthening relationship and building trust. Make it ok to ask questions and be vulnerable. IWG participants decided that the GUTS OPDN should be a closed members-only network. Certain screenshots can be made and shared with the general public to show what is available to community members but we do not want an open network. Curricular material can be shared after the lesson has been used. We don't want the lesson plans to be viewed by club members because they present solutions and kids might think those were the only solutions rather than create their own.

Socialization: how to get peripheral participants more centrally involved? Generally we ask them to take responsibility for something at the face-to-face PD workshops or STI.

Control: totally unfocused may not work. How to create some type of structure without being top down. Maybe implicit. Let community evolve from there.

Making Expertise explicit: Need a mechanism to publicly identify people w/ expertise eg badges, or face-to-face mechanism. (In GYG we announce and thank contributors to the online network at the beginning of the face-to-face workshop.

Supporting new members: CoPs similar to PLC (prof learning communities). Collective responsibility for a club. Hierarchy of newbies and oldies (experts). Do newbies have enough support to become oldies? How do you get people to step up to the responsibility of organizing a club? Maybe have them observe a functioning club? Maybe experienced club leaders would be willing to be video taped so people don't have to travel.

Resource sharing tools: With GUTS clubs we don't utilize resources that are available. Teachers are prisoners of time; have to make choices of how to spend their time. They may not have good info; may not see the value. Maybe incorporate some of these tools (bookmarking) into the site to make it as easy as possible to use them. If we integrate these tools into sites, then it becomes socialized. (Try new things) – example Diigo for sharing bookmarks. (used to be delicious) Could register as a teacher and make a group. Could other teachers to be managers of the group. List of links like programming or water shortages. Then kids start finding websites and posting. Repository of links created by users. Search by topic or tags. // Crowdsourcing. Digest sent out.

Documentation: In a CoP, documentation is a responsibility of all. We are all responsible for knowledge, mapping knowledge and documenting gaps. (think crowdsourcing). How do we achieve this?

Power dynamics: Kersti Tyson says that typically 98% of community uses content but only 2% creates content. We must always give community members the option to participate more fully. Facilitate the next step in their participation. (Could we guide this through their desktop organizer?)

Follow on conversation: "IS the GUTS/SC community a CoP?"

Gonzales and Gibbs lead discussion with Umland and Tyson and group on how GUTS/SC community could become a COP and what features of a COP we'd like to build.

KEY OUTCOMES:

Aspects of CoP the GUTS community has:

Personal - face-face sharing of information

About 50 teachers engaged, between GUTS and SCC

Problem solving - people develop solutions/modifications

Requests for information -- mostly one way to-from JP

Re use assets -- experienced leaders access & modify for themselves (no place to share)

Things we need to further develop CoP:

1. Enable online sharing of materials (community contributions)
2. Way for teachers to learn programming, share information, become part of community online
- 3: Recognize and share expertise of all members of community
- 4: Virtual visits to other clubs
- 5: Make documentation – a shared responsibility
- 6: Enhance knowledge Mapping -- CAS, SLTNG, Science resources

APPENDIX I: Characterizing our practitioners.

Describe the characteristics of the practitioners/end users; what teachers need, what they could share, what teachers will use, and what makes an online PD Network / CoP compelling to them.

Q: Who are our practitioners? Who are members of our OPDN and community of practice?

A: The IWG participants said that club leaders / coaches and facilitators were the members of the CoP who will use the OPDN. It may grow to include new club leaders from out of state.

Q: Do we include all challenge sponsor teachers, students, parents, with what level of access - parents need to know about program, careers, calendar

A: For now we are designing for the community of GUTS practitioners - it includes Challenge team sponsors who also lead GUTS clubs. Parents and students are not members of our OPDN though they need access to GUTS information and resources too.

Irene reviewed the survey data collected from club leaders at Winter PD workshops in SF and LC. (See Appendix B for details.)

- 1) 75% of 32 respondents felt they would use an online GUTS PD network.
- 2) 95% of 23 respondents who said that they would use an online GUTS PD network said they would like to use the network for "learning to program". "Professional development" was the second most selected item followed by sharing stories.
- 3) Top three features respondents were interested in were:
 - Learn to program videos and webinars (52%),
 - Curriculum discussion (38%), and
 - GUTS questions and answers (28%).
- 4) The majority of respondents reported being online at least a few hours per day.
 - 39% reported being online 1-2 hours per day;
 - 16% reported being online 3-4 hours per day;
 - 16% reported being online 5-6 hours per day;
 - 13% reported being online 7-8 hours per day;
- 5) On the use of social networks, respondents seemed to be split into two categories; either they used social networks daily or not at all.
- 6) Most respondents said that they already use the internet or web resources for personal learning or professional development.

We have new, returning, and experienced practitioners. GUTS was initially designed with a three-year progression from new club leader to facilitator (who is able to run the club without facilitation). For the first 4 years (2007-2011) this trajectory seemed to accurately model the development of club leaders into facilitators. In the 2011-2012 year we saw massive turnover of club leaders (especially in Santa Fe).

What are the axes or dimensions that describe our practitioners?

- Science content knowledge and teaching experience
- Programming experience
- Math skills
- Access to technology
- Comfort with technology
- Physical location
- Grades taught
- Subject taught
- Position in school
- Teaching experience

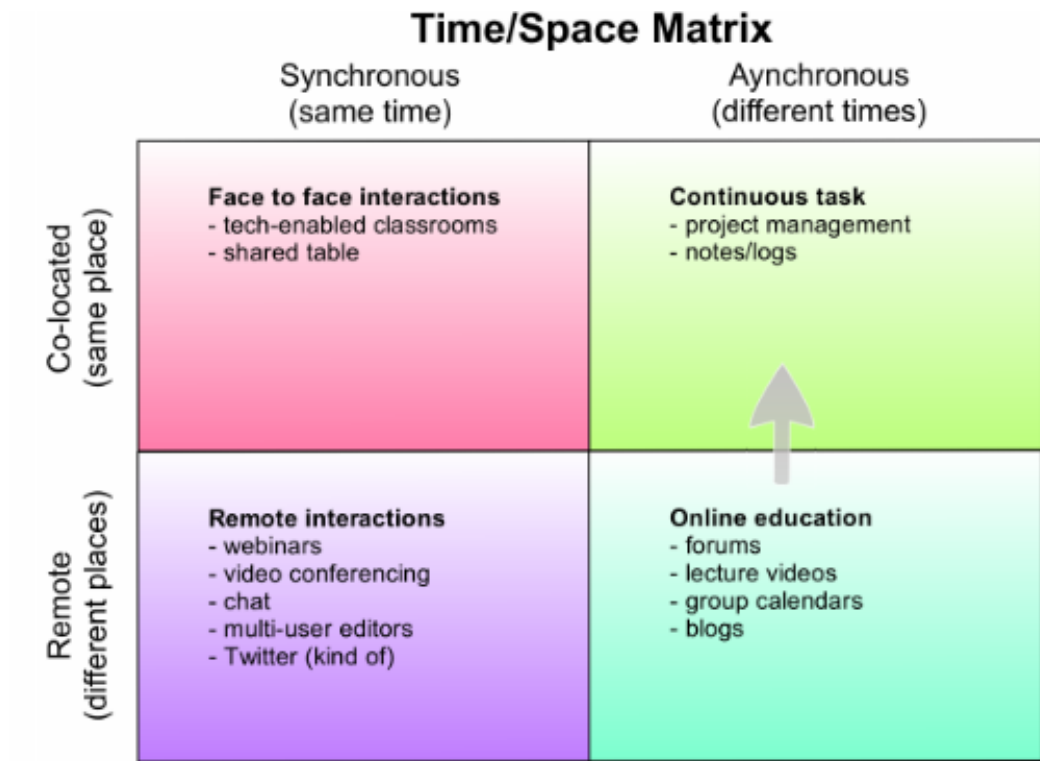
- Pedagogy practiced (in school)
- Time constraints
- Passion for the topics (computational modeling, engaging students through inquiry using computer technology and tools, and complex systems)

What do they NEED	What can they SHARE	What will they USE
<p>Training on programming & an opportunity to practice (programming and debugging challenges)</p> <p>Way to share programming or code - create & share cookbook pages. Backpacks to share code snippets, copy and paste.</p> <p>Learn and share vocabulary</p> <p>List of resources sorted by level of experience, i.e., TNG for beginners, etc.</p> <p>List of resources for CAS concepts and information, science background, pedagogy</p> <p>Tools to help with identification of knowledge gaps. Can we do a survey to identify TNG knowledge gaps</p> <p>Way to discuss code using images - screen shots of code blocks. Embedding screenshots in dialogs.</p> <p>Career information – showing students the possibilities of programming skills. Also for parents and others to see.</p> <p>Mapping of common CS constructs to SLTNG terms (and also in Scratch terms, etc.)</p> <p>Better recruitment materials.</p>	<p>Experience at PD workshops face-to-face and online - pair experienced leaders w/ new.</p> <p>Share code blocks.</p> <p>Expertise with TNG or other -- how can we recognize expertise and identify</p> <p>Adaptations/modifications to curriculum.</p> <p>New activities.</p> <p>Bookmarks to share.</p> <p>Videotaping of club dynamics or particular lessons – on a volunteer basis.</p> <p>Need way to share images of code (blocks)</p> <p>Stories</p> <p>Recruiting tips</p> <p>What works, what doesn't.</p>	<p>Learning modules -- need to be sequential & progressive (for learning to program, for CAS, for computational modeling)</p> <p>Videos & Webinars on code / programming science topics pedagogy CAS</p> <p>Recruitment materials. Spotlights on key successes.</p> <p>Videos of PDs and Roundtables.</p> <p>Self assessment surveys that link to badges showing expertise ? ex) Can you declare / initialize / set a variable?</p>

APPENDIX J: Review of tools and technologies that support online COP (Huang & Dynes)

Dynes and Huang presented two different organizing principles for thinking about the tools and technologies. The first was the Time/Space Matrix and the second was by Holistic principles.

A “Time Space Groupware matrix” was used to organize the technologies. It classifies tasks as Synchronous vs. Asynchronous and Co-located vs. Remote. Different types of interaction are best suited for different quadrants: Face-to-Face interactions are co-located and synchronous; Continuous tasks are often co-located but Asynchronous; Remote interactions are remote yet synchronous; and Online education is often Asynchronous and remote.



The Holistic organizing principle focused on three continuums: Work-Social; Directed-Organic; Explicit-Implicit Moderation. In the Work-Social continuum we consider whether the network will be used for work purposes or social purposes. (Note that even though social interactions are not the main purpose of our network, they are important to the formation of an effective online community.) In the Directed-Organic continuum we consider whether the action on the network will be directed or left for the user to decide upon. We think our network will have both Directed (reporting out) and Organic components (mentoring on demand and forums). Lastly, in the Explicit-Implicit Moderation continuum, we consider how much the community is managed by a moderator. Our experience with GUTS y Girls leads us to believe that moderation is necessary. Other online networks (Scratch and ScratchEd are moderated only in a reactive mode.)

The primary goals of Facilitation / Moderation are to:

- establish trust among participants to enable pragmatic interactions
 - o ice breakers
 - o encourage those who are wallowing in the shallows

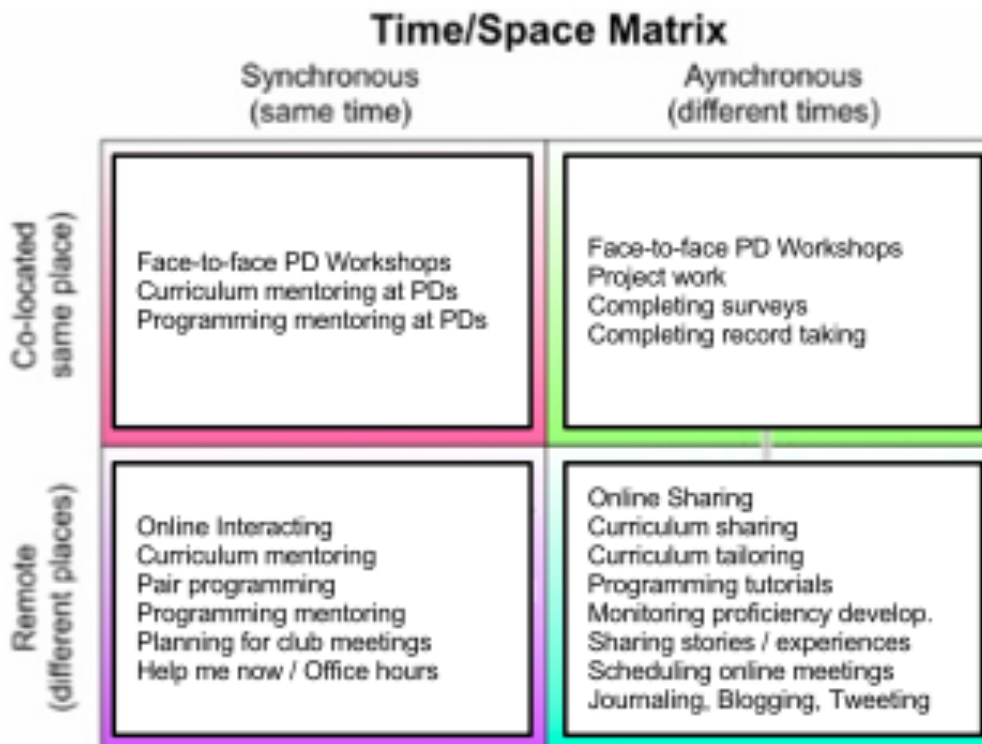
- discuss what this network is about and for, and what are the ground rules
- promote reasoned discourse
- keep interactions moving forward
- act as a “guide on the side” rather than a “sage on the stage”.

The Voices/Roles taken on by a moderator are: Generative guide, Conceptual facilitator, Reflective guide, Personal muse, and Mediator. Critical-thinking strategies promoted by a moderator are sharpening of focus and encouraging participants to dig deeper (learn to help themselves).

Activities to support our community online include:

- curriculum sharing (one way with binder)
- curriculum tailoring (adaptation)
- curriculum mentoring (walk through specific parts of the curriculum)
- pair programming (think and talk out loud)
- programming mentoring (help debug this program)
- programming tutorials (how tos)
- proficiency development (levels – novices -> intermediate -> experienced)
- sharing of experiences
- planning for club meetings (club leader / facilitator planning)
- scheduling online meetings
- Pager for help me now
- Journaling – process query / Q & A
- Announcements via tweeter functionality
- Personal blogging for progress documentation
- Tools to monitor progress of individuals and progress of the whole community

Putting these into a GUTS professional development Time/Space continuum, we see a distinction between “Online Interacting” and “Online Sharing”.



Review of tools that Dynes and Huang have used and most of us are already familiar with:
 Google docs (remote, sync or async) – document sharing, some version control.
 Google+ hangouts (remote, sync) – for online meetings, document sharing. Recording?
 Moodle (remote, async) – for online classes or courses. Only persists for duration of class.
 ScratchEd (remote, async) – Forums, stories, and resources to support the teacher community.
 SocialEngine (remote, sync or async) – Social network front end. Some document sharing.
 ELGG – tools for creating social networks.
 Drupal – content management system.

Examples of newer Online Communities and Online Networks.

Additional tools



Additional tools we looked at briefly:

- LiveMocha (Think of match.com for language learning) Relies on large numbers.
- Ning - sschat.ning.com Uses one's twitter posts as their feed to their ning site.
- Teacher Leaders Network.
- Edweb.net – good webinars. Live chat going on.
- The Math Forum at Drexel
- NSTA learning center. Increase content knowledge and Primarily content knowledge. Self assessments. Diagnostics generate links to new content. Self-paced learning plan. Develop shared portfolio and curate your own portfolio. Learning platform.
- LinkedIn.com statistics. Metrics.
- Get Satisfaction <http://getsatisfaction.com/> FAQ management system FREE
- Code Academy <http://www.codecademy.com/> learn to code FREE
- Screencast-o-matic <http://www.screencast-o-matic.com/> online screen recording FREE
- Diigo <http://www.diigo.com/> collect and organize FREE
- Scribblar <https://market.android.com/details?id=com.richstern.scribbler&hl=en> drawing app for Android FREE
- VBulletin <https://www.vbulletin.com/> online publishing
- Jalbum <http://jalbum.net/en/software> online photo albums FREE

We heard from Wendy Huang about the development of the new WebLogo platform (a web-based version of StarLogo TNG). WebLogo will have features to assist a teacher community. The teacher community site will be integrated with WebLogo. It will allow teachers to browse, search, filter, and share projects; and allow teachers to attach support materials to projects. It will allow commenting on projects, bookmarking, creating class groups or folders. Help requests can be liked to specific projects and teachers will be able to share and read stories.

APPENDIX K: Developing Use Scenarios

As a group we decided to describe our user community members taking a model from the ScratchEd site. Community members were described as “NEW to GUTS”, “FAMILIAR with GUTS”, and “EXPERIENCED with GUTS”. This categorization generalizes the end user by base skill level and experience with our curriculum.

We agreed upon the activities we felt it would be important to support then merged the activities into groups. Four groupings were generated and we broke into smaller groups to address each activity set. Each team was given the task of describing “What is the nature of their problem?”, “What is the nature of the solution?”, and “What is the nature of the interaction with the “system” needed?” keeping in mind the three characterizations of community members. Breakout Teams worked on describing what each activity set might look like within a system. If known, notes were kept on the tools and resources needed to offer each activity.

Activity set #1: (Team: JP, Su, Philip, Terri)

Curriculum sharing (typically one way with binder),
Curriculum tailoring (adaptation often performed but not shared),
Curriculum mentoring (walk through specific parts of the curriculum)

Recommendations from the team:

Curriculum mentoring:

For novices we need to provide appropriate level of assistance: in-person facilitation at clubs, and online welcome pop-up. Novices need to be able to download curriculum and models easily. They need a FAQ section for trouble-shooting, video tutorials, cookbook pages, online chat functionality and forums. We could give novices guidelines such as 15 minutes of required activity online to build on the expectation of pre-planning for the club meetings, and prepare for the next week.

Assistance for all – also Familiarity and building community (helping people help themselves)
We need user profiles that are searchable so someone can find someone else with more experience. We need an active “chat right now” button that alerts a member when another is online. We need to find a way to get club leaders help – perhaps through a welcome screen. We need categorization of problems and issues, and plenty of how-tos.

Curriculum tailoring and sharing:

For those with familiarity with our curriculum we’d like a way for them to easily share their customizations and adaptations our content/lessons. They should be able to upload and share content, see comments and critiques of curriculum pieces and resources, contribute to the model discussion forums, create and post videos to assist others in expanding models. We need better model documentation such as the NetLogo model description template (What is it? How does it work? Things you can do with it? Etc.).

Activity set #2: (Team: Wendy, Irene, Patty)

Pair programming (talk out loud),
Programming mentoring,

Recommendations from the team:

The team discussed four metaphors for “learning to program”: pair programming, webinars, group mentoring via roundtables, and office hours.

Pair programming:

In pair programming a novice would be paired with an familiar or experienced club leader, and a familiar/ intermediate would be paired with an experienced club leader. They would build models or solve short challenge problems using the driver/navigator paradigm while online. The tools needed to accomplish this are screen sharing, application sharing and thinking out loud, and conveying tacit information. This pair programming could be offered as part of a summer intensive, and for-credit) [find tools] [find research citations on pair-programming]

Webinars:

During webinars we would demonstrate a programming concept. A presenter and a moderator would facilitate each session. The moderator would watch the chat window and interrupt the presenter if questions come up in the chat window. The community could suggest and vote on the content of the upcoming webinars to make sure the content is relevant to club leaders. The webinars could take a “watch then do” format where the presenter offers up a challenge then waits for the participants to think about the solution (or discuss a solution or work on the solution) prior to showing a solution. Webinars would be offered monthly. We would need online conferencing (Visimeet, gotomeeting, or other), screen sharing. Novices would view the webinar, familiars would view and perhaps moderate the webinar, and experienced would serve as presenters of the webinar. [could we incorporate features of peer-instruction?]

Group mentoring / Roundtables:

All PD participants (and club leaders who were unable to attend the PD) start with a base model for a unit. They are given an assignment/challenge to modify the model in some way. They come to the roundtable online one week after a professional development workshop to show their progress, get help from one another and share their solutions. Familiar would learn through practice as a participant, the experienced would facilitate as necessary. [this is something we have successfully done in face-to-face PD workshops in breakout sessions] [also Roundtables are a known metaphor where students show their work often “in progress”.]

Office hours:

Office hours would be offered Monday – Friday for 1 hour each day at the same time when clubs meet. These hours can be used to fulfill the “help me now” function or for planning/reviewing the club meeting/activities for the following week. We could have an open Visimeet session or Google+ hangout open and announce the URL on the GUTSed homepage. Club leaders could bring in a problem – anyone can show up. We may need a waiting list if there are several people waiting. Experienced club leaders could host office hours.

Activity set #3: (Team: Juanita, Scott, Celia)

- Proficiency development (levels – novices -> familiar -> experienced),
- Levels & Tools to monitor progress of individuals and the whole community,
- Helping people help themselves (curriculum or coding, connecting to resources)
- Tagging expertise.

Recommendations from the team:

Proficiency development: (ladders from novices->familiar->experienced)

For novices we need to provide social and resource networks, pair programming experiences and mentoring as in a big brother/ big sister program. A more experienced club leader will be paired with the novice. We should schedule the novices' clubs to run one week later than the others so novices can utilize the reflection forum, mentoring, shared programs and ancillary materials developed by more experienced club leaders. For familiar and experienced club leaders we have them lead PD sessions, reflection forums, web meetings and other GUTSed functions. All club leaders participate in “help” forums where club leaders are expected to post questions so they can

be answered by the community. Answers are placed in the FAQ or left on the forum so they can be found by search. We should offer periodic (monthly) web meetings with club leaders and facilitators. Note: At professional development sessions we should teach how to use the new online network including how to sign up and participate in web-based meetings, how to pair program and how to use the reflection forum. (this changes the nature of our PDs)

Levels & Tools to monitor progress of individuals.

Offer a self-assessment (survey or tools?) We need to define in broad strokes what differentiates a novice from a familiar from an experienced club leader (e.g. Novices can run SLTNG programs, do simple debugging). Also we could take video interviews of novice, familiar, experienced and ask club leaders to decide "Whom am I most similar to?" During web meetings and conference calls a facilitator can listen in and identify progress or those needing special attention. These levels and skills are associated with badges and sliders on a panel showing individual progress.

Levels & Tools to monitor progress of the whole community.

Since we will have self-assessments, profiles with sliders, surveymonkey survey results and site statistics, we can determine the growth of the whole community.

Activity set #4: (Team: Carl, Barbara)

Sharing of experiences,
blogging and journaling, tweeting

Recommendations from the team:

Forums can be helpful to club leaders at all levels. Novices can post questions and familiar and experienced club leaders can participate in extended discussions. After a new question is posted, it is visible on a "recent forum activity" side bar, responses posted to the question can include links to blogs and FAQs. Chat or Skype can be used to give assistance in real time. A "who's online" panel should be available upon login. Blogs can be used for detailed discussions. Blogs can be tagged by subject, for whom this information may be pertinent (new, familiar, experienced), and by topic. Blogs or Forums can also be used for "what's going on in your club?"

APPENDIX L: An approximation of the set of tools needed and where different activities will take place. Resources to develop. Prioritization of which needs are most important.

SET of FUNCTIONS: SHARE, INTERACT, PRACTICE, MEMBERS, and EVENTS.

MEMBERS: User Profiles with badges displaying different areas and levels of expertise

MEMBERS: User Tracking (contributions, participation, authorship etc.)

MEMBERS: User Assessments (self assessments of confidence level, surveys & sliders)

SHARE: View current curriculum and upload modifications to Curriculum

SHARE: View and upload models, Model documentation page and template.

SHARE: View and upload video tutorials

SHARE: View and upload Cookbook pages / How tos

SHARE: View categorizations/matrices of resources, Q&As, problems and issues.

INTERACT: Forums, Blogs, and Chat

INTERACT: Post code snippets as images.

INTERACT: Tag content and materials

INTERACT: Rate content and materials / Stars (how useful was this resource?)

INTERACT: Posting status updates and activity feeds (SNS)

PRACTICE: Video conferencing including Document sharing, application sharing.

PRACTICE: Webinars with recording

PRACTICE: Pair programming challenges

PRACTICE: Roundtables with challenges

PRACTICE: Office hours with announcements on the homepage

SIDEBAR: FAQ

SIDEBAR: Search

SIDEBAR: HELP NOW

SIDEBAR: Who's online now

SIDEBAR: User info

SIDEBAR: Members

SIDEBAR: Events / Scheduling / calendar

SIDEBAR: Recent posts

Resource to develop:

Back end analytics, individual and group progress.

Programming tutorials (like codecademy exercises and explanation)

Scheduling online meetings (tutorial or planning)

Club leader / facilitator planning tools (calendar and email)

Pager for help me now functionality

Tweet functionality

APPENDIX L: From use scenarios to interface and interaction design – in Small groups

Multiple levels? How will the GUTS site need to change? The goal was to design the interface and interaction sketches not just the use scenarios. Take the use scenarios deeper and describe the sections, screens, layout, buttons, navigation, interaction with humans or computer resources needed in for each use scenario.

What is the difference between a club leader and a facilitator? Describe the trajectory that we know from GUTS and the barriers we have seen to the progression lately. (high turnover rate). Identify levels with badges, track their trajectory (what are they participating in and how has their confidence, skills and knowledge changed over time?), track authorship (as in the ScratchEd profiles) and provide ways to contact the person upon viewing their profile. In the profile we could also have tags or a tag cloud that shows what this person writes about.

Metaphors for interaction:

Desktop panel / Workspace

Backpack for collected links, to find things easily.

Site organization:

ProjectGUTS.org will remain as the central site and public portal for the GUTS community.

On the home page there will be tabs across the top for a) general public, b) parents, c) students, and d) teachers/club leaders. (There was a question about where would clubs have their own pages.)

From the home page, club leaders would select the teacher tab. There they will see a general landing page for teachers with information for those interested in becoming club leaders and the login to the GUTSed site. As part of the general information for new club leaders we felt it would be important to provide snapshots of the GUTSed site but not access to the site from the outside.

Once logged into the GUTSed site (via authenticated access) there are several functions available to the club leader: SHARE, INTERACT, PRACTICE, MEMBERS, and EVENTS.

The member landing page should have their profile bar, calendar, request a visit or talk. It should have sidebars with latest models, latest posts, latest forums, etc. The help section should have FAQs and Who's online now.