

*Can we begin to identify best practices for interactive online informal science education?*

*What do we already know regarding what is effective that can be shared with others?*

*Can we identify interesting questions for which we don't yet have answers? Can we use our collective expertise to frame those questions in a way that will help us move forward?*

**WEB DESIGNS FOR  
INTERACTIVE  
LEARNING  
CONFERENCE**

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# ideas and issues in interactive online informal science education

Prelude .....	2
Mapping the Online World onto Constructivism .....	5
Multicultural Perspectives .....	7
Evaluation Methods, Goals and Objectives, Impacts and Outcomes .....	9
Who's in a Name? The Language We Use .....	11
Social Use of the Web and Connections with Physical Space .....	13
Paradigms for the Nature of the Experience .....	16
Postscript: Searching for Commonalities .....	18
Additional Topics .....	19



*This portion of the WDIL conference was devoted to issues and topics related to best practices in interactive online informal science education.*

*During the prelude, participants reexamined the goals for this session, brainstormed potential topics, and formed into breakout groups to discuss those topics.*

## Prelude

### Goal Clarification

- Of course we are all here to learn, but we also tried to target and assemble some real brain power represented by people who already know a lot about best practices for developing interactive Web sites. I know all of the problems that there are with the term “best practices,” but let’s use that as shorthand.

What we need to come out with at the end of this is an amalgamation of these best practices that we can then disseminate to other people who want to think about these ideas. What I would like to see us do with these breakout sessions is to somehow begin to move ourselves into thinking about a “final” product. And of course “final” has got quotes around it because this is a conversation that we hope can continue afterwards with forums on our Web site, both with people from this conference and with other people from all around the world who will want to jump into the discussion.

One very simplistic way to think about our goal or end product is that this is funded by the National Science Foundation, and one of the things that I think NSF wants to get out of this is improving the quality of proposals that are coming in that are using the Web as a dissemination tool or as an end in and of itself to help people learn about science education. One of the first things I would like to do with the WDIL Web site is have it be a place that NSF can send people when they call and say, “I’m going to do such-and-such a project and I’m going to do a Web site.” NSF can then say, “Okay, go to

this Web site and click on these links and you’ll get some ideas and some of the most up to date thinking about these issues.”

That is what I mean by final product, but it is only final in as much as it works for right now. • Rick Bonney, Director, Program Development and Evaluation, Cornell Lab of Ornithology

### Cross-Fertilization with Other Disciplines

- Are we restricting ourselves to informal science education, or are we also talking about history and culture Web sites? There are a range of different institutions represented here. • Anon.
- The idea behind that was that an awful lot of the informal science education Web sites are not very compelling; they’re not very interesting; they’re not very artistic. One of the reasons we tried to include people in this conference who aren’t just science educators, as well as people who are from the for-profit world, was to begin to get some of these ideas to cross boundaries into informal science education so that all of those sites don’t look the same. • Rick Bonney, Director, Program Development and Evaluation, Cornell Lab of Ornithology
- My bigger agenda is that, in fact, some of the things that informal science is doing could really inform people doing art and cultural Web sites. All of these categories—art, science, history, culture, and whatever else—need to be broken down a bit because people don’t talk to each other across disciplines. Disciplinary thinking is from the last

several centuries and in the times ahead, cross-disciplinary thinking is really important. I think art can inform science, science can inform art, and history can inform everyone. • Kathleen McLean, Consultant, Independent Exhibitions

## Potential Obstacles

### Best Practices: Too Wide, Varied, and Diffuse

- I keep flashing back to the idea that this is as though we suddenly found ourselves with printing presses and moveable type fully formed and we were trying to come up with best practices for printed media, which could legitimately cover everything from research journals down to Bazooka

Joe bubble gum wrappers. It's kind of the same thing, and it can be involved in so many different legitimate applications that it's hard to frame a problem that we can answer. • James Harold, Director, Information Systems and Technology, Space Sciences Institute

- I agree, and I think that the best practices for a collaborative site, the best practices for an online collection, the best practices for a Webcast, or the best practices for some kind of simulated physics experiment are all going to be incredibly different. Unless we can figure out a way to classify things and talk about them with more specificity, we are going to wind up talking in extremely broad terms and not really wind up with very much practical information. • Jim Spadaccini, Creative Director, Ideum



## Effective Practice, Social Barriers, Interesting Questions

- How are we going to collectively organize this into some big ideas that can really be a contribution to the field? • Dan Barstow, Director, Center for Science Teaching and Learning, TERC
- Can we identify effective practices? What is particularly effective about what we are doing that we might want to share with someone else? It's helpful if people get really specific: "This works because ..." It would also be helpful to identify what the social barriers are. With the technologists in the room, we can solve any problem related to technology, but what are the social barriers, which include authority, privacy, identity? • Sherry Hsi, Director of Research, Center for Learning and Teaching, Exploratorium
- I think it's a good idea to do what Sherry suggested in terms of trying to identify effective practice but there's a danger in that, which is a focus on answers. I think we should have an equal focus on interesting questions for which we don't have answers. I think using the collective expertise of the people at this conference to frame those questions is equally important. • Dan Barstow

### Focusing on Tensions and Issues

- My favorite way of dealing with this is to first come up with what we think are the most pressing issues or tensions, rather than categories, because the tensions or issues seem to be where a lot of the energy is. If we can nail the major issues, then we can move out from there. Rob Semper mentioned an issue earlier that wasn't really even on the agenda—funding and sustainability. I was amazed at how much time we spent focused on what NSF wants, and I was thinking, how did we get there? That's an unfortunate place to be, really. We should be deciding what we really want to do and then convincing NSF that it's the best thing to do.
  - Kathleen McLean, Consultant, Independent Exhibitions

### Needed: Paradigms and Vocabulary for Organizing Our Thinking

- I think one of the things we are lacking are paradigms with which to start organizing some of this thinking. There is so much to say and talk about, I think it would be helpful to just have some classifications for different types of users of these sites, different types of purposes for these sites, and different types of designs of these sites. The field could benefit from a better vocabulary so that we could actually know what we are talking about. If we could even walk away with a rudimentary structure for that, we will have accomplished something. I'm scared that we're trying to achieve so much that we're not going to achieve anything.
  - Scott Sayre, Principal, Sandbox Studios Inc.

### Narrowing the Focus: Personal Impact

- We could, in a sense, go the opposite way and narrow it down to the individual. I now have six pages of notes. What if I just pick three things that really made me think differently, just because they affect the work that I'm doing, not because I think that they are paradigms for the entire universe or cover everything? What is it that really made us think about something differently? If we accumulated those and tried to make some order out of that, it might help us narrow this down rather than thinking so broadly.
  - Dan Barstow, Director, Center for Science Teaching and Learning, TERC

### An Ongoing Community

- I agree with what Dan said. I've learned a tremendous amount already in the last day and a half that is going to inform my work going forward here at the Lab, and I would bet so has everybody else. The issue for me is, what happens when this is over? Have we begun a community here, or has this just been fun for three days? For some of us, this may be it. For others, it may be the beginning of a collaborative community, which is what our goal was. That is why this is a two-year funded NSF project, not just one-year. During the first year we hold this conference, but in the second year we nurture, sustain, and grow this community. Maybe one of the things we can talk about in the small groups is what needs we have as individuals in this community.
  - Rick Bonney, Director, Program Development and Evaluation, Cornell Lab of Ornithology

#### Breakout Group Process

*The group as a whole brainstormed a list of potential topics or issues related to best practices in interactive informal science education online. Breakout groups were formed based on participants' interest in proposed topics. The reports from those breakout sessions follow.*

# Mapping the Online World onto Constructivism

Group report by *Chris Quintana, Assistant Professor, University of Michigan. Additional notes from Cheryl McCallum, Steven Allison-Bunnell, and David Schaller.*

We started out by considering Sherry Hsi’s paper, “Interactivity and the Design of Informal Science Education Web Sites,” and tried to think about the categories or dimensions of interactivity that you can have in Web sites. We wanted to identify the flavors or characteristics of different types of Web sites.

Our categories changed during the course of our discussion, but we began with the following types of Web sites:

Types of Web Sites	
<ul style="list-style-type: none"> <li>• <b>Story-based or Story-oriented</b> <i>Jasper</i></li> <li>• <b>Discourse-oriented</b> <i>Whyville, chat, IRC, blogs</i></li> <li>• <b>Investigation-oriented</b> <i>Great Backyard Bird Count, GLOBE</i></li> <li>• <b>Play-oriented</b> <i>Nickelodeon</i></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Construction-oriented</b> <i>Whyville, chat, IRC, blogs</i></li> <li>• <b>Assessment-oriented</b> <i>Test prep, traffic school, tutorials</i></li> <li>• <b>Reference-oriented</b> <i>Wikipedia, Animal Diversity Web</i></li> </ul>

*In Italics: Tentative examples. In fact, a number of these may fit into more than one category.*

We started looking at different Web sites to see where they might fit into these categories. We realized that these categories could represent different dimensions of interactivity. There certainly is overlap between the categories and you can have Web sites that have measures of each.

Wikipedia, for example, at first seems more like a reference-oriented Web site because it’s a place you can go to for reference materials. But of course, it also includes the aspect of construction if you are contributing to Wikipedia. So there are all sorts of

## Reference:

“Interactivity and the Design of Informal Science Education Web Sites,” Sherry Hsi, Exploratorium, June 2005. (Available on the WDIL Web site.)

## Original Issues/Interest Identification Statements

*Generated During Topic Brainstorming*

### Mapping Genres of Educational Thought

- In the paper I posted online prior to this conference, I tried to come up with a framework for genres of educational thought, though not necessarily as they apply to the Web. I didn’t actually get around to thinking about examples, and I’d love help from others in thinking about those genres and putting them into a framework that people can look at.
- Sherry Hsi, Director of Research, Center for Learning and Teaching, Exploratorium

### Types of Interactivity

- My idea would be to talk about different types of interactivity and the implications of the different things that we could do (starting with Sherry Hsi’s paper in the “Findings” section of the WDIL Web site).
- Brian Foley, Assistant Professor, California State University Northridge (CSUN)

### Mapping the Online World

- I was trying to put a frame on this that related back to the first talk we heard at this conference (Chris Quintana, “Constructivism and Online Interactivity”), and thinking about mapping the online world onto the two notions of constructivist learning, and what parts of the medium we’re working on might actually fit or help support those two domains—the cognitive part and the social part. This would be a start in thinking about why we’re doing what we’re doing and how we can make a case for what we’re doing fit into contemporary learning theory.
- Rob Semper, Executive Associate Director, Exploratorium

## Related Resources/References:

- Kieran Egan, *The Educated Mind: How Cognitive Tools Shape our Understanding*, University of Chicago Press, 1997.

- Howard Gardner's Theory of Multiple Intelligences: a basic tenet of his theory is that people learn, represent and utilize knowledge in many different ways:

- Linguistic
- Logical-mathematical
- Spatial
- Bodily Kinesthetic
- Musical
- Interpersonal
- Intrapersonal

Gardner is co-director of Project Zero: [www.pz.harvard.edu](http://www.pz.harvard.edu)

- Educational Web Adventures developed a typology of online activities, first presented at *Museums and the Web, 2002*, based on the "shape" of the interactive experience (number of inputs and number of outcomes—convergent, divergent).

For more about their "Learning Styles and Online Interactives" paper and "How Do You Like to Learn?" paper, go to: <http://www.eduweb.com/research.html>

overlaps between types of interactivity. The gist of our discussion was to see if we could categorize the dimensions of interactivity and how they map onto different learning goals and assessment criteria.

The reason we think this is important is because we then wondered if you could look at different contexts of use and start mapping between and within those contexts. For example, what are the learning goals? These might be the goals that the designers had, or the goals that the learners are coming in with. Can you start mapping different types of learning goals to different types of interactivity? And can you then start looking at assessment in terms of the different types of interactivity? Do these different types of Web sites lead to different types of assessment criteria? How does scale of users (individual, dyad, group, community) relate to this mapping process?



Evaluation is trying too hard.

If people come to it and spend time with it, you know they are finding some value in it. Does it matter WHAT value they find?

*You can put content online without a process for using it. You can't model a process without providing content.*

Assessment in terms of:

- What users do with the thing
- What users get out of the thing

*An effective Web site allows users to do all of the things that are on the list of types of interactivity.*

Creating a flexible product that can be modified implies a very different model of design, production, and maintenance, and requires resources committed over time instead of intensive development and hand-off. This is a very different model for the production cycle and role of the contractor/staff

The real cash value of constructivism is taking seriously the idea that people are always learning something and that they will do with the "content" what they will—letting go of specific demand.

## Multicultural Perspectives

Group report by Rob Rothfarb, Director of Web Development, Center for Learning and Teaching, Exploratorium

I decided to put aside the other things that I might jump off into and attack this one because it's something I know the least about, and I wanted to learn more and form some process of understanding multicultural issues in site creation. Lynne Spichiger and I talked and were occasionally visited by others, but our group was small and we wondered why that was.

Fundamentally, we had to ask ourselves the question: Why make multicultural or multiperspective content? You can't get anywhere until you've really addressed all aspects of that question:

- Are you trying to broaden an audience?
- Are you trying to be inclusive of perspective and cultural aspects of the content?
- Are you trying to tell a specific story?
- How will you deal with your audience having/bringing a very different point of view about the content?
- What do you need to be sensitive to (presentation aspects, storytelling methods, treatment of facts/historical information, etc.)?
- Do you need to measure your effectiveness in dialoguing these cultural/perspective/access issues? How can you go about doing that?

We recognized that social issues can be very politically charged. It is important to have a method of resolving conflict as you address differences during the creative process. You need to incorporate in your

process a method that enables you to become aware of cultural differences and resolve interpretation differences of stakeholders. You also need to determine how you will deal with resistance to accepting others' views or multiple perspectives.

We also recognized that Lynne and I were talking from two different perspectives—that of creating math- and science-related content and that of creating history-related content—and that the difference between those two perspectives or cultures might be a little more subtle and warrant further investigation.

Developing content which includes multicultural and multiperspective views and access points is a highly collaborative process. It is important to have—among your content creators, developers, consultants, and advisors—those who represent the cultural or point-of-view constituencies of the content and the content narrative.

Typically, at least some of the collaborators whom you would like to involve in the process are at a geographic distance, so you need to incorporate a



Rothfarb and Spichiger: a two-member team

### Original Issues/ Interest Identification Statement

*Generated During Topic  
Brainstorming*

- I was interested in talking with others about the kind of thing that Eric Jolly was talking about in his presentation ("Informal Science Education and Diversity"). Just who does inform our work, and how do you design for multicultural perspectives? I'd like to see a discussion about multicultural Web sites or Web sites that approach a topic from multiple perspectives. • Lynne Spichiger, Director of Online Exhibits/1704 Project Manager, Pocumtuck Valley Memorial Association/Memorial Hall Museum

### About Audience: Americans and Beyond

One question we considered during our discussion was, who is our audience? Are we thinking in terms of Americans who need to understand multicultural perspectives and views within this society, or does it extend beyond those boundaries? And if so, who needs to inform that process? People from other cultures?

## Engaging the Diverse Cultures Involved in Informing and Forming the Web Site

- I think that the major point was that, to the extent that you are creating a Web site that is either accessed by diverse cultures or is about diverse cultures, you must have as part of your entire planning and development and design team people who represent those cultures. • Lynne Spichiger, Director of Online Exhibits/ 1704 Project Manager, Pocumtuck Valley Memorial Association/ Memorial Hall Museum

Localization isn't just about adding another language. You also need to consider cultural and perspective issues such as selection of multimedia, narrative elements, presentation order, and user interface.

strategy for accommodating geographic distances of content experts and contributors. One strategy to overcome this potential obstacle would be to build technology into your Web site that allows you to interact with those helping you to create the project.

There are also questions relating to accessible technology needs and how to address them:

- Do we largely ignore making sites accessible?
- Do site creators know how to do this?
- What aspects of a site's visual and interactive design are limited by making a site accessible?
- Are there current methods or best practices that can be used to help facilitate making content work for disabled audiences/participants?

User interface issues to consider include color, size, and fonts.

## Resources for Accessible Technology

- Center for Accessible Technology  
<http://www.cforat.org>
- Resource for accessible technology practices in content creation:  
<http://www.astc.org/resource/access/best.htm>



# Evaluation Methods, Goals and Objectives, Impacts and Outcomes

Group report by *Minda Borun,*  
*Director of Research and Evaluation, Franklin Institute*

Rick Bonney reminded us of one of Stephen Covey's principles "Begin with the end in mind." We need to specify the goals of the project at the outset. Then the evaluation has to be customized to the goals of the individual site. Rick also pointed out that there are tools for evaluation and there are strategies for evaluation; the client needs to specify the desired impact in order to determine which tools and which strategies are appropriate. The question that arose is: Do you assess goal achievement in terms of the primary audience (for whom the site is designed) or the secondary audience (those who come after the site is launched)? The answer to this question will vary with the type of site. Community sites, where the audience drives the next wave of content, will need to consider the secondary audience. Non-interactive sites may focus on the primary audience.

Regarding when to evaluate, we all seemed to agree that you need a phase of evaluation in the year after launch to see who is coming and how they are using the site. That means that you should plan ahead and budget for that later phase of evaluation. In the case of community sites, where the audience provides input to the site, the evaluation needs to be repeated at intervals.

Some people wanted a way to share evaluation information across sites, and to extend this conference into a sharing of major mid-course corrections

and things learned along the way. To be able to do this we need guidelines for evaluation so that we can standardize some of the summative techniques, questions and measures in order to be able to make those comparisons across sites. A contrary impulse was the desire to embed evaluation into the site itself so that users do activities (e.g., "test yourself") that reveal whether they are learning or growing or doing whatever relates to your particular goals. That kind of "invisible evaluation," which embeds behaviors related to your goals into the

## Original Issues/Interest Identification Statements

*Generated During Topic Brainstorming*

### Impacts and Outcomes

- How do we measure the impacts of these different kinds of interactive sites? What kinds of outcomes are we aiming for? What kinds of outcomes are measurable? What can we learn from those outcomes about how to identify successful interactive approaches? • David Schaller, Principal, Educational Web Adventures

### Evaluation Methods

- I'd like a discussion about evaluation methods, including but not limited to audience impact and analysis of Web server log statistics (or maybe those represent separate interests?). • Tricia Jones, Senior Research Associate, University of Michigan/Animal Diversity Web

### Goals and Objectives

- About 120 years ago physiological psychology said if you want to know what behavior is, all you need to do is clearly define the stimulus. There are probably no behaviorists in this room besides me, but constructivists also need to think about what it is the stimulus can be. That is, what are you creating and what do you expect to happen from it? What are the goals and objectives that you have? What you look for will determine what you see, and I'd like to see that discussion started. • Saul Rockman, President, Rockman Et Al

## Resources

There are a number of organizations that are beginning to talk about online evaluation:

- The Visitor Studies Association (VSA) focuses mostly on museum visitors, but is now looking at online visitors.  
[visitorstudies.org](http://visitorstudies.org)
- The International Society for Technology Education (ISTE)  
[iste.org](http://iste.org)
- The National Science Digital Library (NSDL)  
[nsdl.org](http://nsdl.org)
- Commercial sites and DOE projects

### About Statistics

We need to decide which Web statistics are useful. Not all data from server logs is informative.

design of the Web site, would be unique to the individual Web site.

We talked a little about learning, but didn't get far regarding measures of learning because we agreed that it is difficult and depends on what you mean by "learning." Saul Rockman suggested you often need to scale down your expectations. Instead of overestimating the effect of a brief online experience, we need to scale our expectations to the treatment.

With short-term experiences, it may be possible to measure things that incrementally lead to learning, such as:

- Engagement with the material;
- Learning some vocabulary;
- Other indicators of learning.

We agreed that no one set of measures is going to do it. You need to triangulate; you need self-reports and qualitative measures as well as quantitative Web-based measures.

Regarding self-reports, we agreed that anecdotal narratives yield rich stories:

- Tell us what you think.
- Why did you come to the site?

- What did you get out of it?

We also agreed that there is no way to avoid surveys. If you want to identify the audience, you have to ask them. We discussed techniques for online surveys, including the following recommendations:

- Don't put a survey on the home page; you want visitors to encounter it upon leaving.
- Ask for their e-mail address.
- Ask people to come to a survey site.
- Ask for a phone number.

We also identified a variety of incentives that can be used to encourage people to participate in surveys, including:

- Gift certificates to Amazon;
- Free readmission to the site;
- Entry into a drawing or raffle (good for teachers).

# Who's in a Name?

## The Language We Use

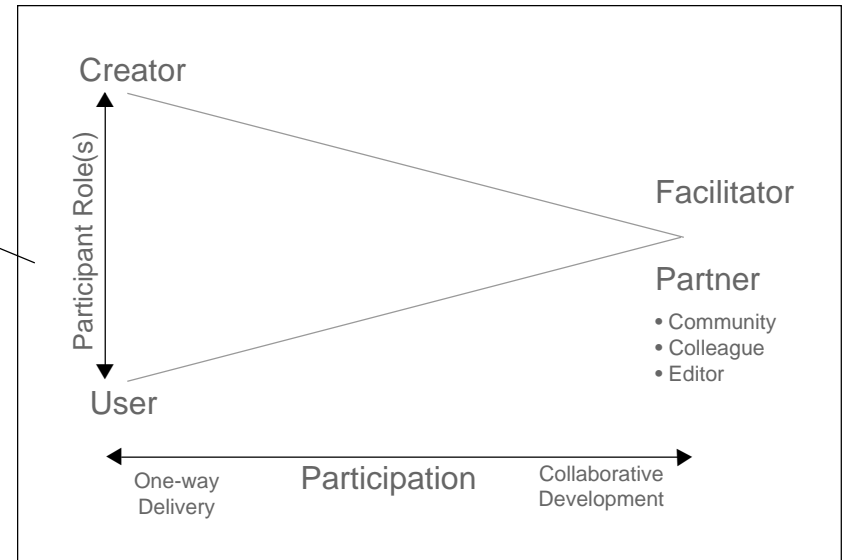
Group report by *Dan Barstow, Director, Center for Science Teaching and Learning, TERC*

I would like to do a little exercise with everybody here while Scott Sayre prepares a diagram we'd like to share with you. As you may recall, the question is, what do you call the people who are involved with your Web site? I would like each of you right now to try the following exercise.

First, what would you call your role as the lead person on a Web site that you have been involved in? Second, what name or names would you use to describe the other people who are involved in some way in your Web site? Just take a moment and think about that. You may use multiple roles or names for one individual. Just answer however this question has meaning for you. What did you come up with?

We played around with all of those words and ended up, after we really thought about it, coming up with this visual model. It may or may not work, but let's just think about it.

From the left to the right is the model of participation that we have for our sites. On the left side you'll see the caption at the bottom, "One-way delivery." That is a site in which the creator creates the content and delivers it to the user. On the other end of the model we have "Collaborative Development." Now, a site can have multiple components. The



### The Name Game

#### Names for Leaders of Web Sites

- Queen of England (Jimmy Wales)
- Director
- Designer
- Facilitator
- Administrator
  - God
  - Producer
- Coordinator
- Developer

#### Names for Those Who Come to Your Web Site

- Participants
- Partners
- Members
  - Peons
- Teammates
  - Visitors
- Citizens
- Users

### Original Issues/ Interest Identification Statement

*Generated During Topic Brainstorming*

- What we call the people who are involved in our Web sites and the language we use drastically affects the whole mental paradigm, including how we think about us/them and the work at hand. Are they: users, customers, partners, explorers, students, members, birders, hobbyists, scientists, creators, 12-year-old girls, mummy-attentives, avatars? Whatever you call them is a really crucial stage-setting context for your whole mental paradigm of what you're creating for the people involved.
- Dan Barstow, Director, Center for Science Teaching and Learning, TERC
- Scott Sayre, Principal, Sandbox Studios Inc.

The idea is that your Web site might not be fixed at one point on this spectrum. A museum site, for example, might have representation in multiple areas because there could be your online museum store, an interactive experience, a blog, and so forth. • Scott Sayre, Principal, Sandbox Studios Inc.

Cornell birding site, for example, creates descriptions of birds and delivers them to the birders who are the users, so it would seem to be on the left-hand side of the spectrum. However, the same birding site has people who are doing observation. They are partners in the research and inquiry process and the site has facilitators who organize the timing and collection of data. That type of participation is on the right side of the spectrum. Wikipedia would be another model that is on the right-hand side.

When we use terms like “community” or “colleague” or “editor,” we are imagining a model of our site that is on the collaborative development side. And if we use the term “creator” or “teacher,” and “student” or “audience,” we are putting ourselves on the one-way delivery side.

The vertical continuum represents the role a person has within the model. On the left-hand side there is a wide differentiation between the user and the creator. As we move to the right those roles squish together more, and on the far right we see that the roles of facilitator and partner are really much more interwoven.

There are nuances within this. Are you the creator of content or are you the creator of experiences? Those are two very different views of your role. For example, a project that I am imagining doing and am in the very early process of, involves creating an experience as if you were in space looking down on earth. If I am envisioning the participants as explorers, with some of them creating their own tours and serving as tour guides, the use of that language helps me frame a model, a paradigm, of what the participant experience is. I’m sure each of you, using your

own examples, can come up with the same sort of thing.

### About Adding Time to the Spectrum

- Is it okay to add something if you weren’t in this group? Another dimension or axis that occurred to me is a timeline for the development cycle. On the left side you have an up-front input—your production, design, and deployment process is collapsed into a short time, you roll it out, and then it’s out there. On the right-hand side it’s an ongoing process—the development cycle, the actual work of doing a site, is drawn out over a longer time horizon, and that has various practical and financial implications regarding how the site is structured. It’s just a very interesting additional dimension that goes along with those two current axes. • Steven Allison-Bunnell, Senior Producer & Writer, Educational Web Adventures
- I don’t know if I agree because there are some Web sites in which the user has no input and no participation, but the museum continues to pump knowledge in so there is continued production. There’s no user input, but it’s still a lot of ongoing work for the institution. • Scott Sayre, Principal, Sandbox Studios Inc.
- But if it isn’t just a matter of adding content to an existing structure, but actually modifying the nature of the thing itself in a more profound way, the time axis makes sense. • Steven Allison-Bunnell

# Social Use of the Web and Connections with Physical Space

Group report by  
*Andrea Bandelli, Independent Collaboration Manager*

What we have at this point is a list of examples, recommendations, actions, and deeper thoughts in no particular order.

We started with the idea that we should have more work done in terms of new interfaces and embedding technology in physical spaces. We need to move beyond the idea of a screen, a keyboard, and a mouse. This means looking much more into the art world and at the use of technology in developing countries.

For example, in Brazil, Philips is giving MP3 players to kids to take home as well as activities they can do with MP3 players. In Indian villages there are partnerships between the government and groups of indi-



viduals. And in Africa there is a lot of use of Mesh network technology, which involves each individual building part of a network. Because the network is built through connections between single computer users, if you shut down your computer you break the network. So you have all of this social responsibility and social connection in creating the network and profiting from the network.

In relation to developing countries, last week at the ECSITE conference there was a report on the world-wide project, The Relevance of Science Education (ROSE), investigating the way young people fifteen-

## Reference:

**Voices in Your Hand**  
[voices.rdvp.org/eng/index.html/](http://voices.rdvp.org/eng/index.html)

A humanitarian project to create simple voice-email handsets and cheap audio services to overcome language-barriers and meet literacy and health information needs in urban shanty towns and isolated rural areas. The project is conducted by Reuters Digital Vision Fellowship, sponsored by Philips Electronics.

## Original Issues/Interest Identification Statement

*Generated During Topic Brainstorming*

- I would like to focus on the social use of the Web, which is really the question of how you move beyond the screen and beyond this individualistic approach to the Web. Actually, the communities we are talking about—the Wikipedia people and the gamers—get together physically and that is important. How do we build that into our design? • Andrea Bandelli, Independent Collaboration Manager
- I don't know if there is anyone else here who is a gamer. I play Xbox a lot and at any given time I can be playing with somebody from Germany, Asia, or you name it. There are language differences, but when you talk about gaming, people think of a kid in a dark basement shooting things, and I interact with, speak directly with, and team up with people from around the world on a regular basis, so that is social. • Brent Lowrie, Games and Animation Director, Rare Method
- At the local level, people physically get together. They exchange games, they have weekly meetings, and the physical gathering is essential. • Andrea Bandelli
- That could be tied in with the fact that a lot of us are at museums that have physical spaces with physical exhibits that can be tied to the Web. • Bryan Kennedy, Internet Developer, Learning Technologies Center, Science Museum of Minnesota

## References:

### **The Relevance of Science Education (ROSE)**

[www.ils.uio.no/forskning/rose](http://www.ils.uio.no/forskning/rose)

A worldwide project investigating the way fifteen-year-olds think about science.

### **Café Scientifique**

[cafescientifique.org](http://cafescientifique.org)

A movement that started in France and has spread. The concept involves having a speaker and follow-up discussion on science and technology topics chosen by the participants. Participants (from students to adults) meet in informal social settings. It encourages informed debate around the issues in science that are changing our lives.

### **Waag Society Story Project**

Design process: <http://verhalentafel.waag.org>

Finished product: <http://www.storytable.com>

An interactive table for storytelling used in retirement homes and nursing homes.

### **Dana Centre**

[www.danacentre.org.uk](http://www.danacentre.org.uk)

A new building at the Science Museum of London dedicated to adult audiences and designed to house events serving smaller audiences.

years-old think about science and the perception of science. It was incredible to see how, in developing countries, they had a much more positive opinion of science. I think we should look at developing countries, and particularly Africa, as an example. They are better off than we are in terms of young people's attitudes towards science.

We also talked about the example of the Café Scientifique, which involves basically going where people go and taking over places like bars and cafes to have conversations about science and technology.

Another example is being developed in Holland by the Waag Society, which built a system that involves an interactive table for storytelling. They bring it to retirement homes and nursing homes where older people can collect and comment on their stories and participate in storytelling activities. The aspect of facilitating and also really listening to what people have to say about their heritage and their knowledge is essential.

One idea would be to simply start offering space for groups that already gather together—reading groups, collectors, and so forth—to understand the mechanics and psychology of these groups. Another idea is to identify the leaders of these groups that regularly meet. It would be worthwhile to invest the time to talk with them and really listen to the leaders of these groups. There is also the idea of how the social interaction of these groups can change physical spaces. For example, libraries change their internal physical space in response to reading groups.

We also talked about personification of the Web, just giving it a human face by putting faces next to the names and knowing who is really behind the Web

site.

Time is an issue, and this is particularly important in terms of funding. All of these activities require a lot of time, so funding should be long-term. There is no way we can understand these social activities in one or two years. We need a five-year plan. On the one hand we have to cope with a sort of leap of faith—we hope that people will do what we intend—but we must also be prepared for unexpected results, both positive and negative. In this context, time constraints can be dangerous. We also need time to build these activities.

Another thought we had relates to ownership of the place. An example was the Dana Centre, a new building of the Science Museum in London which is dedicated to adult audiences, members, and also serves small audiences, many of whom become regular participants in the events organized there. For the Dana Centre, sixty people attending an event is a big success. So how do we cope with small audiences? We need to build new economic models. It can't work with entrance fees. There is no way to have meaningful social experiences with hundreds of people, you really need to go down to small audiences and you need to build a feeling of ownership of the place.

This led us to talk about trusting the visitors and trusting the users and showing that we really value what they do. We need to establish measures to create this trust and make it explicit.

Regarding the value of what adult audiences can contribute, case studies of patients dealing with medical issues have shown that they have a lot of personal knowledge that can be exchanged with

others that goes far beyond the formalized knowledge of medical doctors. In that particular case there is a lot of activity going on online as people share this knowledge, and it involves a lot of social activity because it is personally relevant—it is about their personal health.

Another point regarding adult audiences is that we assume we have to make things entertaining and fun. In fact, those things have a lower priority than we think. It doesn't need to be entertaining and fun, it needs to be valuable. Patients suffering from diabetes don't want to be entertained, they really want something that is valuable to them and they want a better way to share it than the current way.

We also made a leap to the example of using GPS systems for geo-caching scavenger hunts, which brings up the idea of going into the territory and using technology to build a link. There is the example in the Twin Cities of the golden medallion, which is hidden every year somewhere and thousands of people become involved in trying to find it. It is very engaging.

We also had a couple of failure stories which are very interesting. One was the idea of networked exhibits—physical exhibits in the museum that can be connected to different places—which has met with both successes and failures. It is interesting to know how these networked exhibits work, if they work, and whether they get funded.

There is also the arm wrestling exhibit at the New York Hall of Science, which allows visitors to play against people in other distant locations. It sometimes works and sometimes doesn't. Sometimes it involves playing with someone in another country, but

even on one continent it doesn't always work because you have no idea who is on the other side. However, it is an idea to build on.

One nice idea was to have people interact with each other, but on the same computer. In other words, you would have two players on the same key board with the right half for one player and the left half for the other, so you can elbow your opponent and use the same machine.

And finally we talked about the "magic circle" and what really makes people get into these social activities. That term comes from a book called *Rules of Play*, which is an excellent resource about game design.

We also felt it would be worthwhile to explore some of these ideas from the viewpoint of anthropological research and knowledge about social interaction.

## Reference:

*Rules of Play: Game Design Fundamentals*, Katie Salen and Eric Zimmerman, MIT Press, 2003.

Building an aesthetics of interactive systems, Salen and Zimmerman define core concepts like "play," "design," and "interactivity." They look at games through a series of eighteen "game design schemas," or conceptual frameworks, including games as systems of emergence and information, as contexts for social play, as a storytelling medium, and as sites of cultural resistance.

A key concept that Salen and Zimmerman promote is adapted from Johan Huizinga, the magic circle: "To play a game means entering into a magic circle, or perhaps creating one as a game begins."



## Original Issues/Interest Identification Statement

### Generated During Topic Brainstorming

- This idea picks up on something I already mentioned earlier. I've been a judge at a lot of interactive design competitions, and I've gone to Museums and the Web and have seen a lot of those competitions, and those people talk about something totally different from what we've been focusing on. And I thought, wouldn't it be interesting to look at some of those paradigms for the nature of the experience that we're creating? Almost all of the Web sites we have been looking at during this conference are traditional, linear, page-based approaches that leapfrog from one experience to the next. Instead of that traditional approach, what about 'screen-based' interfaces? What about game-like environments like Whyville? What about rich media, immersive experiences? We could look at this from the experience point of view rather than the content point of view. • Brad Johnson, Co-founder and Creative Director, Second Story Interactive

## Paradigms for the Nature of the Experience

Group report by Susan Gallagher, Educational Designer, UCAR/GLOBE

Our starting point was, how do we move beyond content and structure to think about the experience, and what kinds of different experiences are there on different Web sites?

We saw that there is value in cross-pollination based on what might help or improve outreach or connecting to users. All of our varied experiences create a kind of collective conscious from which we can gather new information.

We talked for a while about the role of design, what some of the features are of a well-designed site, and what that means. Is it well-designed for the purpose of your site and for your goals and objectives? Design features would include usability and ease of use, and

whether the site is well-executed (including hardware-response time, etc.). A negative feature would be barriers to access. Factors that influence and are influenced by the design include content, process, experience, and context.

We also talked about the Web as a publishing tool versus really providing interactivity that cannot be done in other publishing mediums. While other publishing mediums get a lot of information out there, the Web has capacity that other mediums don't have, so the challenge is how to use a Web site as more than just a delivery mechanism.

We talked about graphic design, user design, information design, and interactive design, and that there is probably a list of variables that will define or inform your design, so you need to identify what is appropriate and effective for your purposes.

Then there is the need to make connections with the users so that they have a good experience and are



able to learn or take something away from that experience. How do you attract and hold the attention of a non-engaged user to the point where they take something away from the site? Rich media is one way of making an emotional connection.

We discussed content versus context, and the idea that those might be two different things. Content will define the format or the design and then take user considerations into play, and vice versa.

We also talked about best practices and how to define best practices. We found it was a spiral of sorts, and we kept going around in circles because we agreed that the best practice would depend upon the goal and the design of an individual site.

We came up with what is essentially levels of sites. While these are different types of sites, they can still all be effective in terms of experience or design. For

example, an informational reference site can be effective even though it might be a very simplistic design. All of these are different kinds of experiences that you can have on the Web without any one of them being the golden goose or the answer.

That led us to the conclusion that the context for what you are communicating is probably one of the most important factors.

We decided that the best way to capture best practice would be to get lots of people doing it because it's a moving target. As soon as we say, "Here's the best practice," someone will say, "Well here's an upgrade." We decided it was probably best to have a collective conscious of people working in different fields helping to build knowledge about this work.

We talked about using the Web site for the WDIL project as a follow-up on this conference, since we

#### Levels of sites that may still be effective experiences/designs

- Informational reference
  - Multimedia delivery
- Rich media (like glue to bring pieces together as an experience)
- Different outcomes based on user input
  - Inquiry-driven inside a simulation with controlled outcomes
- Collaborative/participatory/authoring/creative (where you don't control the outcomes)
- Immersive/role-playing



#### Provocation to best practices:

Is this worth doing? Should I make an interactive feature or should it be moved to a different medium?

### Using the WDIL Web Site as a Means of Modeling, Critiquing, and Exchanging Design Ideas

What can translate from one project to another? Are there generic processes that we could apply to our own to improve it?

Can we generate a list of things to consider (e.g., audience, cost, type of activity) so that others can identify the right questions to ask while designing a project?

Can we include models that illustrate concepts that apply to other topics?

What about a framework or database that can classify models that could work and/or links to models that illustrate concepts and have commentary by people who view it?

#### Potential Models:

Gamasutra  
gamasutra.com

10 Second Club  
10secondclub.net

are a collective conscious that people have already worked to select and put together. The Web site could provide the opportunity to do a show and tell, not necessarily of entire sites, but of functionalities or features that have an interactive or experience base. You then might be able to get a review of it or suggestions from others regarding other levels or approaches that could be tried. It would provide a place for people to go to explore how their particular project or design could be pushed to the next level, or how they could think differently about the project or design.

We then talked about whether there are basic constructs that will translate from one project to another. Can we make a list that we could give to somebody just starting a project that would inform them?

Finally, we talked about some examples of the type of Web site we envision, including the 10 Second Club and the Gamasutra, that offer examples or models that people then learn from for their own projects.

## Postscript: Searching for Commonalities

- When I heard the first group talk and then other groups, a lot of things resonated. It felt like a history of academia or something—in the time of the Greeks, everything was philosophy. It's like people are saying, "Let's make a good science Web site," and then realizing that there are a lot of different kinds of people here that have very

### Other Thoughts

*Good Web design can take advantage of assets that are available for the content. You can be opportunistic in using resources.*

Amount of time spent using the site as well as the number of users who come to the site.

The longer they spend there, the more difference there will be in what they take away.

*Are there generational issues for audiences—extra steps to view, complexity?*

*Users may want text or rich media.*

*Information needs can be lean and mean.*

different needs, different content, and different user types, and we had a hunger to come up with some kind of definition of how they should be.

- Brad Johnson, Co-founder and Creative Director, Second Story Interactive
- It would be really great to get some of the other groups to do a little diagramming because there really is an overlap here. • Kathleen McLean, Consultant, Independent Exhibitions

## Additional Topics

*The following topics surfaced during the initial brainstorming. While they did not become the focus for breakout discussions, they may serve as a focus for future discussions on the WDIL Web site.*

### Software and Technology Issues

#### Formats and Authoring Tools:

##### Proprietary or Nonproprietary?

- What are the issues involved in choosing between proprietary and nonproprietary formats and authoring tools? A lot of us use Flash and Director. They are widespread, with relatively low learning curves, but they are proprietary (and now have a slightly unclear future given the Adobe purchase).
  - Theodore Koterwas, New Media Director, Exploratorium

#### Practical Issues: Multiple Versions, Scalability, etc.

- I'd like to talk about practical issues for spinning out and supporting multiple versions of a site, including dial-up/broadband versions, localized versions, accessible versions, etc. On a broader note, we could talk about tools for scalability and open source vs. proprietary formats in terms of how to transition from ease of content creation to how users actually access and interact with what you make. • Rob Rothfarb, Director of Web Development, Center for Learning and Teaching, Exploratorium

### Cross-Disciplinary Strategies

- How can concepts successfully applied to science Web sites that were critiqued during this conference be utilized in sites and programs with a

cultural, historical, or storytelling context? More importantly, what are the broader informal interactive education concepts that can be derived from this cross-application? • Kirsten Pickard, Multimedia Specialist, University of Alaska Museum of the North

### Trust, Collaboration, and Controversial Subjects

- Are user-trust concerns valid in institutions that seek to limit the content they publish (whether outright or through community interactions) due to a desire to protect relationships with minority groups? Can limited user-interaction (collaboration) provide a level of comfort between user, institution, and pertinent communities for discussion of potentially controversial subjects? Should they be used in that manner, or does too much effort toward protection limit audience interest and participation? • Kirsten Pickard, Multimedia Specialist, University of Alaska Museum of the North

### Audience

#### Audience: Local vs. Global

- It is often assumed that because content is on the Web the implied audience is geographically global, and that is not always the case. It is curious that in the case of certain museum exhibits, the target audience seems to be much more local. However, others, like the Biodiversity Web, have an obvious global audience. This doesn't have to be a topic for the breakout session, and is rather a question to Web designers at museums: How do you balance

### The Spectrum Between Community and Collaboration

- How do we define the spectrum between community and collaboration? What are the increments of interaction?
  - Kirsten Pickard, Multimedia Specialist, University of Alaska Museum of the North

### Formal versus Informal

- What are the practical implications of “formal” versus “informal” designations for Internet-based education? Practical implications could include anything from what audiences go for, to what audiences get, to where you get your money, to what your content looks like. And how do you classify your product, and why? • Jennifer Logan, Manager of Strategic Communications, The Brain Institute at the University of Utah

the local vs global appeal/reach for a project?

- Sesh Kannan, Principle and Producer, Flaneur Media

### Nurturing the Audience

- How do we nurture our audience and let them get more engaged, more empowered? This intrigues me because it’s kind of one of my prejudices. I think you start to care about something more through an ongoing connection rather than through a one-shot experience. • Jane Cross, Web Site Manager, Monterey Bay Aquarium

### Sustainability

#### The Department of Defense

- There is something that I have been hesitating to say. You guys are going to get run over, and what you’re going to get run over by is the money that the Department of Defense is spending on exactly this. If you want money, figure out how to connect what you want to do to the training needs of the Department of Defense. There is now an association building between the game industry and the Department of Defense, and they are talking about hundreds of millions of dollars. The single most popular online game is *America’s Army*, which was built by the U.S. Army.

The reason I mention this is, if you really want to do this and you want to stay on the edge of what is going on, which is rapidly proceeding ahead, this is not a big enough community. You need to invite the guys from the Army and the guys from the D.O.D.

- Jim Bower, Chairman of the Board & CEO, Numedeon, Inc. (Founders of Whyville.net)

- That’s assuming that the most money will create the coolest stuff. • Bryan Kennedy, Internet Developer, Learning Technologies Center, Science Museum of Minnesota

- Well, at the moment it’s creating the most popular stuff. • Jim Bower

### Options

- So far, we’ve heard several different models of funding for these Web sites, from adding on to an exhibit, to funding from NSF, to other grant programs. Now everybody’s going to go check out the Department of Defense. What are our options for funding, growing, and improving scientifically valuable interactive Web sites? And I guess that should include, what are the various implications or down sides to accepting various kinds of funding? • David Witzel, Managing Director, Founder, Forum One Communication



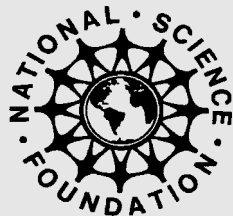
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Go to the Web Designs  
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**[www.wdil.org](http://www.wdil.org)**

This document is intended to be a faithful synthesis of the discussions at the Web Designs for Interactive Learning conference that took place at the Cornell Lab of Ornithology in Ithaca, New York on June 15-18, 2005. It is meant to serve as a resource for those who attended and as a resource for others in the field. It does not necessarily reflect the views of the Cornell Lab of Ornithology, the Exploratorium, or individual conference participants.

In some sections, participant comments have been paraphrased. These are not exact quotes, rather they are an attempt to capture the content and meaning of the ideas presented.



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