

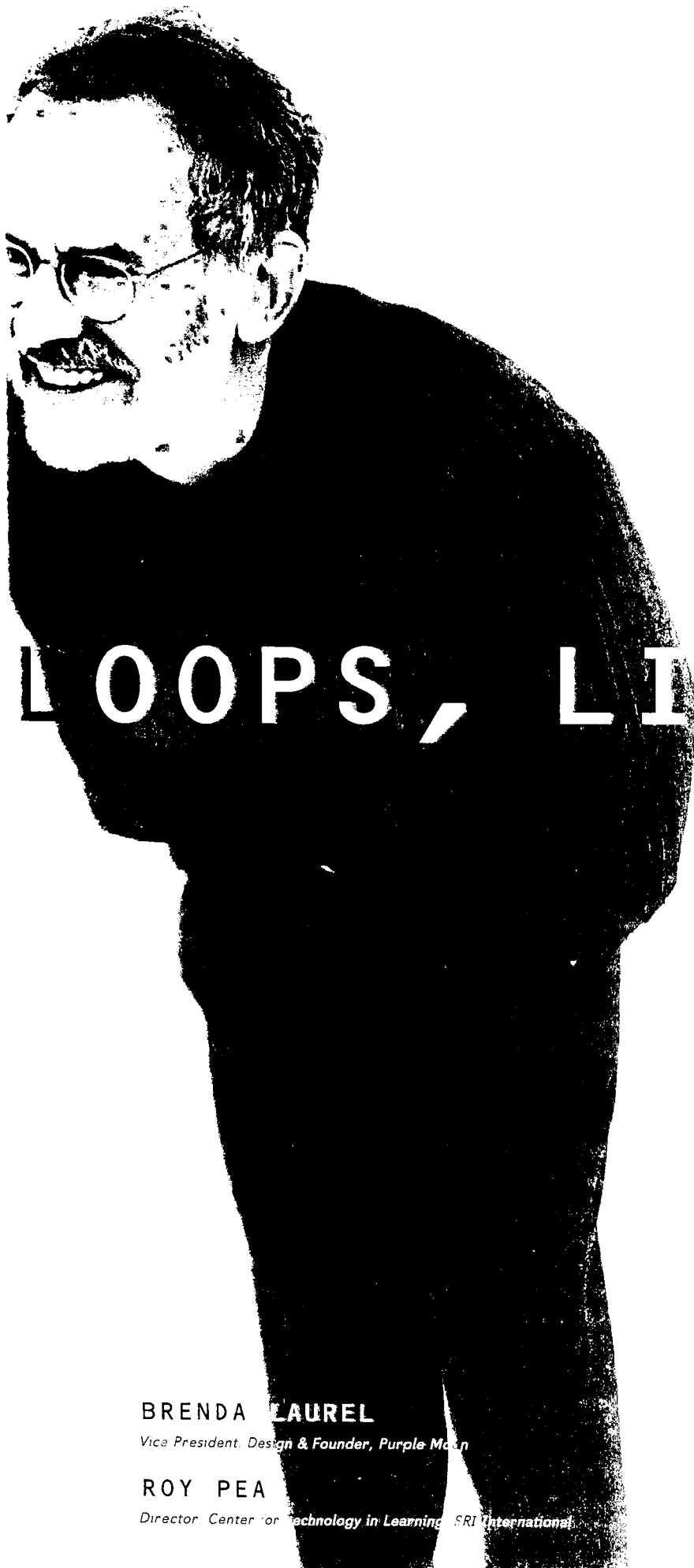
LETTERS

BE CLEAR
IDENTITY

TRANSPARENCY AND THE NET

1998 PLATFORMS FOR COMMUNICATION FORUM

HEWLETT-PACKARD PALOMAR, CALIFORNIA, ARIZONA MARCH 22-25 1998



LOOPS, LITERACY

BRENDA LAUREL

Vice President, Design & Founder, Purple Mountain

ROY PEA

Director, Center for Technology in Learning, SRI International

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Michalski: This next panel session is about learning, literacy, entertainment and other such issues that are changing radically. Brenda Laurel, the founder of Purple Moon, joins us with Roy Pea, the director of the Center for Technology in Learning at SRI International. Brenda, you did a great deal of work researching children's behavior in entertainment and educational settings at Interval. From this, you drew many interesting conclusions, some of which were based on your own experience growing up.

Brenda Laurel, Purple Moon: My deprived childhood! We primarily looked at differences based on age and gender in children and how they play. We came to conclusions that we could extrapolate to other areas of their lives as well. When I talk about gender differences, I talk about statistical averages. I always say first that there's less difference between the average boy and the average girl than between the extremes of the bell curve of difference, for either boys or girls. In terms of the discussion of the previous panel, a couple of our findings are relevant. When we spoke with girls about what they would like from CD-ROMs and on-line

AND LEARNING

experiences, they demanded personal relevance, which I found surprising, and as a provider, really stimulating. There are many community issues around how we do that in terms of providing both engaging fun materials that make girls comfortable with technology and that speak to what's happening in their lives — that horrible crucible of pre-adolescence they all endure.

Correct Spelling **Michalski:** The difference is between things coming at you and things being connected to you.

Laurel: In the field of education, we see the child as the user, the consumer, the patient, if you will. These characterizations affect how we ask the questions. When you start to see the child as the participant or as the player, then the questions and answers about what you're supposed to be doing become quite different. Children worldwide are blanket-ed with agendas by every adult, political community and religious group. There are probably more agendas to peel back from girls than from boys before you can see who they are and what's going on so that you can respond to what it is that they need, and how it is they work. Roy has a similar mission in understanding students in schools. This really isn't about teachers, parents, governments, regulations or institutions — it's about children.

Michalski: Paying attention to that is hard sometimes. You get caught up in the business model or whatever is happening in the background. At some point, you have to realize there are people here and that the people are children. Roy, you've done interesting work in learning. I want to draw attention to some of the words we're using, and some of the words that we're not, and make them part of the discussion. We're talking about learning, not

necessarily education. We're talking about comfort, which is Brenda's goal, rather than entertainment. Can you help peel apart some of these words as to whether they're about education and learning, or knowledge and knowing?

Roy Pea, Center for Technology in Learning: This notion of personal relevance is a good place to begin, because in the past couple of decades there's been a revolution in scientific understanding of learning. However, this is not reflected in most education settings, which are still dominated by the teacher at the front of the classroom giving lectures and demonstrations to kids who have very little opportunity to express their beliefs. This happens at the college level, too, not just K-12. We can use architecture as a way to think about this. We now know that knowledge is largely a constructed activity in that the knowledge structures of any individual kid are very different from those of another. If there are 55 million K-12 kids, there are that many different structures. The challenge for an architect is to build a structure in relationship to the site. We don't do that often enough with individual learners. We don't give them enough chance to express themselves in conversations. Computing and communications open up all kinds of exciting opportunities to understanding the kids' perspectives.

correct spelly

Michalski: Brenda mentioned relevance. Much of this is about listening, about paying attention, and not forcing something into the situation.

Pea: Right. Many of the new knowledge ecologies that use the Web start with kids driving questions and are about kids working together to define projects. Of course, teachers and others, such as scientists and folks in the community, must actively guide the kids to reasonable projects. But starting with kids' questions is the best way to build knowledge structures that will work once kids get into the workplace. Many of you will hire kids coming out of our current educational system and spend a great deal of money retraining them.

Michalski: What happens to teachers in all of this? What support do they get? What do you think they need?

Pea: As Brenda pointed out, the focus has been far more on the curriculum than on the child. But in the past five years, all these great project-oriented systems were developed. The difficulty was that every teacher had to be the translator for how those systems functioned in the classroom. Brilliant learning environments don't work well if the teachers aren't equipped to work in them. We've been dumping on teachers for far too long, instead of seeing them also as learners. They've been isolated in relation to the content disciplines. For example, elementary teachers typically take only a couple of science courses; the major way they learn science is through a textbook. This is not a good foundation for helping kids learn how to be scientific inquirers.

Michalski: When we look at technology and education, we make this mental leap forward of about 20 years and think, "Ooh, the wired classroom, and families connected at home so that they can check the homework and talk to the teachers." Something tells me this isn't very realistic. What is realistic?

Pea: As I listen to the discussions here, I keep thinking about the evolution metaphor. Education, in the context of the rain forest of change you all talk about, is more like a glacier, which is seized up in all kinds of ways. We have 50 different nations — the states — each setting their own standards.

Michalski: That's just within the U.S.

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Pea: That's right. The states set mandates through tests for how those standards are to be met. Those mandates then make their way to state and local curriculum coordinators, who base their work on textbooks that reflect the state standards. Professional development for teachers is largely neglected — a hit during weekend workshops. There's also very little money in the educational system. Very few people are making money in educational software. Even though K-12 education is a \$300 billion enterprise, only 1.25 percent goes to technology of any kind, including hardware, software, support, maintenance, wiring and the like. The President's Committee of Advisors in Science and Technology last year looked systematically at how technology could help K-12 education. The committee was shocked by that low figure and recommended that it



be increased by about a factor of four. Members also were shocked by the very small proportion of research and development funds that go to figuring out how to improve learning in education.

WE'VE FIGURED OUT HOW TO MAKE FUSION RUN ON A SYSTEM 390 ...

Samir Arora
NetObjects

John Patrick
IBM

Laurel: Imagine having millions and millions of captive customers who are forced to use your product. This has been the story in educational software for 20 years.

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Michalski: The dream of everyone in this audience!

Laurel: We've put crap into the classroom, because the customer is not the same as the audience. The customer is an institution, a board of directors. The audience has something foisted upon them, so standards have been extremely low. I want to add to your observation about this glorious future we see. Because we sell products to 8-to-12-year-old girls and provide an on-line environment for them, we have to address technology's lowest common denominator. Some of our stuff still has to deal with Windows 3.1, for example 4MB of RAM —

Michalski: Or Apple DOS.

Laurel: Right. Both the customer and the audience have some fear and loathing of “new and improved.” They don’t want to have to install a new sound card. This happens in education too. People think, “One more year and we’ll have all this new bandwidth; we’ll have these new facilities; and everything will be different.” The world doesn’t hold still long enough for social structures or community support systems to evolve, for good interfaces to become stable, or for us to use our expertise to create environments that children can have consistent coherent transactions with. One of Purple Moon’s strengths is that we’ve been very conservative about relying on technological innovation to enable us to do something new. I’ve focused on understanding the human person, the characteristics of engagement, and confining

innovation to the domain of content and social relationship, as opposed to technology. Education could take a lesson from that.

Michalski: Before this session, many of our conversations have centered on identity. I’m particularly interested in some of the Purple Moon characters and the roles they play. Can you elaborate on them?

Laurel: When Jeff Berg talked about stars yesterday, I didn’t hear him mention any stars who weren’t human. I wanted to hear about Bugs Bunny. I assume that Bugs has an agent.

Michalski: He’s probably a Toon.

Laurel: Yes, he’s probably a Toon. Our research identified not only the many different individual characteristics that girls find important and interesting at this age, but also explored the cultural dynamics that tend to form among the different social groups. To a certain extent, we used that information when we developed our characters. Of course, without a brilliant writer like Pam Liddell and a great artist like Grace Chen, we wouldn’t have gotten there. But the characters are reflections of the children we talked to during our four years of research. We launched our Web site in September, a good month before we released the CD-ROMs. Several of the characters had home pages to which postcards could be sent. These characters received an avalanche of postcards on the basis of very little information about them. From reading the postcards, we realized that girls were projecting onto those characters because we’d done a good job of capturing traits familiar to them. In this interesting way, our character universe, which reaches through all of our products, reflects our customers’ universe and gives them space to experiment with emotions and identity. This is quite different from other toy characters and properties.

Michalski: What do girls do at Purple Moon?

Laurel: We have about 60,000 registered users. We’ve served over 35 million pages since we launched, so I guess that’s 300 million hits. We just won a Coty Award for best debut site.

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return



HERE’S THE SECRET COMBINATION.

Jim Cannavino
Cybersafe

Michalski: Congratulations.

Laurel: Thank you. The girls send postcards to each other. We don't have a live chat situation, primarily for safety reasons. We decided to invest our R&D dollars in collectible treasures on-line, scavenger hunts and contests. Typically, our members visit the site 1.5 times a day and view 37 pages per visit. They send a couple of postcards, collect treasures, enter contests, and complete stories for us. The facility offers many opportunities for members to contribute content, as well as for social relationships. One of the fun things that's happened is that the girls have started organizing swap meets — not an easy thing to do in a postcard-based system — so that they can trade treasures on-line.

Michalski: One of Esther's nieces and one of my nieces-to-be is already a Purple Moon addict. They go to the Web site all the time.

Laurel: We hope that they're also becoming exposed to our characters and stories, because they are an attempt to address, with love and honor, the things our members enjoy and a desire to heal the things that are problematic. We put this in the context of entertainment, because that's how you reach people. But make no mistake, there are values driving what we do to help girls deal with the stuff that's problematic for them.

Michalski: You're looking for a sense of comfort. What kind of comfort? What does comfort mean?

Laurel: Initially, we meant comfort with technology. When we started our research in 1992, the percentages were much worse than they are now in terms of the ability of girls to walk up to a computer, put their hands on it, and feel okay about that. David Liddle's favorite example is knowing that if you hit return 87 times, something will probably happen. If it breaks, it's not your fault. Our initial desire was to motivate girls to put their hands on a computer and begin to feel about it the way they do about a telephone or a VCR. We also want to provide comfort with the social, emotional and pop culture realities of girls' lives, and help them know that they're seen and heard, that they're being validated in some way by somebody, instead of being preached at.

Michalski: And a large part of that is making the environment safe.

Laurel: Yes.

Michalski: What safety measures do you take?

Laurel: A parent is required in the registration process, which usually works. Sometimes it doesn't — every system breaks sometimes — but so far we've been very fortunate. We have a safety alert button, so if there's a problem, someone is alerted right away, and we have captured whatever occurred. Our word filters are increasingly sophisticated, because as everyone who works with children knows, one of a child's favorite things is to figure out how to thwart the word filter.



Michalski: Spell it backwards, put hyphens in, whatever.

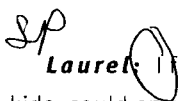
Laurel: Yes. If anything, girls, because they're more verbal, are better at this than boys. In that regard, they constantly challenge us. If there are problems, we call kids on the phone and toss them off the system. I spend a good deal of time answering e-mail from boys who want to know if it's okay if they're there; occasionally I give Miss Manners' lessons.

Michalski: What's the answer to the boys?

Laurel: It's certainly okay if they're there, if they behave themselves properly. [Laughter]

Michalski: Let me carry over this safety idea into classrooms of all kinds. Given some kind of Internet connection or a machine that potentially can go anywhere, and teachers who are under-trained, how do you create a safe environment?

Pea: That's an issue, and it's certainly the one that's attracted the most press attention; I'll say something about it in a minute. But wasted time is a bigger concern for Web-savvy teachers and schools. The search engines are poorly tuned to educators' needs. If you type in the word magnetism, you'll get references to personal magnetism, as well as lesson plans. There needs to be much more of a third tiering, whether it's community-based or social information filtering. Many people are working on projects in that area. When we looked at kids and teachers in the classroom, we saw kids wasting an awful lot of time trying to find things that are useful. There's also not been a great deal of curriculum support. One reason people are so hungry for the Web is that there's so little opportunity in many schools to find information that matches learning goals in the classroom. Many schools don't even have libraries anymore, and yet suddenly they're getting Internet connections. As for the safety issue, a number of researchers, myself included, believe that filtering systems in a classroom, and possibly even in the home, will not be the ultimate answer. We need to look much more to requiring teachers to help kids maintain a critical ability, to know how to stay away from dangerous sites.



Laurel: I fantasize that this poor mother in her housecoat, trapped at home with four little kids, could answer character postcards. If we decided that such filtering is a community responsibility, there ought to be many opportunities for adults who do not find themselves in the workplace to help us.

Michalski: There are already hundreds of thousands of kid-safe Web sites, and resources for kids and classrooms. Without much funding, teachers are sharing materials all across the Web; it's quite impressive.

Pea: When researchers have looked closely at the learning process in math or science, have really listened to kids' understanding of these subjects, and have thought hard about the affordances of the technology, they've come up with very different approaches to teaching. Results have been dramatic. Some urban schools are teaching calculus to sixth, seventh and eighth graders using simulations and linking them to graphs that change in real-time.



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practice
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Matthew Symonds
The Economist
Stewart Baker
Stephoe & Johnson

I KNOW I PUT IN THE RIGHT IP ADDRESS TO THIS TOASTER ...

These students are out-performing suburban high school students. One of the things that excites us most is rethinking the goals of learning and the methods of learning in relation to the powerful affordances of technology. To that end, the National Science Foundation recently funded an effort, which I direct, with a number of other institutions in the country. During the next four years, we will try to harvest the best research activities and the best innovating schools out there. We will try to create a knowledge network to bring these approaches into much broader use in U.S. schools. We're also building a strong industry program, and I hope that some of you will have an interest in that.

Michalski: Much of your early work was in getting people together through the medium. At Northwestern University, you worked on a project called Collaborative Visualization (CoVis) that used videoconferencing, shared screens and other technologies to help people collaborate. Much of the thinking behind that was that learning is situated and social: You learn when you have the right things and people around to help you learn with. Juan Moran talked yesterday about the difference between tacit and explicit knowledge. Many knowledge management systems try to make that distinction between the knowledge you can mine out of a database and what you know. But the idea is still around, perhaps tacitly, that if we could only be motivated properly, we would type our knowledge into the system, then replicate it and share it. Can you talk about the difference between knowledge and knowing, and the social dimension of learning and how that differs from this other model?

Pea: Learning is a deeply social process. Probably the metaphor to start with is the child learning language. Parents don't give a kid vocabulary drill lists. They engage the kid in conversations. They provide a great deal of support. The kid goes off, talks to somebody else, and learns something new through that experience. The issue is of learning through participating in ever more challenging situations. In that sense, the evolutionary metaphor is apt. Another property of knowledge is that it is acquired in the context of use. The just-in-time learning notion that comes out of the workforce was part of the pedagogy of folks like John Dewey, a century ago. The technology gives us new ways to begin to provide it.

Michalski: I'd like to invite the audience up to the microphones with questions. What are some of your other favorite projects out there? What sorts of Web sites, software or nontechnological solutions do you like?

Pea: We're big supporters of the Global Learning and Observation to Benefit the Environment (GLOBE) program, which was the brainchild of Vice President Al Gore. Since that time, GLOBE has engaged many scientists and educators, and tens of thousands of kids around the world. In about 50 nations, scientists have helped develop protocols that engage kids in collaborating with them and other kids worldwide in collecting data about air and water quality. Then they pull it back through the Internet and use it to interpret the global findings. The scientists are telementors, helping the kids to do real science. Kids having an audience for their work — publishing, doing research — is a great thing.



ENTITY

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Michalski: Anything you really like, Brenda?

Laurel: I want to plug the Turl site. It was originally developed at New York University, where Red Burns and some of her people worked on it.

Michalski: She's right there in the second row!

Laurel: This is a fabulous resource for girls slightly older than the girls we address. It's a beautiful balance of humor, engagement and good information. It treats girl as customers.

Michalski: Thank you. At the first microphone, please?

Mark Heckendorn, 1800: I'm interested in how you deal with the generational aspects of this. I was sitting at a table at a trade show with the people who are writing the software for the company I work with, and they were exchanging horror stories from their high school computer labs. I graduated from high school in 1968 and never saw a computer until I was two years into university. Teachers may be in the same generational slot. Are there ways to create loops among the teachers so that they have their own learning community that then passes knowledge down? Is there a parents' club in Purple Moon? Are there ways to deal with their acceptance of the technology? They may not quite understand what their girls are doing.

Laurel: Purple Moon doesn't have a parents' club on-line per se, but we get a tremendous amount of e-mail from parents and many calls to customer support. There is an opportunity to form an on-line community with parents. We just haven't done so.

Pea: There is a big generational issue around the teacher community. In about five years, 40 percent of the two million-plus teachers will retire. If the schools of education would wake up, there is a tremendous opportunity to transform the comfort level of teachers with technology in relation to the classroom. Part of this lack of comfort and knowledge is the fault of the people here. Standards, interfaces and systems change so rapidly that teachers find

computers confusing, and schools don't tend to buy them. But the issue is not one of generation per se, because large groups of seniors use computers. As long as there's a personal relevance to their computing, many older people are wired and on-line much of the time.

Michalski: There are enormous opportunities for reconnecting people who have been disenfranchised or closed out, like retired people, who have much to say and do. But many are held back either by not knowing about each other, or, more likely, safety issues — how to vet somebody's competence in discussing some particular subject, or whatever?

Pea: Right. That's why we developed a project called TAPPED IN, which uses MUVE technology —

Michalski: MUVE means multiuser virtual environment.

Pea: — to create a virtual camera — a combination of synchronous and asynchronous communication in a graphical interface.

Michalski: I get extra quota points for that last one.

Laurel: Dr. Acronym.

Pea: TAPPED IN is a teacher professional development institute. We work with a large number of teacher development organizations to create on-line around-the-clock support for teachers as they learn from one another and from these organizations.

Laurel: Mary Furlong is the president and founder of SeniorNet. Her experience and achievements are worth noticing, because older people, generally speaking, are among that group who feel as if they'll break the computer if they do something wrong. Don Norman spoke to this in his books. Mary has demonstrated with her work that if you give older people relevant, engaging social content, they'll become computer-literate very quickly.

Michalski: Or at least they learn enough to get by.

Laurel: Enough to stay afloat, which, after 27 years in the business, is about as much as I know, because I don't care to learn anymore than that.

Michalski: Mary Furlong, by the way, runs Third Age Media. If you haven't visited Third Age Media, you ought to. It's spectacular.

David Flint, Wentworth Research: Roy, I was interested in your statement that the Internet is not optimized for education for teachers. I'm sure that's true. It doesn't seem to be optimized for anyone in particular. Do you have a view as to how that might be fixed? Clearly one can see both technical means of fixing it with relevant feedback and techniques like that, and social means, whereby if one doesn't go to the search engine, one goes to some sort of community. Do you see both as relevant? Do you see how the optimum fix might be obtained?

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Pea: I see both as relevant, and I'll say something about two projects that we're getting under way. One of them builds off Jim Spohrer's Educational Object Economy. That project was out of Apple for a while. The idea was to create a community and archive in which people can share and reuse Java applets. There are well over 1,500 at the moment. Part of the experiment was to demonstrate that people would be interested in doing such a thing; more than 100 developers have contributed objects already, and schools are using them. Another goal was to identify the difficulties that come up in this type of situation so that ways to support it can be identified. For the most part, these kinds of activities are not well documented, and often don't interconnect or tie into standards. SRI has a new project called ESCOT, Educational Software Components of Tomorrow, which will take that approach to middle school mathematics.

un bold

Michalski: I'm glad you're defining all these acronyms, because I couldn't make my way through them.

Bold

Pea: Sorry about that.

Laurel: You could've made up a really good one for that.

Pea: A second project, Science Forum, seeks to do much of what you describe — community-based information filtering. The intent of this project is that teachers and others using Web-based resources in the sciences can rate them on how useful they are for particular educational tasks. This is being done in combination with the IMS' Meta-data Project. This is an effort of Educom, the White House, the Department of Defense, and a number of universities, organizations and private companies to develop specifications and software for managing on-line learning resources. These would be eXtensible Markup Language-readable in the next generation.

Michalski: I forgot to mention earlier that resistance to change is a barrier to connecting, whether with retired people, teachers with each other and cohorts, or whomever. Roy, you mentioned how decisions are made in a very decentralized fashion, although they seem to follow this rigid, almost geographic pattern. What a Texas school board decides to do is followed by a great number of school boards across the country. There's a rhythm and a cycle to it. Every parent with children has many opinions about how this should go. There is also a great deal of suspicion about the new media. Much of this worry is legitimate. Is this going to be a big barrier in the next few years?

un bold

Laurel: I'm not the education expert, but we're responding to change, like children bringing firearms and drugs to school, in ways that are chaotic and frightened. We're not acknowledging the huge social issues, which involve the well-being of children, that pre-dispose them to be poor learners and make the traditional educational structure inappropriate. This is happening because we're not studying children. We're studying institutions. Maybe we're studying their teachers, but we're not looking at the context of children's lives — the way they relate to our media, their culture, the ridiculously small amount of time their parents spend with them, which can be numbered in the minutes on average per day. The inflexibility here comes from us as a group of human beings not taking responsibility for our young people and always trying to make it somebody else's problem.

Michalski: Michael Crichton's speech last year was very much a call to action on exactly that front.

Graham Anderson, Euclid Partners: In spite of the advances in the graphical user interface design, much of what we see in on-line services and in software is still text-driven. Have you seen any salient differences between the ways in which prereaders use software and on-line services, and the ways in which older children use those same services?

Laurel: I bet the prereaders respond better to pictures.

Pea: Yes. And to sounds, too.

Anderson: Figured that. [Laughter]

Michalski: That was easy.

Laurel: I'm sorry.

Pea: Idit Harel of MaMaMedia, who is here in the audience, is testing younger children on interface issues of that kind. Certainly text-intensive interfaces for 5- and 6-year-olds will be problematic. By and large, for kids of that age, we'd like to see a parent

around as a resource, much as we'd like to see them around television, not just see a machine and a 4-year-old alone on the Web. In thinking about the learning environment, as we go to the preschool years, I want to look gingerly at the relationship of the family and hands-on things, as well as computing.

BUT CAN YOU SIMULATE THE DECISION TREE OF A FRENCH BUREAUCRAT?

Michel Bera
Grolier Interactive
Europe

John Hiles
Thinking Tools

Michalski: Great.

Alexander Lapidus, Whistle Communications: Brenda, there is a massive flow of information in the form of postcards between your participants and your characters. Some issues and characters are undoubtedly preferred over others. There's a wealth of content about what 8-to-12-year-old girls worry about. You must have done a ton of research up front, but now you have this flood of ongoing real-world data. The problems of children in the real world must be changing, as well. How do you learn from that and make your software evolve?

Laurel: We don't just look at problems. I didn't mean to paint such a grim picture. We also look at what they enjoy and what delights them. Purple Moon has an ongoing research program, and we probably are more intensely involved with research than most companies of our type. About eight times a year we're out talking to girls about life in general and specifically. In terms of the fire hose of information that we get from the Web, we've found the best method is periodically to interview the people who are answering character postcards and talk to them about what's salient. A great deal of qualitative work goes on there. We offer a juried

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fiction contest, which girls submit stories to. People read them, we summarize them, and we feed back the information to our writers, who are writing either the monthly adventures on the Web site or producing more narrative for the CD-ROM series. We're in the process of designing some new forms — I don't want to say questionnaires — of voting activities that can be more complex than those we currently use. So far, getting human eyeballs on all this information, and then talking about what's salient, has been the best method we've come up with.

THERE'S PRETTY GOOD BUZZ AT THIS CONFERENCE, DON'T YOU THINK?

Jordan Pollack
Andy Sack
abuzz

aries, your software forces children to learn from other children their own age, instead of learning from those older and younger. Doesn't that promulgate the problem of the classroom? Roy, what technologies could enable children to be challenged appropriately by children outside their age groups? So the gifted could work with older children, the remedial readers could work with younger children, and so on?

Jordan Pollack, abuzz: Brenda and Roy, by maintaining age-group bound-

Laurel: Our writers are all in their 20s or 30s.

Pollack: Oh, okay. So that's a teacher, right?

Laurel: Right. So while there are adults that are members of the community that is extruding a narrative, we're all extruding this universe together, very much as Star Trek fans add to the Star Trek universe. There's a blending of ideas from children and adults in the work that we do.

Pollack: If you weren't constrained by demographic sales drive, could you imagine extending your society to different networks of girls of different age groups, all working together?

Laurel: Yes, except that our expertise is in the age group that we're working with, and we haven't begun to meet the need that's there. I'm comfortable staying where I am. It takes a tremendous amount of resource to gain the depth of knowledge and get the motion that we have going. To start that process over again would be daunting.

Pollack: We'll look for Purple Moon to expand its bandwidth.

Laurel: Bandwidth. Yes. That's good.

Pea: Jordan, your point is a good one, because learning does tend to be aspiration-oriented. When it occurs outside formal educational settings, a broad age range is important. Then kids can get a sense of the skills, abilities, language, whatever, greater and different from theirs. When I was at Bank Street College of Education in New York, I was very happy that it offered a multiple-age classroom setting. The third and fourth graders would be together, and so forth. The CoVis project, which is on-line learning through collaborative visualization, spans middle school, high school and college students, university researchers, faculty and graduate students by setting up telementoring programs. We post in a news group and invite people to come back if they want to help. Then we register them, in terms of expertise, in a database. We obviously do a lot of filtering in relation to this. A great deal of cross-age work goes on in that context, both with kids with one another and with more professional mentors. Certainly there are many ways to augment that with technology.

Dyson: I'm glad we heard Jordan's question, because it's something that fascinates me and that I'd like to turn around. When a kid walks in here, if it's a cute kid, usually people start cooing, talking baby-talk or changing the way they would usually interact with another adult. But what if a 7-year-old goes on-line and starts discussing whatever it might be, and is not perceived as a 7-year-old, but as an adult? This phenomenon fascinates me. I've talked to a number of kids about it, but haven't heard any good answers yet.

Michalski: By the way, Esther, that issue manifests itself as a gender issue for adults. When women go into rooms with anonymous names, they are often treated with more respect than —

Dyson: I know. *[Laughter]*

So, with all that accomplished, we want to thank all of you for coming to the 21st PC Forum. I want to thank Jerry, and Jerry and I want to thank Daphne Kis, and Daphne and Jerry and I want to thank everybody from EDventure, including Scott Giering, who registered you all, Mari Katsunuma, who markets to you all, Helen Martin, who manages the office so that we can do all this, Trista Schroeder, who manages me, and Philena Taylor, who manages all of us in our internal communications. In terms of empowered employees, one of the most important things is to have your people come to the conferences you hold and get to enjoy the fun parts, as well as the office work. We want to thank Lante and specifically John Meyer, who ran the Lante team that set up all the equipment, some of the equipment suppliers, including IBM, Tektronix, Elastic Networks and ANS/WorldCom. Also, our transcript editor, Christina Van Horn, who has faithfully followed all your words, and Paula Court and Michael Sofronski, the photographers, who have recorded all your actions and silly faces.

Michalski: Thank you all very much. We want to give you a round of applause. *[Applause]*

Dyson: Thank you, everybody. See you next year. *[Applause]*

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