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**Towards Collaborative Virtual Learning Communities:**

**“The Learning is in the Making”**

Prepared for  
**The Getty Education Institute for the Arts**  
**The Getty Center**  
**Los Angeles, CA**

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**Final Report**

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Portions of this report are extensions of previous writing about the development of successful virtual learning and design communities, which I first developed while at the Institute for Research on Learning (IRL). A DesignWorlds consulting contract with Apple Computer's Educational Object Economy Project (now the EOE Foundation) in 1997-1998 followed this work. I also extended this work in an article I wrote and presentations I made on behalf of the George Lucas Educational Foundation (GLEF) in 1998-1999, as noted in this report. I am grateful to Jim Spohrer, John Lilly, Martin Koning-Bastiaan, Ed Gaible, Anil Srivastava and Jeremy Roschelle for their encouragement and support of my work for the EOE, and to Milton Chen, Sara Armstrong, Mark Sargent, and the staff of the George Lucas Educational Foundation for their support of my work as a GLEF Fellow.

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And finally, to my wife and DesignWorlds partner, Frona Kahn, and to our sons, Yoni and Aaron, my thanks and love to you for being the wonderful family we are.

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## Contents

<b>I. Overview.....</b>	<b>4</b>
<b>II. A survey of the virtual communities landscape.....</b>	<b>6</b>
<b>III. Designing virtual communities for creativity &amp; learning.....</b>	<b>7</b>
<b>Four domains of a learning community.....</b>	<b>9</b>
<b>IV. Some examples of successful and emerging virtual learning communities.</b>	<b>14</b>
<b>V. Implications for the Getty's ArtsEdNet community.....</b>	<b>28</b>
<b>VI. Conclusion.....</b>	<b>31</b>
<b>Bibliography &amp; Research Resources.....</b>	<b>32</b>
<b>Additional Curriculum, Web and Virtual Community Resources.....</b>	<b>36</b>
<b>Appendix I: Ten Steps to Establishing Online Communities (Kim).....</b>	<b>40</b>
<b>Appendix II: ACME Virtual Training Network (VTN) Summary Q&amp;A.....</b>	<b>41</b>
<b>Appendix III TAPPED IN.....</b>	<b>50</b>
<b>Appendix IV: New Technologies for Interactive     Multimedia/Web Design and Collaboration.....</b>	<b>53</b>
<b>About the Author.....</b>	<b>56</b>
<b>About DesignWorlds for Learning.....</b>	<b>57</b>

## **Towards Collaborative Virtual Learning Communities: “The Learning is in the Making”**

**Ted M. Kahn, Ph.D.**

“In real estate, the key to success is location, location, location. In the world at large, the key is connections, connections, connections. The survival and success of every enterprise will be based on stakeholder relationships—on human and electronic connections to a much broader community.”

—Stephen R. Covey, “The Ideal Community” (*The Community of the Future*, The Drucker Foundation, 1998, p.49)

“Virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.”

—Howard Rheingold, *The Virtual Community* (1993, p.5).

### **I. Overview**

This report explores the rapidly growing use of the Internet and the World Wide Web to create online or virtual learning, design and professional development communities. *Virtual learning communities* are groups of people who share common needs or interests in supporting learning activities, but who may have never met one another in person. Traditional communities tend to be defined by members residing in the same place—such as residents of a neighborhood, town, or city— or through sharing common interests, such as religious communities or business, research or arts practitioners (Oren, *et al*, 1998). Members of virtual communities often live, learn, play or work in widely distributed geographical locations (including multiple cities, states or countries). They most often emerge around shared life experiences, relationships, and common interests. Learning through diverse forms of active participation in “communities of practice” is the key to one’s becoming a more central participants in these communities (see Lave & Wenger, 1991; Wenger, 1997). Virtual community pioneer, Howard Rheingold, also places strong emphasis on the positive affective and emotional ties and different kinds of relationships that can grow from people’s affiliation with one another over long periods of time as a defining characteristic of successful virtual communities (Rheingold, 1993, 1998).

Virtual communities are far more than occasional email exchanges or access to a Web site of common interest. Virtual communities are characterized by their members’ use of various technologies to access, connect and communicate with fellow members who are geographically distributed. This is most often done through computers and telecommunications networks (such as the Internet or more local Intranets), together with the use of various forms of computer mediated communication software, such as: email, chat, listserv and Usenet

groups, online conferencing and discussion forums, interactions through and design of shared Web sites, and multi-user design and research activities. But virtual communities can also be initiated and supported through other technologies; for example: interactive two-way video and audio technologies for distance learning, call-in radio talk shows, and various forms of inexpensive videoconferencing. Members of virtual communities share information, interests, and experiences, explore personal relationships, play out fantasies or design imaginary worlds (often via the use of Multi-User Dimensions (MUDs or MOOs) and taking on alternative online persona), and carry out transactions or exchanges of goods and services in which users add additional value through their sharing of information (Hagel & Armstrong, 1997). They can also use the power of “leveraging cyberspace” (Kalil, 1997) to access and use networked, distributed information and computing resources that can enable new forms of distributed collaborative learning, work, and recreation in support of a set of common goals.

While virtual communities have been around since the earliest days of electronic mail over 30 years ago, the explosive growth of low-cost personal computers and the decreasing costs of high bandwidth connectivity provided by both the Internet and both public and private local area networks over the past decade alone has resulted in an unprecedented growth of this social phenomena. No one knows for sure just how many online communities exist now, but some recent statistics indicate the exponential growth of this new social phenomenon: Since Yahoo launched its online “Yahoo Clubs” (“a “host your own” community under <http://www.yahoo.com>) only nine months ago, there have been over 200,000 distinct communities formed. Remarq, another online community site, has logged over 500,000 daily postings to Usenet (Cashel, 1999). Also, the growth of new chat-based communities on TalkCity <http://www.talkcity.com> since its inception two years ago or on AOL has been enormous. From these statistics, more and more people feel that designing successful Web sites will require also intentional design of ways to bring users together into active virtual communities, rather than relying on the value of browsing for information. As shown in Appendix I, designing effective online that can engage continuous participation and interest from members is a art form involving social infrastructure and interaction design (see Kim, in Glaser, 1997; Rheingold, 1999; Cashel, 1999; Oren, *et al.*, 1998; Fulton & Riel, 1999).

As new information continues to be produced at an ever accelerating pace, people’s needs for finding new ways to continue to learn are also expanding—and hence, it is in the domain of virtual learning communities that this report is centered. This report is not designed to do a thorough analysis, research or evaluation study of virtual communities that support learning (see Oren, *et al.*, 1998, and Riel & Levin, 1990, for important work in these areas). Rather, it is a survey of the landscape and a short exploratory voyage to several different kinds of learning communities in different content areas, each having very different histories.

A community of particular focal interest to the past work of The Getty Education Institute has been that of K-12 teachers, specifically, teachers and

educators in the visual arts. While most of the learning communities surveyed in this report are not dedicated to the arts in K-12 education, *per se*, the kinds of virtual communities listed here offer a rich set of design alternatives of different emerging models of technology-supported learning communities which could benefit—and could be benefited by—the growing arts education community of users of the Getty’s own online learning community, **ArtsEdNet** <http://www.artsednet.getty.edu> .

## II. A Survey of the Virtual Learning Community Landscape

The material in this report is also an elaboration of a particular approach to designing virtual design and learning communities , which the author has developed in a number of projects, as well as previous articles and presentations, over the last five years. We call these “DesignWorlds for Learning™.” In particular, this report is a direct descendant to an article I wrote, entitled, “Designing Virtual Communities for Creativity and Learning,” published earlier this year as an online complement to the Spring, 1999, issue of the *Edutopia* newsletter of The George Lucas Educational Foundation (Kahn, 1999) <http://glef.org/edutopia/newsletters/6.2/kahn.html/>

DesignWorlds are virtual communities that are characterized by two major design principles:

1. **Users themselves are “participatory designers” of some or all of the structures and content of these virtual communities**—and in so doing, they embody a constructivist philosophy of “learning-by-designing” that enables much higher levels of learning of content, as well as acceleration of learning to effectively use sophisticated technological tools ; and
2. **Virtual teams of geographically-distributed users collaborate and integrate a variety of different kinds of technology applications and tools in the service of designing effective, Web-based “products” or online content and services.** This process is a highly valuable learning experience that maps onto real-world work situations and creates real “ownership” of these products by the design community members. Communities who design and use these virtual Web-based communities create their own effective collaborative learning environments. This continually growing collective experience base not only raises each user’s level of sophistication and understanding in how to best use these technologies to further his or her own learning, but it also enable other students and teachers to benefit from the use and expansion of these products to further their learning. This means there is an implicit plan for “scaling up” these powerful learning experiences so that others can learn to design their own “DesignWorlds” virtual communities for learning, as well.

We believe that this particular approach to virtual learning communities offers substantial new potential growth opportunities for the Getty’s own ArtsEdNet community in the areas of Web-based learning & teaching, distance learning, professional development, and collaborative design and creativity. Because the Web is evolving so rapidly and so many heretofore separate media and

technologies are experiencing rapid digital convergence, we encourage readers to “think outside the box” of how different digital technologies might be combined and used in the near future to support new kinds of online—and offline— collaborative design and learning activities of a growing community focused on improving education and lifelong learning in and through the visual arts. To support this kind of futures brainstorming, we have also listed a number of emerging collaboration technologies (and their providers) in Appendix V.

### III. Designing Virtual Communities for Creativity & Learning <sup>1</sup>

*“Knowing is literally something which we do...”*—John Dewey

#### Changes in Our Views About Learning

Real change and innovation in any endeavor or organization are really about people. While technology can be a catalyst for much-needed change in our educational system, it can only be really effective if we support, enrich, and leverage the creative work and lifelong learning opportunities of all the people who, together, form a learning community—learners, providers, payers and policy-makers<sup>2</sup>.

In the past, the domains of learning for each of these four stakeholder groups were considered separate from the others. For example, students were viewed primarily as learners; authors and publishers were the providers; parents and teachers were the payers; and government officials, school administrators, and members of the School Board were the policy-makers. This division of responsibility was based largely on a model of education and views about learning and work that emerged from the needs and practices of the industrial age. Early in the 20th century, most students were being prepared to work in factories or organizations that required very little innovation or continuous learning. In this model, knowledge creation was viewed as the activity of a few select people, and the “packaging” and transfer of this knowledge or expertise from teachers to students (as if knowledge were a substance) was the dominant model of education in the classroom. Individual competition, standardized assessment and eliminating as much variation in as many aspects of the teaching and learning process as possible were also seen as a major goal of education, as

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<sup>1</sup> An earlier version of this article appeared on The George Lucas Educational Foundation web site <<http://glef.org/edutopia/newsletters/6.2/kahn.html/>> in April, 1999. This article was based on two previous online articles I wrote in 1997 and 1998 for the **Educational Object Economy (EOE)** virtual community Web site <<http://www.eoe.org/>> . Formerly a research project at Apple Computer, the non-profit EOE Foundation now sponsors one of the largest online resources for interactive, Web-based learning, including a repository of over 3,000 indexed Java educational “applets” contributed by members.

This article also includes material from the presentation I made as a GLEF Fellow for the annual conference of the California School Library Association (CSLA) in November, 1998. Many thanks to GLEF, as well as to Sherman Rosenfeld for this thoughts about social match-making on the Net, and to Jeremy Roschelle, Jim Spohrer, John Lilly, Martin Koning-Bastiaan, and Anil Srivastava for their interest and support of my earlier work for the EOE.

<sup>2</sup> Institute for the New California (1997), Learning in the Information Age: A Conversation for California's Future. <<http://www.inc-cal.org/educatn/edulearn/learning.htm>> .



they provided predictability regarding which students were most likely to succeed—and which were most likely to fail.

As we have entered the information and communications age, a major shift has taken place in our understanding of how people really learn (both in classrooms and informally), as well as in what kinds of work and preparation are required for 21st century jobs<sup>3</sup>. A main area of job growth is in what former Labor Secretary Robert Reich called, “symbolic analysis” or “knowledge work.” In this kind of work, value is created by all the different groups involved in a learning community through their creating, sharing and applying their own new knowledge, not just in acquiring or absorbing knowledge created by others. In the area of knowledge work—and with the rapidly increasing use of computers, multimedia and the World Wide Web— a learning community is created through an alignment of the four domains or stakeholder groups shown below. This process is inherently a set of collaborative, constructive, and creative activities of members of all these groups, and members may play all four roles (sometimes simultaneously) in creating a shared vision of a learning community. The success of these communities will ultimately be their ability to become **effective knowledge designers**, as well as information consumers. And it is in their ability to create new knowledge for themselves, their local communities and for others globally where these communities add real value.

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<sup>3</sup> For example, see “Seven Principles of Learning” and other publications of the Institute for Research on Learning (IRL), Menlo Park, CA <<http://www.irl.org>>.

# FOUR DOMAINS OF A LEARNING COMMUNITY



Institute for the New California (1997). "Learning in the Information Age: A Conversation for California's Future."  
<<http://www.inc-cal.org/educatn/edulearn/learning.htm/>>

## Toward Virtual Learning Communities

The growth of new kinds of virtual learning communities has emerged as a byproduct of the rapid growth of the Internet and related new media. Data and information are now being created at a far faster rate than most experts can convert this information into forms of knowledge that can be communicated effectively to teachers, students, and the general public. Virtual communities address this problem by providing an environment for people to connect with and learn from other through collaboratively participating in the construction of new knowledge. . In their book, *Net Gain*, John Hagel and Arthur Armstrong identified four basic kinds of needs or values that these virtual communities provide their members <sup>4</sup>:

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- **interest** (e.g., shared interest in biology, cosmology or cars)
- **relationship** (e.g., shared life events, such as cancer, death of a loved one, senior citizens seeking companionship)
- **fantasy & imagination** (use of MUDs or MOOs to bring out different aspects of the personalities/talents of members )
- **transactions** (trading, buying and selling, brokering, etc.)

Research in the cognitive and learning sciences has also showed us that different people learn in different ways and have different learning needs at various times in their lives. Many research groups, such as the Institute for Research on Learning (IRL) and the Center for Workforce Development of the Educational Development Center, have also pointed out that learning is a fundamentally social activity—whether it be in schools, workplaces, or other environments. It is also going on all the time, often through the informal interactions we have with different people every day. (This is one of the main reasons for the widespread popularity and rapid growth of chat rooms and email as today's dominant forms of interaction on the Internet.)

Government agencies, such as the National Science Foundation and the U.S. Dept. of Education, have already supported many exemplary programs in developing new curricula, integrating technology, and providing new models for professional development of teachers. One of our greatest challenges in education is how to spread the successful innovations from these funded programs to new participant and how to leverage the investment in educational research and development through connecting these efforts with one another? Using technology to build virtual learning communities may well be one of the best means to provide support to teachers, as well as providing scale-up of these efforts on a widespread basis.

### **Toward Building Communities of Knowledge Designers**

"Consuming culture is never as rewarding as producing it."  
 ---Mihalyi Csikszentmihalyi, *Creativity* (1996)

A uniqueness of cyberspace is that the growth of the Internet and the World Wide Web enable (and demand) the continuous creation of new content, interactive learning and collaboration environments—and more and more of this content and knowledge is being created by the users themselves. Like the designers of the great cathedrals of the Middle Ages, we are now the designers of the worlds and spaces of Cyberspace that we will inhabit—at school, at work and at home. As Cesare Pavese said, "To know the world, one must construct

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<sup>4</sup> John Hagel III and Arthur G. Armstrong (1997), *Net Gain: Expanding markets through virtual communities*. (Cambridge, MA; Harvard Business School Press).

it. Thus, we will all need to learn collaborative knowledge design skills so that our virtual learning and work environments can effectively support our knowledge work and creativity.

From my own work, I have realized that a key feature of successful virtual learning communities is in members designing or making something together. Just as members of an orchestra, jazz ensemble, or rock group make music together, the most effective virtual learning communities are designing knowledge-based products and services together. In order to do this effectively; new kinds of skills need to be developed that take advantage of the diverse and unique talents and experiences of different members in these communities. Below is a list of seven general kinds of new “basic skills” for creating effective communities of knowledge designers:

**Know-who** (social networking skills, locating the key people and communities where competencies, knowledge and practice reside—and who can add the greatest value to one’s learning and work)

**Know-what/ Know “what-not”** (facts, information, concepts; how to customize and filter out information, distinguish junk and glitz from real substance, ignore unwanted and unneeded information and interactions)

**Know “What-if...?”** (simulation, modeling, alternative futures projection)

**Know-how** (creative skills, social practices, tacit knowing-as-doing, experience)

**Know-where** (where to seek and find the best information and resources one needs in different learning and work situations)

**Know-when** (process and project management skills, both self-management and collaborative group processes)

**Know-why...and Care-why** (reflection and organizational knowing about one’s participation and roles in different communities; being ecological and socially proactive in caring for one’s world, for others and the environment)

I believe that “know-who” is one of the most neglected of these skills in schools—and yet, it is one of the most critical to the success of any major enterprise in life. Since human talent is ultimately our most important resource, finding key people who have the right kinds of ideas, talents or resources you need just at the right time. One interesting example of an Internet company that takes this notion quite seriously is **About.com** (formerly called The Mining Company) <http://www.about.com> is one of the few Internet startup companies to recognize just how important people are to the information search and access problem. Rather than rely on just intelligent agents and search engines, About.com is based on a network of hundreds of real people who help others

**“mine” their way through information space through their own recommendations, indexing, and organizing of information resources. Effectively, they are really playing the role of information brokers and pathfinders.**

### **III. Some Examples of Successful & Emerging Learning Communities for Teachers**

#### **Access Excellence**

<http://www.accessexcellence.org>

Access Excellence is an award-winning science education community for biology teachers, biology curriculum developers and educators. This community was originally started by Genentech, one of the pioneering companies in biotechnology and genetic engineering research. This site has a wealth of lesson plans, discussion forums, and resources related to topics of interest in high school biology—and like many of the best virtual community sites, most of its content has been contributed by its members.

#### **The Autodesk Foundation**

<http://www.autodesk.com/foundation>

#### **The Autodesk Foundation PBL Network**

<http://www.autodesk.com/foundation/pbl/>

The Autodesk Foundation has become internationally known for its support of a growing community of teachers and educators dedicated to Project-Based Learning (PBL). The Autodesk Foundation supports this growth through hosting its annual national PBL Conference for teachers each March, as well as through publishing monthly online newsletters, hosting an emerging virtual PBL Network community, and through sponsoring site-based institutes at exemplary PBL schools. The 1999 Autodesk Foundation PBL Conference, held March 4-6 in San Francisco, drew over 800 participants from the U.S., Canada, and several other countries.

#### **The Bay Area School to Careers Action Network (BaySCAN)**

<http://www.bayscan.org>

This collaborative supports development and implementation of new kinds of school-to-work and school-to-career efforts. With strong initial leadership from Bob Pearlman, President of the Autodesk Foundation, BaySCAN has a number of different school-business-higher education coalitions in areas of: multimedia learning, teaching and learning careers, financial services and information technologies. One important resource in the multimedia area is SkillsNet <<http://www.skillsnet.net>>, created by the Bay Area Multimedia Partnership to provide resources for both students, teachers and businesses around multimedia and Web-based skills development and career opportunities.

#### **Center for Digital Storytelling, School of Education, University of California, Berkeley**

<http://www.storycenter.org>

Founded by Joe Lambert and Nina Mullen several years ago as the San Francisco Digital Media Center, the Center for Digital Storytelling has been providing hands-on digital storytelling workshops to a wide variety of people, including students, teachers, artists, seniors, and those with disabilities and learning differences. These workshop use a curriculum centered around supporting

people to quickly learn to use high level multimedia software tools, such as Adobe Premiere and Photoshop, through creating short, personally meaningful digital movies. Digital Storytelling has become an international phenomena, with an annual international Festival each September in Crested Butte, CO. For more information, send email to:

[info@storycenter.org](mailto:info@storycenter.org)

### **Classroom CONNECT**

<http://www.classroomconnect.com>

This is a commercial company dedicated to providing teachers with resources and project opportunities for effectively using the Internet in education. One of the key offerings of Classroom Connect is a series of Internet- and Web-based “quests” or adventures (e.g. Asia Quest), in which teachers and students explore different areas around the world through Internet communications with scientists, researchers, and others who are physically located and working in these areas. This electronic field trip concept, related or similar to MayaQuest (originally developed by MECC/The Learning Company) and NASA/Passport to Knowledge’s “Live from other worlds,” is currently one of the most popular uses of the Internet by teachers and their students.

### **Doreen Nelson’s City Building Education Web site, Cal Poly at Pomona**

<http://www.csupomona.edu/~dnelson>

Doreen Nelson has been developing and applying a methodology of project-based creative learning, called City Building Education, for nearly 30 years. This design-centered and alternative futures-oriented methodology helps teachers help their students design “never-before-seen” environments, such as cities and civilizations of the future. Doreen also heads up a 2-years M.A. program for teachers at Cal Poly, Pomona, in “Design & Creativity in Education” which extends this and related methodologies (“backwards thinking”) as a means of integrating some of the best of creativity and design arts education into a multidisciplinary, project-based approach to learning for students of all ages.

### **Galef Institute, DWoKNet**

<http://www.dwoknet.galef.org>

This Web site is designed to provide support for development of virtual professional development communities around interdisciplinary learning in and through the arts. Based around the Galef Institute’s “Different Ways of Knowing” (DWoK), a major curriculum integration effort in elementary schools, this Web community provides a number of discussion forums around issues of using the arts and humanities for curriculum development, integration, assessment, and school reform.

### **Global Schoolnet Foundation**

<http://www.gsn.org/gsn>

Global Schoolnet (GSN) is one of the oldest non-profit groups supporting teachers and students to do Internet-based education projects. Co-founded by Al Rogers and Yvonne Andres, GSN has created an important national and international leadership community of teachers and educators who have pioneered many new Internet-based technologies in education as they have first emerged from research (e.g., CU-SeeMe videoconferencing). They also have developed very important rubrics for evaluating student Web-based projects, such as those submitted for their CyberFaire contests.

### **Institute for Research on Learning (IRL), Middle School Mathematics through Applications Project**

<http://www.irl.org/mmap/>

<http://www.irl.org>

This is a major NSF-funded project developing new, design-oriented and PBL approaches to teaching and learning of middle school mathematics, with full integration of computer applications. IRL's most important contribution to the area of online communities has been its research and projects related to understanding the social nature of learning through people's participation in multiple "communities of practice."

### **San Francisco Museum of Modern Art ("Voices & Images of California Art")**

<http://www.sfmoma.org>

The Education Department of SF MoMA is creating a statewide community of teachers who are using this wonderful multimedia exploration and resource about contemporary California artists.

### **Show-Me Center, University of Missouri**

<http://showmecenter.missouri.edu>

This is one of three NSF-funded math curriculum dissemination sites, including five different funded math education reform projects. This site and resource is specifically for teachers who are using or interested in one of these new middle school math curricula. This kind of "community of curriculum project practitioners" could become a model for other federally-funded curriculum innovation projects in the arts, as well.

### **TAPPED IN**

<http://www.tappedin.org>

TAPPED IN is a Multi-User Virtual Environment (MUVE) focused around Teacher Professional Development (TPD). Developed by SRI International, it is one of the fastest-growing federally-funded R&D in developing effective virtual community support for alternative models of TPD. This environment has also been used for pre-service teachers, as well as students, for various online collaborations. As of June, 1999, TAPPED IN had grown to over 4,200 members, including 1,400 new teachers from the Los Angeles County Office of Education who are being trained this summer.



(See more information in excerpt from one of TAPPED IN's published research papers (e.g., Schlager, et al., 1998 in Appendix III) or a good practitioner's article in *Edutopia* by Gray, 1999).

**Teacher Universe.**

<http://www.teacheruniverse.com>

Teacher Universe is a company dedicated to providing lifelong professional development in technology and curriculum integration, as well as related products and services, to teachers. Part of Michael Milken's Knowledge Universe family of companies, Teacher Universe offers a wide variety of workshops, technology planning, and curriculum integration services to schools and school districts.

## **Learning Communities Primarily for Students (and Teachers)**

### **ACME Virtual Training Network (VTN)**

<http://www.convergemag.com/Publications/CNVGSept98/warnerbros/warnerbros.shtml>

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Unlike almost all the other examples of Internet-based virtual communities cited here, the ACME Virtual Training Network (VTN) primarily uses two-way video/audio distance learning technology, rather than the Web and Internet, to support a growing community of high school and college students studying animation with the aid of top industry animators. This technology complements—and helps spread—the best educational practices developed by Dave Master and outstanding animation professionals to remote participating school sites. ACME VTN was originally piloted as a nine-month virtual training program for high school and college students who possessed fundamental drawing skills and were eager to test the waters of animation. This project was designed to reduce the need for remedial-level and/or basic animation training at job sites by helping emerging and established preparatory programs to meet industry standards in a more efficient way—regardless of these programs' demographic profiles or geographic locations.

ACME VTN is an intense, interactive, distance-learning initiative that focuses and builds on the most important foundation skill in animation: the ability to draw. Using live interactive two-way video/audio conferencing systems, ACME VTN gives self-selecting students and teachers at qualified remote locations a hands-on opportunity to learn the art of animation from the industry's top professionals and to improve their ability to meet the animation industry's highly competitive, entry-level hiring criteria.

ACME VTN is a public/private collaborative effort among diverse parties. The key partners responsible for planning, implementing, and sponsoring the pilot were: Warner Bros. Feature Animation (WBFA); the Birmingham Board of Education in Alabama; Next Wave Learning (NWL) a nonprofit system-wide auxiliary of the California State University (CSU); Rowland Unified School District and La Puente Valley Regional Occupation Program in Rowland Heights, California; GTE California; MCI Telecommunications Corporation; Bell South Corporation; and EDnet. (NWL and EDnet played critical founding roles in the first two years and are no longer directly involved.)

The classrooms of teachers and students (referred to as sites) that have participated in the three-year pilot are from four academic institutions in California: San Jose State University (Art & Design), CSU Northridge, CSU Fullerton, and Rowland High School/La Puente Valley ROP; and three in Birmingham, Alabama: Phillips High School, Jefferson State Junior College, and Lawson State Community College & Arts Academy.

(See Appendix II for more information on this project.)

### **Animalhouse.com**

<http://www.animalhouse.com>

This community now includes close to 1,000 different online "campus" communities, built by students from colleges all over the U.S. Directed by Jay Alan Samit of Universal Studios, animalhouse.com is a community targeted to college life and culture. Samit credits its success to three key components: "a focused audience, an organic structure for growth, and a robust collection of tools and content" (*New Media*, Dec., 1998, p. 38).

### **CitySpace**

<http://www.cirtyspace.org>

CitySpace is a collection of virtual cities, all designed by contributions from kids and older students around the world. Originally designed and produced by cyberartists and entrepreneurs, Zane Vella and Coco Conn, CitySpace is an interesting model of how user-created content of a variety of forms can become integrated into online user-navigatable environments, using QuickTime VR. (For a description of this project, see Mestel, 1996).

### **CNN Student News Bureau**

<http://learning.turner.com/sb/>

Turner Learning/CNN has developed a major new educational media project called the CNN Student Bureau. The CNN Student Bureau will support collaborations between high school and college students, local cable television providers, and college journalism and communications departments to enable students to produce professional quality news stories. Stories will be developed in video and Web-based formats for distribution on the Web (e.g., via CNN's Newsroom) and on local and national cable broadcasts.

### **The Exploratorium**

<http://www.exploratorium.edu>

The Exploratorium was an early pioneer in the use of the Web to extend its vast science education resources, as well as to expand audience access to these resources. It has also pioneered the use of Internet multi-party videoconferencing, as well as Webcasts, for major events of scientific and educational interest to a wide community.

**The International Education & Resource Network (I\*EARN)** <http://www.learn.org>  
I\*EARN is one of the oldest online educational network communities, with participation of thousands of teachers and students from over 40 different countries. I\*EARN was started in the mid-1980's, with an intent to show how computers and network technology could support students to do international collaborative learning, research and work that can really help improve the world. The project has had substantial funding overseas from The George Soros Foundations, especially in Eastern Europe.

**The International Telementor Center, Center for Science, Mathematics & Technology Education, Ft. Collins, CO.**

<http://www.telementor.org>

David Neils <davidn@telementor.org>, (970) 206-9352. The International Telementor Center could provide a powerful vehicle to match new media arts and web design professionals from business and industry with students in creating mentoring partnerships. Because of the math/science focus of the Center's sponsoring organization, such a collaboration could also accelerate the curriculum integration of multimedia with interactive Web-based simulations with math and science learning (see also EOE, below).

**The Mars Millennium Project**

<http://mars2030.net>

The Mars Millennium Project is a collaboration between NASA/ Jet Propulsion Laboratory, the U.S. Department of Education, the National Endowment for the Arts, and the Getty Education Institute for the Arts / The J. Paul Getty Trust. In this project, K-12 student teams will learn about what it takes to create sustainable, vital communities through designing communities of the future for groups of 100 pioneers to live on Mars in the year 2030. This major educational project for the Millennium year will involve collaborations between a growing number of different business, science, arts and education partners. It will also hopefully catalyze a international forum for discussion about how to improve our own communities now through projecting ourselves into what ideal communities might be like in the future. For more information, see also: <http://www.artsednet.getty.edu/ArtsEdNet/Resources/Mars/index.html/>

**The Math Forum, Swarthmore College, Department of Mathematics**

<http://www.forum.swarthmore.edu>

This is an award-winning site for teachers, as well as kids, parents, mathematicians, and anyone interested in mathematics and exciting mathematics learning. This NSF-funded Web site and community has become the key portal for many parents and teachers looking for exciting math education resources (inside and outside of school), as well as they're being a major partner with many federally-funded education & technology R&D projects (e.g., see into on the ESCOT and TAPPED IN projects below).

## **NASA & “Passport to Knowledge”: Electronic Field Trips**

<http://www.passport.ivv.nasa.gov>

Passport to Knowledge has been pioneering the creative integration of live television broadcasts from remote locations with ongoing interactions with professional scientists over the Internet and the World Wide Web to really bring cutting edge scientific exploration and research directly into K-12 classrooms. This collaboration between executive producer Geoffrey Haines-Stiles, NASA, PBS, and the National Science Foundation has allowed students and teachers live and ongoing interactions with scientific explorations and expeditions in remote environments that few people could experience directly. Recent Passport to Knowledge projects have included divers and robotic vehicles under the Antarctic ocean, atmospheric scientists on the Kuyper Airborne Observatory, the Hubble Telescope, the Mars Pathfinder, and the South American rainforest.

As one example, “Live from Mars” <http://quest.arc.nasa.gov/mars/> structured a number of learning activities for students to learn about Mars, beginning in Fall 1996 with the launching of NASA’s Mars Pathfinder and other Mars missions. A major international event was the live Web-cast of the landing of Pathfinder on July 4, 1997 seen by hundreds of million people around the world.

## **ThinkQuest: An international showcase of student collaborative creativity**

[www.thinkquest.org](http://www.thinkquest.org)

ThinkQuest is a non-profit, annual international student competition in which teams of students, ages 12-19 (often from different schools or even different states/countries), collaboratively design Web and multimedia-based educational sites, products or projects. This competition has grown substantially since its inception, and there is a large pool of college scholarships and other awards now given to winners in various different categories. ThinkQuest focuses on helping students develop the following skills, all of which are directly relevant to using the Web and multimedia for authentic learning:

- \* collaboration (teams of 3-4 students, often from different schools or even different countries, and mentors/sponsors)
- \* creativity (end products are Web and multimedia-based products with educational value)
- \* effective communication through using digital media
- \* authentic audience for student work (with excellent scholarship/award opportunities)
- \* exposure to and feedback on student work from both industry and academic communities

Applications for student teams and sponsors/advisors are usually due in March, with projects due during the summer and awards presented in November. An informational resource CD-ROM (with samples of past student winning work) is also available from the ThinkQuest web site. This year, a ThinkQuest Junior competition is being added for students from 4th-6th grades, as well as a special ThinkQuest for new Teachers.

**Science Interchange & Earth News Radio** <http://www.earthnewsradio.org>  
or email Jerry Kay at <earth@enn.com>: Recent research indicates that teens are not sufficiently prepared in the area of writing when entering college. In the next century, the fundamental skills of communication (both written and verbal) will be considered as essential to all future employees, as well as the bailey to learn and use diverse technologies for creation and effective communication of knowledge.

Bay Area radio and media personality/educator, Jerry Kay, has created Earth News Radio and the Science Interchange Teen Environmental Media Network to address these ideas by offering real work opportunities for high school students to acquire these skills. Kay feels that student creation and distribution of media in digital format provides a unique opportunity to integrate various media (such as text, audio and video), facilitates the public's involvement in the communication process, and offers a tremendous opportunity to engage teens. He is actively seeking Bay Area high school students interested in journalism, Web radio, radio and video, who will work with (and be mentored by) some the nation's best environmental journalists

Students involved in the Network write stories, interview experts, produce radio programs and multimedia content for web sites. Stories appear on their web site <http://www.earthnewsradio.org>  
Also, the Environmental News Network distributes student stories to CNN and National Geographic. Earth News radio programs are heard in the San Francisco Bay Area on KQED and KCBS, and they are heard nationally on CBS radio.

## **Learning Communities for Educators and Advanced Technology Research & Development Communities**

### **The Educational Object Economy Foundation (EOE)** <http://www.eoe.org>

The explosive growth of the Web over the past 3-4 years has enabled an unprecedented global linkage of information resources. One catalyst for the use of the Web in interactive learning has been the recent development and growth of the Java programming language. Java and other new related "component" software technologies allow small applications to be designed that can run on any computer, as well as to be easily linked and integrated with other small "applets" or components, analogous to the way you can put together your own home stereo or entertainment system. Because experience in programming and developing Java applications is one of the most sought-after skills in the computer and Web industries, the Educational Object Economy (EOE) provides an excellent model of how to build an effective virtual learning community around this new technology.

The EOE was initially designed as an advanced research project at Apple Computer (originally funded by the National Science Foundation), to develop a new model of building virtual communities. The main premise of the EOE is that members can learn about a new technology such as Java through contributing small application examples (“applets”) and sharing with their experiences with other members. This practice has included contributing articles or short “think pieces,” member-written reviews, and active social “brokering” between developers and educators to suggest improvements or revisions of contributed applications designed to ensure the highest quality application for education and informal learning. Over the past four years, the EOE has engaged the interest and contributions of hundreds of members from all over the world—including major high technology companies, colleges and universities, K-12 teachers, students, and others—and it has become a key online resource dedicated to improving interactive learning and education on the Web.

EOE members have contributed over 3,000 Java applets and other resources for use in education to a specially designed EOE Web site. This site has been designed around easy-to-use database technology (FileMaker Pro 4.x) which can be easily exported to either Macintosh or Windows servers. Through the creation of a “starter kit” of freely-downloadable files and templates, known as the Generic Object Economy (GOE), this architecture has made it possible for other groups to set up their own virtual communities and Web site in a matter of hours.

The EOE’s structure and the GOE model have been used in a number of major university consortia, such as California State University’s MERLOT <http://merlot.csuchico.edu>. MERLOT helps connect Learning Technology Coordinators across the 22 California State University campuses. It has also been used in developing countries who are interested in developing their own local Web-based interactive learning resources, as well as by a number of teachers at high schools (e.g., The Celebration School and San Francisco School of the Arts) to provide Java examples and resources for students interested in developing interactive Web-based programs.

## **SRI International: Collaborative Projects Related to Virtual Communities**

All of the following projects have received funding from the National Science Foundation (NSF) to research, develop and spread the effective use of computer, multimedia, and Internet-based technologies to improve K-12 education. What is consistent across all of these projects is that each involves virtual collaborations with one or more major partners in creating and sustaining virtual communities in research, technology, curriculum, and assessment design, and teacher professional development.

### **The Center for Innovative Learning Technologies (CILT)**

<http://www.cilt.org>

The Center for Innovative Learning Technologies is a major virtual research and development consortium, funded by the National Science Foundation. Its partners include SRI International, the Concord Consortium, the University of California, Berkeley, and Vanderbilt University. This major distributed virtual collaboration is built around four major themes: Ubiquitous Computing, Visualization & Modeling, Alternative Assessments of Learning, and Tools for Learning Communities. CILT recently held a major national conference in San Jose April 29- May 2, 1999, which brought together teachers, researchers, software developers and policy-makers to discuss its research and collaborative efforts in educational technology to support school reform.

- **CSCL 99: International Computer-Supported Collaborative Learning Conference.** <http://learninglab.stanford.edu/CSCL99/> December, 1999 (Menlo Park, CA). Co-sponsored by SRI International, Institute for Research on Learning, Stanford University Learning Lab, and others. This will be one of the best communities dealing with using technology to support collaborative, project-based learning—both in K-12 and higher education.

### **ESCOT: Educational Software Components of Tomorrow**

<http://www.escot.org>

Like the EOE, ESCOT is based on the promise of supporting, leveraging and integrating the intellectual assets of a virtual community, based on shared interest and practices around promoting Web-based component software technologies. This community involves active collaboration of multiple R&D organizations, commercial software and curriculum companies, and teachers—and ultimately, students themselves—in the collaborative design of both Java- and Web-based interactive software technologies and curriculum activities that embody the effective use of these technologies. A major premise of this project is that a new kind of virtual, collaborative educational design and development community or *testbed* can be developed and sustained around the shared practice of developing and integrating small software “components” (e.g., Java Beans) that can drastically reduce the cost of developing highly effective, interactive learning environments. Collaborators include: SRI International; University of Missouri’s “ShowMe Center” for dissemination support of five major NSF-funded middle school mathematics curriculum projects; Swarthmore College’s “Math Forum;” the University of Colorado’s Center for Design and Lifelong Learning (and the “Agent Sheets” project); the University of Massachusetts at Dartmouth’s “SimCalc” Project; Key Curriculum Press, Inc.; DesignWorlds for Learning, Inc.; the EOE Foundation, and a growing international community of other component-based educational technology R&D efforts. Collaboration of middle school math and science teachers with educational technology developers is being accomplished with “integration teams,” especially through developing a set of interactive Web-based “Problems of the Week” for the Math Forum during the entire 1999-2000 school year. These teams are designed to facilitate development of new software components, as well as to grow the communities of teacher who can use and



exchange their resources with each other to support curriculum reform and teacher professional development.

#### **TAPPED IN**

<http://www.tappedin.org>

(see description above).

### **Successful Non-Education Specific Virtual Communities**

#### **Amazon.com**

<http://www.amazon.com>

Amazon.com is much more than an effective way to purchase online books and CDs. This company surprised much larger book sellers through its innovative approach to encouraging users to add comments and reviews of books for other users. It is an example of both a community around transactions, as well as shared interests, and has now spread as a model to many other electronic commerce enterprises (e.g., eBay) in which buyers and sellers can develop other kinds of business and personal relationships around commercial exchange.

#### **SeniorNet**

<http://www.seniornet.org>

SeniorNet was originally created by Mary Furlong of the University of San Francisco in the 1980's as a federally-funded research project to address the needs of senior citizens to learn to use technology and telecommunications. One of the most successful virtual communities, SeniorNet has now grown to over 100,000 members in both the U.S. and abroad. This community is one in which shared life experiences and the development of relationships has been a key to its success.

#### **Starbright Network**

<http://www.starbright.org>

Starbright began as a non-profit R&D project of Stephen Spielberg and others to provide a means to connect and support children around the world who all have serious or terminal illnesses. This network pioneered the use of virtual worlds, including avatars (visual alternative persona) in which children in children's hospitals could use telecommunications networks to play interactive games, share experiences, and maintain communications with parents, families, and friends.

#### **TalkCity**

<http://www.talkcity.org>

TalkCity has become one of the largest global communities of moderated and unmoderated chat rooms, as well as providing very easy Web page design tools for kids and parents. TalkCity forums cover scores of topics for both children and adults.

## **The WELL**

<http://www.well.com>

The WELL (Whole Earth eLEctronic Link) is one of the oldest of discussion and topical forum-based online virtual communities, dating back to the early 1980's. This community is documented by Howard Rheingold in *The Virtual Community* (1993) and it offers an excellent example of communities created via shared interests and relationships.

## **DesignWorlds for Learning Virtual Design & Learning Communities**

At DesignWorlds for Learning, Inc., we are working with a number of other projects in which new kinds of learning communities are being created. Here are a few examples of some established and emerging learning communities (for more information, see the DesignWorlds Web site at <http://www.designworlds.com>)

### **The ASTL Edenvale-Idalina Water Pollution Research & Arts Project**

<http://www.garlic.com/~lullah/brazilus/water.html/>

<http://www.migal.co.il/teleproj/>

<http://www.designworlds.com/studio.html/>

Over the past year, Linda Ullah and her 3rd-6th grade GATE students at Edenvale Elementary School, a school in a very low-wealth community in San Jose, have been carrying on an online collaboration with Tania Callegaro, Eliana Fredo, and other teachers and their high school students at Idalina School in Sao Paulo, Brazil. This virtual community was the result of my own long-term collaborations with Linda Ullah, Edenvale and several other schools in the Oak Grove School District, and several other K-12 schools in the San Francisco Bay Area which led to the founding of our company, DesignWorlds for Learning, Inc. The Edenvale-Idalina collaboration was one of major successes that emerged from online “matchmaking” and an international conference/ workshop for teachers and educators from developing and developed countries, called “The Art, Science and Technology of Learning (ASTL): Designing Learning Environments for the 21st Century” <http://www.migal.co.il/telproj/>. In November, 1997, the ASTL conference brought together six educational coaches or “mentors” together with over 40 teachers and educators from 14 developing and developed countries. Participants were chosen after partnerships had been created over the Web, based on the promise of interdisciplinary educational project proposals for providing exemplary educational experiences to students and teachers in both the developing and developed countries.

The Edenvale-Idalina collaboration has been based on around both groups of students doing a comparative study of the historical roots, causes and current

state of water pollution and other environmental pollution in their respective countries. A major product of their collaboration is a Web site that communicates the ongoing learning of the students and teachers in both schools—in this case, knowledge and understanding about pollution integrating science, social studies, art, and poetry. The Web site they have jointly built is unique in showing the importance of art and poetry as powerful communications vehicles for raising awareness and effecting social action in addressing this issue. The collaboration between these teachers and students has also enabled these schools to find “just-in-time” learning resources they need to accomplish their work. For example, the participants discovered a Web resource that does decent first order translation between English-Portuguese, as well as other languages. The project has raised the level of cultural understanding of both communities, while also providing the teachers with a means of expanding their own learning and professional development horizons well beyond the walls of their individual classrooms and schools.

### **The Jewish Museum of San Francisco’s Education & Outreach Program**

<http://www.jewishmuseumsf.org/education/>

<http://www.jewishmuseumsf.org/otzma/>

A variety of multimedia and Web-based education and outreach programs are now being carried out by the Jewish Museum San Francisco, which is now in the process of building a major new facility. Based on themes of student-created digital stories and Web sites, high school students are making digital movies about their summer experiences in visiting Israel, as well as other topics related to their Jewish learning and identity. A longer-term project involves a group of post-college graduates in the Otzma program, who live in development communities in Israel for a full year and have been documenting their experience through an evolving Web site of digital photos, stories, email and discussion forums, and via live chats. This latter program was based partially on the highly successful model of photo-journalist Rick Smolan’s, *24 Hours in Cyberspace* (Smolan and Erwit, 1996).

## **V. Implications and Directions for the Getty's activities in Expanding its Web Presence for Arts Education and Lifelong Learning**

The Getty Education Institute's ArtsEdNet <http://www.artsednet.getty.edu> has developed into an excellent information resource for teachers and educators in the visual arts. Approaching 400,000 page hits on its home page, this site has clearly become a focal point for resources in K-12 arts education, discussions about Discipline-Based Arts Education and other forms of arts education pedagogy, a collection of a wide diversity of lesson plans and online discussions, and a pointer to arts projects and Getty Museum exhibits of interest to the education community. In the future, as new forms of alternative assessment of arts-based learning emerge, as well as research on how the arts can complement and supplement other forms of effective learning in other content areas, this site could become the virtual community of choice for a creative, leadership community of educational reform in K-12 education.

As the Getty Center re-conceives how its main Web site <http://www.getty.edu> Should converge or join communities with ArtsEdNet, careful thought should go into the design of ways to extend and expand the emerging virtual learning communities that could grow out of the synergy of both of these rich Web resources for the visual and design arts.

This report has briefly summarized many different alternate models and Web resource projects whose design and experience in building sustainable, successful virtual learning communities could inform the re-design of the Getty's Web presence. These resources can also provide design guidance in informing the Getty's design strategy for creating and supporting an expanded lifelong virtual learning community around the visual arts learning community that goes beyond the K-12 teacher audience—and includes family learning from home, continued education and distance learning of professionals in many fields, and a global resource for art historians, museum curators, and researchers.

The following are three brief descriptions of ideas for Getty educational online projects, which have been discussed over the course of the development of this report. At this point in the re-design of the Getty's Web presence, each of these offers the possibilities of leveraging the rich arts collection of the Getty Museums, as well as engaging active participation of a global user audience in exploring alternative dimensions of understanding and learning-by-doing in the visual arts:

### **1. Design your own virtual arts learning studio/museum**

The Getty could provide users with a wide variety of pre-designed "rooms" or spaces in which users (parents, kids, teachers, and professionals) could each design their own personal virtual arts learning studio or museum. In this project, the idea is for users to learn about the vast collection of the Getty Museum, as well as the resources of ArtsEdNet, and to design their own "online

environment to more effectively organize and find resources for their own arts learning needs. It could also become a “one stop shopping” portal or service for helping users create customized learning plans, finding and purchasing arts supplies and education resources for teachers and parents, complete with user recommendations and reviews of these resources, stories, and pointers to other resources.

This idea could be extended to involve groups of students and teachers working collaboratively online to design their own collection for a shared virtual arts museum. Of special interest might be a wing dedicated to student-created art works, which could be virtually curated by a panel of Getty Museum and other arts educators. This also provides an interesting training model for museum interns and curators (Note: A pilot design experiment in this vein was done by Getty Museum staff members, Christina Olsen and Anne-Marie Schaaf, with Daniel Zeidman, as of a student team design project for a UCLA graduate Library & Information Studies course (LIS 208) in “Designing Digital Multimedia as Cultural Resources,” taught by the author in the Spring, 1998. See <http://dliis.gseis.ucla.edu/courses/208/>

## **2. “Art Quest”**

Leveraging the outstanding success of several electronic field trip projects (e.g., as the NASA/Passport to Knowledge “Live from Mars” and various Web-quests, such as “MayaQuest” from MECC/The Learning Company and “AsiaQuest” from Classroom CONNECT), the Getty could collaborate with a third party educational technology publisher or multiple sponsors in a global, intercultural virtual adventure in art history and research. Teachers and parents could subscribe to participate in different ArtQuest adventures in conjunction with museums all over the world, such as those in Paris, Barcelona, Florence, Amsterdam, and London, in exploring the background and history behind various famous paintings, sculptures, and buildings. Similarly, ArtQuests could be established in just about any community, not just those with famous museums and collections.

This idea is also based around the power of the collective and distributed intelligence of a community of people who are exploring together the history or interesting facts about a common theme or set of artifacts. Getty Fellows, as well as other art historians, could become online mentors to students and teachers interested in learning about history, social studies, and the humanities through the exploration of the background behind one or more art objects from the Getty Museum and other collections.

## **3. The Art Detective Mystery Series**

Kids and adults alike love detective and mystery stories, as evidenced by many popular book series for children (e.g., *Boxcar Children*, *Encyclopedia Brown*, *The Hardy Boys* and *Nancy Drew*) as well as many popular PBS series (e.g., BBC’s *Mystery* and *Masterpiece Theater*, and *Ghostwriter* from PBS). Suppose a series of

interactive mysterious were created, each around a key figure or object in one painting, in which children could explore a story based on this figure. These stories could either be fictional or historical, both adding a literature and language arts dimension to studies in the arts. Characters could be created for the series, which could be done in multiple media: CD-ROM, on the Web, a video/TV series, or even hybrid interactive TV.

In each of these projects, the Getty Museum's collection could become a vast resource for constructivist learning, while also encouraging the creation and support of a growing community of learning by and through the arts. These projects also all provide the opportunity for multi-year expansion, use of different (and new emerging) technologies and media, and exploration of new forms of user interface design that promote more sharing of visual arts and design practices—not just exchanges of text chat and lesson plans.

By expanding the definition of the Getty's support of education, from K-12 teachers to lifelong and family learning, each of these projects also enables participation by various commercial partners and technology/service providers to enable scale and growth of multiple, global virtual learning communities.

## VI. Conclusion

All these projects and virtual communities embody three pairs of "C's" that are the foundation of successful virtual communities:

- **Content in Context:** The value of educational content depends on the context in which this content is going to be used. For example, information about the nature of water pollution in both Sao Paulo and San Jose is dynamic because it is being gathered and analyzed by the students themselves, as well as their finding other resources on the Web to assist their analyses. In the most successful virtual learning communities, some (if not all) of the content is created by and shared with users themselves, which provides a sense of intellectual “ownership” of this content—and hence, a motivation to ensure that its of interest and use to an authentic audience of other users.
- **Creativity in Communicating Knowledge:** All of the national curriculum standards include enabling students to use a broader range of media and methods to communicate their knowledge than traditional standardized tests. It is well known that one of the best ways to learn something is to teach it (or communicate it) to others. We also have interdisciplinary fields of inquiry now (such as chaos and complexity theory) in which finding new ways to use computers and multimedia to visualize and communicate data and patterns are as critical to our understanding as the data themselves. The creation, sharing and use of different forms of knowledge in multiple media is in the service of encouraging students to communicate their knowledge and understanding to an authentic audience of their peers, teachers, and professionals. This is the power of students and teachers learning the art of digital storytelling for many different content areas.
- **Collaboration for building Communities of Learners:** Effective participation in the global economy means being able to work collaboratively with a wider diversity of other people. Business and industry have continually highlighted that today's schools need to prepare students to work collaboratively in teams (co-located or virtual) as one of the top priorities for educational reform. The Internet and the use of Web-based tools and resources are one of the best vehicles we have for achieving this goal—and in the process, we can also help build sustainable learning communities.

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