

# ARLIS/NA

ART LIBRARIES SOCIETY of NORTH AMERICA

2014: 42<sup>nd</sup> Annual Conference  
Washington, D.C. | May 1-5

Collaborating to Achieve [Session]  
May 4, 2014  
Submitted by Moderator: Lyndsay Bratton

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### **Reaching Across the Aisle: The Library As Bridge Between Science and Art**

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#### **Introduction**

Today I'll be talking about the relationship between science and art and share some projects we're doing at Denison to initiate collaboration between the two disciplines. Throughout my talk I may stop a moment to give you some more detail on the work you're seeing on the screen. The works here are details from the BFA exhibition of Denison senior, Haley Anderson.

The connection between art and science is as old as the caveman. When we started to wonder about who we are and where we are, we began making art and exploring science.

We all know about the Renaissance and its icon, Leonardo da Vinci. And we all know about the Enlightenment, when the mind/body dichotomy pushed art into the realm of emotion and science became reason. So, for lack of time today, I'm going to start our history in 1959.

*image - Haley Anderson, Denison BFA student, senior exhibition*

#### **CP Snow**

This is the year CP Snow wrote his infamous paper, *The Two Cultures*. Snow was a British molecular physicist and novelist. In *The Two Cultures*, Snow laments "that the intellectual life of the whole of western society is increasingly being split into two polar groups" (reprinted in *Leonardo* 23(2,3), p169).

Those groups are physical scientists and literary intellectuals, but this latter category is easily opened to encompass all of the arts. Snow states scientists and artists have "a gulf of mutual incomprehension...lack of understanding. They have a curious distorted image of each other" (169).

About scientists, he says “their imaginative understanding is less than it could be. They are self-impooverished” (171) and on artists, he mentions “It is bizarre how very little of twentieth-century science has been assimilated into twentieth-century art” (172).

Snow blames this split on Western educational practices and his essay continues to provoke to this day.

I want to take a moment to mention the artwork you are viewing. This is Blood Wars by Kathy High. Blood is drawn from two participants; the white blood cells are extracted and placed in a petri dish to fight for the nutrients within the environment. All the data from the winners is being shared with scientists.

*image - Blood Wars by Kathy High*

## **Science & Art Initiatives**

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Around the turn of the century, the twenty-first century, movements emerged to reunite the two cultures again. Humanity is facing huge problems and we need creative solutions to solve them. You’ll often hear the term “creative economy” to describe the global need for innovators and change-makers.

Much of this movement started outside of the US. The Swiss-based Artists in Labs supports research and residencies “to inspire artists to create new works” about scientific discoveries. SymbioticA at the University of Western Australia enables “artists and researchers to engage in wet biology practices in a biological science department.” This is where Blood Wars started.

In the US, MIT has started a Center for Art, Science, and Technology with classes, residencies, and symposiums. This is also a great example of the science/art collaboration expanding to embrace performance arts.

While these are all institutional-driven science and art collaborations, individuals are working together too. Since a 2004 residency at the Wexner Center for the Arts at The Ohio State University, glass artist Josiah McElheny has been collaborating on sculptures with OSU astronomy professor David Weinberg.

*images - details from institutions’ websites*

<http://www.yvonneweber.ch/>

<http://thecreatorsproject.vice.com/blog/japans-one-and-only-uncontrollable-diy-bubble-machine>

<http://arts.mit.edu/artists/julia-ogrydziak/#prettyPhoto>

<http://wexarts.org/public-programs/josiah-mcelheny-and-david-weinberg-big-bang-island-universe>

## **STEM to STEAM movement**

These programs and collaborations are part of the STEAM movement. To understand STEAM, you need to know about STEM (Science, Technology, Engineering, and Math). In 1958 (one year before The Two Cultures), the National Defense Act provided funding for education in the STEM fields and STEM education has been at the forefront of conversations on education since the

1983 Reagan report A National at Risk (pdf). In 2009, more money was invested, particularly in math and science, through the Education to Innovate program.

Pay attention to that last title, Education to Innovate. Innovation and creativity will become central to my argument.

John Madea, when he was president of of RISD (starting in 2008), championed adding Arts to STEM education. As of last year, there is now a STEAM caucus with the mission to change “the vocabulary of education to include art and science - and their intersections - to prepare our next generation of innovators to lead the 21st century economy.”

The STEAM Journal, an open-access, peer-reviewed journal from Claremont Graduate University also started in 2013.

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So, as librarians, how can we support this pedagogical shift as STEM becomes STEAM, not just supporting science and art but their intersection?

*image - steam rail from Alberta Archives, STEM to STEAM, and STEAM Journal*

#### **information-seeking in creative economy**

Let's familiarize ourselves with the new era of information-seeking in this creative economy - what does it look like?

Information science acknowledges that the internet and other electronic information systems allow users to filter their research. Theresa Dirndorfer Anderson, a leading researcher in creativity in information systems, finds that reducing “the number of paths available for discovery and connection building” (2010) - filtering - greatly reduces creativity in the research process. It is easy to find information and points of view similar to our own. In this manner, we've isolated ourselves. Today I'm talking about the gap in communication between science and art; information science has had a part in maintaining that gap.

Here you are seeing Auger & Loizeau's Rent-a-Body Service, where the wearer's sight and sound are experiencing a remote location from his physical location. In Blind Date, the remote camera is on the date. Social Tele-presence comments on military surveillance and computer-mediated reality.

*image - James Auger & Jimmy Loizeau  
Rent-a-Body Service: Blind Date (Social Tele-presence series, 2001)*

#### **Risk-taking**

In this new millennium, the STEM disciplines are vitally important to the global economy. CP Snow argued that we need more scientists, scientists that are well-versed in the arts (and vice versa). The leaders in this economy will be innovative, forging pathways of discovery. Yet this comes with a price. Thinking creatively requires an ability to rethink the research process. We need learn to work through uncertainty, ambiguity, and engage in what

Anderson calls “the productive potential of risk...Risk taking at individual and collective levels propels us forward as creators, adventurers, and discoverers.” (2010)

*image - Janine Antoni, Touch, 2002*

## **Risk-taking 2**

Risk, uncertainty, and ambiguity are driving forces in creative thinking. We can teach creativity by teaching tolerance of risk, uncertainty, ambiguity. These are major elements in the creative process, a process that reflects the artistic studio practice and the scientific method.

This is why I focus on creativity as the unifying force behind STEAM. When we add Arts to STEM, we tend to keep the arts in a peripheral role within education - the arts can support science. How can the arts make science better? By focusing on creative thinking and the issues accompanying it (risk & failure), we can have a more balanced conversation about collaboration and two-way exchange.

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This was an installation at The Galleries Lafayette in Paris. There are two view ports at each end, allowing two people to have an intimate, private conversation across the atrium. But why should artists and scientists work together?

*image - Pablo Reinoso, L'Observé, 2002*

## **Jonah Lehrer article**

Jonah Lehrer wrote a really great article for Seed Magazine (2008) that gives a glimpse into the STEAM philosophy without ever calling it that. He talks about how, the more we learn about ourselves and our world through scientific discovery, the more we need art and metaphor to make these discoveries tangible.

What I like about this article is how Lehrer brings metaphor to the discourse. This relates nicely to visual literacy and infographics. Consider the image and story of Newton and the falling apple; we need narrative and imagery to explain complex science.

Later he says that, by interpreting scientific ideas and theories, “the arts offers science a new lens through which to see itself.”

At another point, Lehrer says the arts can provide science with “a glimpse into its blind spots.”

*image - Marc Quinn (2009-2011), We Share our Chemistry with the Stars (MQ1 280L & AB 200R)*

## **collision space**

I want to return to CP Snow’s The Two Cultures for a moment. In it, he argues that Western education is to blame for the art/science split and I agree. However, he states something

with which I disagree. He says, “There seems to be no place where the two cultures meet” and that there should be a “clashing point...ought to produce creative chances.” (172) I argue that the library is the place where art and science meet. The library is a collision space.

In order for a cross-disciplinary conversation to happen, artists and scientists need a neutral space to meet and collaborate. Pedagogies of space offer a number of theories on the importance of space to social engagement, knowledge sharing, and learning. These theories fall under the broad category of border pedagogy and include ideas about place-conscious education and developing academic collision spaces. As art librarians, we can relate to border pedagogy. We are nomads (term taken from the theory), moving between the disciplines of art and information science.

So what can we do in libraries to engage artists and scientists?

*image - Lawrence Weiner, Realities Collide (2012)*

### **Science@Denison Visualization Gallery**

Moriana Garcia is my collaborator in reuniting the two cultures. She is the Natural Sciences Liaison Librarian at Denison. She created an online image gallery called the Science at Denison Visualization Gallery in which summer student scholars can showcase their work. This

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is in the spirit of the International Science and Engineering Visualization Challenge from the National Science Foundation which states that “some of science’s most powerful statements are not made in words.” For the gallery at Denison, the best photo from each year becomes the cover image for the summer scholar proceedings.

*image - details from photos in Science@Denison Visualization Gallery*

### **displays & collection development**

Displays are an easy way to begin to showcase the connection between science and art. We have put together a book display about science in the arts and when we create displays about scientific topics we include small artworks exhibited with the books. We also started purchasing books about more multidisciplinary topics and with better visuals. We have books focused on artists using science. We also have an artists’ books collection and a few details from science-based books in the collection are shown here.

And since you’re librarians, you’ll be pleased to know there is a subject heading for all this: Art and Science.

*images - details from artists’ books collection*  
*Jessica Gifford, Brains and Spines (2005)*  
*Eleanor Ryburn, Dear Microflora (2012)*  
*Joyce Cutler-Shaw, Elegy for the Natural World (2003)*  
*Jamie Weaver, Faith Medicine (2012)*

## **subject guide**

To aid with both library displays and collection building, I put together a subject guide about science and art that provides resources for learning more about the STEM to STEAM movement and the latest collaborations between artists and scientists. As part of this, I have a Scoop.it! page where I constantly bookmark web posts about science and art. Some great websites for getting started include: the great visual blog on Tumblr called Science Sparks Art; UCLA's Art Sci Center is dedicated to pursuing and promoting the evolving "Third Culture" by facilitating the infinite potential of collaborations between (media) arts and (bio/nano) sciences; and STEAM not STEM has a mission to educate governments, the public and the media to the need for returning Arts to the national curricula. These are all on the subject guide and you can see a few of the latest posts to the Scoop.It! page here.

*images - screen shots from Science & Art Scoop.it! page*

## **interest group**

The subject guide is primarily to support a faculty interest group we initiated, the Science and Art group. Last year, we put out a call to general faculty interested in the relationship and collaborative possibilities between the two disciplines. We had about 25-30 responses, many that included thanks you's for taking the lead. We've had a few meetings - general discussion meetings and a reading group.

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We tried to start an immersion program where the group would participate in a studio workshop one semester and then a lab workshop in the other. The faculty showed real enthusiasm when the idea was first mentioned but when we tried it last spring, we were unsuccessful. We wanted to host a dance workshop, led by a dance faculty member who is in the group. The responses were telling: "I don't know how to dance; I'll go to all the science workshops but not the art ones; I'll feel vulnerable doing art."

Remember earlier when I talked about this new economy needing innovators willing to take risks and embrace ambiguity and uncertainty? Clearly, faculty aren't ready for immersion....

*images - Zachary Copfer, Bacteriographs and Hyungkoo Lee, Face Trace*

## **Denison Museum**

Where we have been successful is partnering with the Denison Museum and we currently have two projects under way.

Microbes at the Museum is a student independent study. She is working with a biology professor to examine bacteria on artifacts in the museum's permanent collection. The entire process is being documented by a cinema student.

The spring 2014 Museum exhibition is Green Revolution. This is a Smithsonian Institution Traveling Exhibition and its purpose is to be "an innovative, low-carbon impact temporary museum exhibition" that provides education about sustainable living. No artworks comes from the Smithsonian; instead, the Museum reached out to the Denison community and asked for

art proposals. The Science and Art group had our proposal accepted and 5 of us created an installation about fracking in Ohio using recycled library materials.

*images - from Denison Museum's Facebook page*

### **makerspaces**

The library community at large is also embracing STEM to STEAM (whether they know it or not!). Makerspaces is a growing trend in libraries. ALA's TechSource has hosted webinars on how to build makerspaces. ACRL's TechConnect posted about makerspaces moving into academia.

And what is a makerspace? It stemmed from MakerFaire, hosted by Make Magazine, and hacker culture. A makerspace provides a community with access to tools and resources that help individuals or groups create works that wouldn't otherwise be possible. Makerspaces are about shared space and community dialogue.

Technology is very important and much of the conversation about makerspaces has been about 3D printing. You can see some 3D prints here from the University of Nevada, Reno's DeLaMare Science & Engineering Library makerspace. I heard DeLaMare's director, Tod Colegrove, speak at the 2013 American Association for the Advancement of Science's conference. He said the space is primarily for and used by engineers. The second largest group of students? Artists and designers.

*image - details from DeLaMare Science & Engineering Library's Flickr galleries*

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### **makerspaces 2**

At Denison, we are in the very beginning stages of conversation about makerspaces and 3D printing. The educational technologists from the IT department and the liaison librarians are now meeting regularly to improve communication and discuss future collaborative projects. (Someone could rewrite Snow's The Two Cultures about librarians and IT professionals!) Denison now has a small, mobile 3D printer that is being used to introduce the technology to faculty and encourage them to think of ways to incorporate it into the curriculum. Not coincidentally, I'm sure, the two educational technologists tasked with the 3D printer are the Natural Sciences educational technologist and the fine arts educational technologist. But ACRL points out that "makerspaces are defined not by specific equipment but by a guiding purpose to provide people with a place to experiment, create, and learn."

Makerspaces "provide opportunities for new types of rich cross-disciplinary interaction to occur." They are collision spaces. While I would like to see makerspaces IN libraries, I much prefer if libraries became makerspaces, borrowing the ideas of access, sharing, and collaboration to foster creativity in the computer lab AND in the stacks.

*image - Thinking About Making post by the Indie School Librarian*

## **conclusion**

Returning to creativity in the research process, we can see the benefits of makerspace culture. This is a quote from the Art as a Way of Knowing conference held at the Exploratorium in San Francisco in 2011 (another great art/science resource): “Making builds somatic knowledge. When we think with our hands, we deepen our understanding. We remake the world.” The science lab and the art studio both require hands-on learning and thereby encourage creative thinking.

Ainissa Ramirez is a Yale professor of engineering and her book, *Save our Science*, she argues that reading, writing, and math are not the skills of the 21st century learner. Rather, we need to teach creativity, curiosity, critical thinking, and problem solving. Making fosters those skills. Art and science foster those skills.

Because libraries are natural collision spaces, they can easily support collaborative making by providing the materials, spaces, and support for creative learning.

The new millennium requires innovation in the STEM disciplines. To be a part of this, all libraries must move from being places of transactions to spaces of transformation where users become content creators. Libraries bridge the transition from simply accessing information to creating it, helping users become 21st century innovators. Those 21st century innovators are our artists and scientists. Thank you.

*image - library sign*