WOMEN'S STUDIES CELEBRATION
Women's History Month 2005

NOMINATION: Papers and projects done in completion of course work for Spring, Summer and Fall 2004 eligible for nomination. Students do not need to be enrolled Fall 2004 or Spring 2005 to be eligible.
(Students are encouraged to identify works they would like nominated and approach their professor to initiate the process.)

Instructor John Hildebrand Dept. English

Course Number and Name Engl 412/612 Nonfiction Writing Semester completed Fall 2004

Title of Nominated Work Awakening the Silent Technologists

CATEGORY:

	Sampson:	
Undergraduate Research Paper	___	~~**See**~~ ___
Undergraduate Project	___	**Olson** ✓
Graduate	~~X~~	~~**Kessler**~~ ___
		Turell ___
		Belter ___

STUDENT INFORMATION:

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****WHY DO YOU, THE INSTRUCTOR, RECOMMEND THIS AS AN EXEMPLARY STUDENT PAPER/PROJECT?** (Attach a separate sheet.)

As the nominating instructor, please notify the student and ask them to turn in the paper, or attach to your nomination form.

Awards are sponsored by the UW-Eau Claire Foundation, Helen X. Sampson Fund, and by private individuals. Research involving human subjects must conform to the guidelines given by the Institutional Research Board. Contact Research Services, 836-3405, with questions.

Submission deadline is February 11, 2005.

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February 10, 2005

I wish to nominate Julia Lehman's paper "Awakening the Silent Technologists" for a Helen X. Sampson Foundation Award. Ms. Lehman wrote the paper as a graduate student enrolled in my Seminar in Nonfiction Writing Course (English 412/612) during Fall semester of 2004. As a work of creative nonfiction, I believe "Awakening the Silent Technologists" particularly fits the criteria for the grad-level Tillie Olsen Award.

Ms. Lehman's piece is a profile of Brenda Puck, a technology instructor at UW-Stout, but the overall subject is the scarcity of women in technological careers. (Less than ten percent of all American engineers, for example, are women.) In the hands of a less talented writer, the subject could have been handled as a typical research paper, plodding along on statistics and quotations from experts. But Ms. Lehman skillfully ties the subject to Brenda Puck, an irrepressible advocate for introducing girls to the world of technology and engineering. Puck is her own best example. Ms. Lehman builds her profile around a sequence of narrative scenes: Puck instructing seventh-grade girls in the use of a foundry, Puck in her office musing on her childhood, Puck reminiscing with a former student now enrolled as an engineering student in college. The scenes are equal parts dialogue, description and background information. They have the quality of life observed—a difficult trick for any writer. In the end, the reader learns a great deal about Puck, STEPS--the summer program she runs to introduce girls to technology, and about the different perspective women can bring to technological problems. I think the greatest accomplishment for Ms. Lehman is not simply the amount of information she manages to impart in fifteen pages but the way in which the reader comes to genuinely care about Brenda Puck and her students.

It's worth noting that this writing project mirrors Ms. Lehman's own background and interests as she holds B.A. in English-Technical Writing and worked four years for computer software companies.

Sincerely,

John Hildebrand

John Hildebrand, Professor
English Department

Julia Lehman
English 612
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1/28/05

Awakening the Silent Technologists

"What kinds of everyday kitchen products go from a liquid to a solid?" Brenda Puck asked. She wore a lime green button-up lab coat with two square front pockets, her blonde hair pulled tightly back in a pony tail and her bangs curly and disobedient above her blue eyes. Brenda gestured toward a table of shiny metal artifacts cast by previous students: book ends, plates, goblets, and paper weights. "Most of you are casters and you didn't even know it," she said.

Twenty seventh-grade girls stared at Brenda, their cheeks flushed and their damp hair stuck in clumps, glasses steaming.

After a few moments of silence, Brenda heard hesitant responses.

"Jell-O?"

"Cake?"

"Ice cubes?"

"You got it!" Brenda replied. "Our liquid, when poured into a mold, is turned into solid products like jewelry, engine parts, faucets, and dental molds."

On a stormy 80 degree July afternoon, the temperature in UW-Stout's foundry felt like 110, but everyone wore jeans, t-shirts, tennis shoes, and safety glasses. Proper gear was required when working with molten metals. Brenda's girls were casting aluminum nose cones for their radio-controlled

model airplanes. The door was propped open, attempting to capture a breeze, but the foundry remained sticky and noisy, filled with the heat and hum of an enormous 1400 degree Fahrenheit electric furnace, and the vibration of an overhead ventilation system. The foundry even smelled hot, like the acrid fumes of a potholder forgotten on an oven burner.

"Does anyone remember my acronym?" Brenda asked. "M&M. Melting and Molding." Beads of sweat multiplied on foreheads and safety glasses as Brenda summarized loss foam casting. "We will create a mold for the nose cone from dylite foam, place the mold in a box called a form, and then pack the form with a type of silica sand called olivine. Finally, we'll pour molten aluminum into the form, burning out the foam mold and creating the aluminum nose weight."

Brenda grabbed a ball of dylite foam and passed it to the girls. "What does this remind you of?" she asked. This time a response came nearly instantly.

"Styrofoam?" one of the girls answered.

"Exactly!" Brenda tapped her fingers against a dylite ball, like knuckles knocking on wood. "Only it's more solid—it's denser, isn't it?" Brenda's hands, with slightly enlarged knuckles, revealed years of working with her dad in his welding lab, and taking apart lawnmowers, watches, and airplane engines to learn about the parts. Scattered on tables were diagrams of model airplanes flying over land, generated by the girls using computer-aided design (CAD) software. The drawings featured three dimensional landscapes,

steep, jagged mountains, rusty orange and bright blue skies, and model airplanes gliding on the horizon next to silver stars.

As a technology instructor at UW-Stout, Brenda teaches casting and materials design to Manufacturing Engineering students, and during part of the summer she teaches for the Science, Technology, and Engineering Preview camp (STEPS) for seventh-grade girls.

Seeing Brenda and the STEPS girls in the hot, noisy foundry, melting and molding aluminum didn't just seem unusual—it was unusual, for in the engineering field, the lack of female engineers is a reality. Although women comprise nearly half of the labor force—projected to reach 48 percent by 2008—less than ten percent of engineers are women, according to the U.S. Department of Labor. Research also shows that the predominance of men at all levels of technology has created the common misconception that technology careers are a male endeavor. STEPS was created to help close the gender gap, by introducing girls to the world of technology and engineering at a young age, before they begin to believe that technology careers are not for women.

On this sticky afternoon in the foundry, the once-quiet STEPS girls were experiencing the world of technology, chattering and scooping handfuls of black sand into their forms. Brenda produced full protective gear: a face shield, massive leather gloves, a fireproof body suit, and shoe protectors. She led the girls to the furnace—a large cylindrical shape in the corner holding molten aluminum. While holding a face shield over the open circular

furnace shaft, Brenda allowed each girl to peer down the furnace shaft at a crucible of glowing molten aluminum.

"What does it look like?" Brenda asked.

"Lava?!" one of the girls answered.

"Wow!" another girl commented.

"Is Brenda really going to pour that lava into our molds?!"

The girls had lost all timidity. By the final phase of loss foam casting, they were excited and engaged, showing interest with only a little encouragement.

Although few women pursue careers in technology, throughout history women have played an integral role in the development of technology. Casting has been around since early civilization; the Greeks and Romans credited women for inventing it, naming the Goddess Athena as the inventor of all mechanical arts, including the yoke and bridle, the sailing ship, and the flute and trumpet. Women have also invented the wedge, pulley, lever, screw, plow and harrow, windshield wiper, fire escape, computer compiler, liquid paper, Kevlar®, and Scotchgard™. Although many women have made such significant contributions to technology, many do not pursue careers in technology. The STEPS camp is proof that people like Brenda have begun to ask why.

"Do you know how hot molten aluminum is?" Brenda asked the girls. "Water boils at 212 degrees Fahrenheit. The aluminum in the furnace is almost 1400 degrees Fahrenheit. That is really hot, isn't it?! How warm do you think the air and the room around us are? Much cooler than the

aluminum, aren't they? So what's going to happen when that molten aluminum hits your mold?"

With wide eyes, many girls shouted out answers.

"Burning?"

"Fire?"

"Smoke?"

Brenda affirmed their answers. "Yes, you'll see lots of sparks and ash as that molten aluminum burns out your mold and replaces it with molten aluminum."

Brenda pressed a control on the furnace and the cylindrical furnace shaft rose up and rotated 45 degrees clockwise, exposing the crucible of molten aluminum on a circular concrete platform. As the girls stood safely behind Brenda, she ladled the molten aluminum into the forms. Sparks, ash, and cinders filled the room, floating towards the open foundry door that framed the falling rain outside.

The foundry filled with a boisterous racket as the girls located their forms and ripped them apart with long metal tongs, in a race to find the hidden treasure in the sand—no dylite foam molds, only steaming, finely textured aluminum nose cones.

High in the air, ash and cinders fluttered, floating as thick as heavy snow, and landed on damp, sweaty skin, leaving trickling black smudges. The girls rinsed their nose cones in the foundry sink, releasing a hiss of steam as blistering aluminum met tap water.

"Never underestimate the power of casting," Brenda said, struggling to project her voice over the excited conversations of many girls. They had much to talk about, having just witnessed the miracle that metal nose cones could emerge from all that sand. In Brenda's foundry, where metals are melted and cast into molds, the world of manufacturing engineering had been revealed.

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"Big Mouth Billy Bass. Singing Sensation. TRY ME!" The headline on Billy Bass's box described this singing, flapping rubber fish once popular in stores like Wal-mart.

"Someday I am going to dissect this. It's a wonderful piece of technology," Brenda said, pressing the button that made Billy Bass sing and flap to the tune of a fishing song. "Look, it's even got an actuating rubber jaw." Brenda was amazed with the technology embedded in Billy Bass, reacting with a passion she found impossible to conceal. "I love going to the store to analyze products!" she said, revealing that she sees much more than finished products—she sees how products are designed, assembled, and packaged.

Billy Bass was not the only gadget in Brenda's office on the second floor of Frycklund Hall at UW-Stout. On the window sill were four dark blue vases, each containing a single white flower. A poster on the wall featured a Faith Whittlesey quote: "Ginger Rogers did everything Fred Astaire did, but she did it backwards and in high heels." Fastened on the walls, perched on high wooden shelves, and suspended from the ceiling, gadgets dominated

the room: miniature catapults, model airplanes and cars, shiny metal plates and paper weights cast from various metals, and a spider model—clear plastic with a segmented body and several pairs of jointed appendages, which Brenda describes as a design model for alternative transportation: "Like arthropods, it uses the lever concept from harbor cranes, where the load stays parallel to the ground with actuating legs and armatures." Suspended from every surface, wheels and wings, metals and models.

Brenda grew up on a 40-acre hobby farm; her dad was a high school Technology Education teacher, her mom a stay-at-home mom. "I always had an interest and curiosity about life. I would look at something and wonder how it was created. I was always tinkering with stuff—taking it apart—to see what was under the springs, how the nuts and bolts worked, or how the gears worked," Brenda said. Seeing her now and as a child shows exactly what she means when she says "I'm as happy up to my elbows in grease as in a clean, sterile lab environment."

It is no coincidence that the STEPS girls build model airplanes. "I was bit by the bug when I was very young," Brenda said. On an annual family camping trip, where a family friend flew experimental airplanes, Brenda discovered her passion for flying. Brenda earned a degree in International Business and Aviation Management and her private pilot's license, working in the Twin Cities at the Metro Airports Commission. Years later, Brenda came to Eau Claire to work at a Fixed Base Operation (FBO)—a service station for aircraft and the people who fly them. "After twelve years in the commercial aviation business, I felt the thud of a glass ceiling," Brenda said. She got her

Master's degree in Technology Education from UW-Stout so she could teach Technology Education like her dad.

In 2000, Brenda began teaching Manufacturing Engineering at UW-Stout, where she became known as the "female technology teacher with a tool belt." When sharing this nickname, Brenda is quick to add that technology is a fluid term. "Technology is the knowledge and resources around us used to enhance life. The technology of the telephone has changed history and society, and we as a society have changed the concept of communication," Brenda said. "Take the example of the telephone when it was first invented, and what the cell phone has become today. Do you think Bell ever imagined the cell phone of today? Technology is different things in different times."

Technology also has the power to define gender roles. Research shows that most people don't think of domestic products like washing machines, sewing machines, and microwaves as technological. In addition, girls' toys tend to have hidden technologies intended to model domestic family scenarios, while the technology in boys' toys tends to be overt and flashy, representing prominent technologies in society. "We've lost something along the way," Brenda said. "The average woman is a technologist living in a technological society, but we don't recognize women as technologists." Combine this lack of recognition with the predominance of men in the technology field, and the gender gap is not surprising. How we define technology has the power to perpetuate the negative stereotype that

technology is a male domain—a view that potentially alienates fifty percent of the labor force from careers in the technology field.

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STEPS was the brainchild of Dr. Pete Heimdahl, UW-Stout Dean of the College of Technology, Engineering, and Management. In 1995, Pete encountered the gender gap while searching for female technology professors for the new Manufacturing Engineering program. Out of the 114 instructors nationwide who taught the curriculum, only three were women. After the Manufacturing Engineering program began, the enrollment of female students averaged only 10-15%. So Pete decided that UW-Stout would have to grow its own female engineers, and in 1997 the STEPS camp was born.

In 2005, Pete will retire, making Brenda the STEPS director. "It's nerve wracking," Brenda said. "Handing over 160 young girls and all the people involved in teaching—just the logistics of it feels daunting. After eight years in existence, some things almost run themselves, but still. There are many 'a-ha moments' while we see the girls change and grow, and those moments make it all worthwhile."

Brenda has been involved with STEPS seven of the eight years of the camp's existence. Her Master's degree thesis "Modeling Athena: Preparing Young Women for Work and Citizenship in a Technological Society," was co-authored with Dr. Kenneth Welty and printed in 2001 for the Wisconsin Department of Public Instruction. "This is my baby," Brenda said with excitement and just a hint of sadness. Brenda is in her early thirties, single, with no children. "It's one of those weird blessings," she said. "I can make a

Development with Ecolab in the Twin Cities, and another internship with SC Johnson that will take her through the remainder of 2005.

Although her internships will keep her away from STEPS in 2005, Brianne has returned to STEPS every summer to be a camp counselor. "I am a mom for the week," she said, smiling. For three weeks every summer, Brianne stays with the STEPS girls in the dorms, twenty-four hours a day, seven days a week as they work in Stout labs, learning the manufacturing engineering processes required to fabricate a radio-controlled model airplane. "It's fun seeing the reaction girls have, from not knowing about technology to becoming excited about it. Their confidence really shoots up. It's crazy. The change you see in one week. I still get cards from them throughout the school year," Brianne said.

As a STEPS counselor, Brianne has witnessed the STEPS girls' changes firsthand. She remembers one of the mothers—an engineer who brought her daughter to STEPS. When she picked her daughter up at the end of the week, her daughter said, "Thanks, mom. Now I know why you love your job."

But to Brianne, STEPS is even more than witnessing the changes. "It's like what Pete says, we are teaching these girls it's ok to be cute *and* smart."

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"Imagination is more important than knowledge, for imagination embraces the world," Brenda said, reading an Albert Einstein quote from a yellow handout titled "Great Thinkers and Inventors."

In the Research and Development lab, UW-Stout engineering students in Brenda's Design for Industry class were learning about materials design. Originally set up as an industrial woodworking lab, the R&D lab is a large open room with six wood-topped square tables. There were three females and eighteen males.

"What do you think?" Brenda asked the class. "Imagination or creativity? What's more important?" She paused for a few moments, giving the students time to think. "Who could be a better designer? Kids with all their imagination, or adults with all their knowledge?"

"Isn't that like what came first, the chicken or the egg?" asked a student.

"Nowadays, what you can imagine, you can do," another student added. "Yet without knowledge, it's kind of like books on a library shelf that just sit there."

"That's right. We need both, don't we?" Brenda said. "We don't design in a vacuum. We get in touch with what's happening around and beyond us. Knowledge alone can box you in to other possibilities, but without it, you have a limited experience of the world around you."

Despite the gender gap in the Design for Industry class, it was not the traditional "shop" class. Research says that men and women differ in the way they relate to technology. Women react in a social manner, wondering how technology can benefit society. Men react in a practical manner, wondering how the technology works. Men need to tinker, while women relate to technology in the context of solving a problem from everyday life. To attend

to these learning styles, research recommends that educators frame their lessons and learning experiences in the context of everyday life and to promote the feminine side of technology, stressing the roles that technology plays in improving the quality of life.

In the R&D lab, Brenda's students were not tinkering with gadgets; instead, the male students had pained expressions on their faces as they sheepishly took crayon and marker drawings out of their backpacks, grumbling that Brenda's assignment had been "too hard" and "too weird." During a previous class, students were assigned creativity exercises from Michael Gelb's book Learning to Think Like Leonardo Da Vinci: Seven Steps to Genius Everyday. The "Senzazione" creativity exercises were described in the book as the "Continual Refinement of the Senses, Especially Sight, as the Means to Enliven Experience." For these exercises, students had drawn pictures to music, and practiced transpositions—asking if someone such as Mozart or Michelangelo had a different profession, what would it be?

"How many of you thought this was the hokiest thing you've ever done?" Brenda asked. Many hands went up. "How many of you will never do anything like this again?" Many hands went up. "How many will maybe try it again?" A few hands went up. "Did you find there were things rolling around in your mind that you weren't aware of?" Some nods. "What did you find interesting about this? How things pop into your head while you're listening?" Stubborn silence.

One of the male students seemed angry. "This really isn't something we would ever do, if you knew anything about our lives," he said.

"My life is really not that much different from yours," Brenda replied. "If you didn't want to learn or stretch yourself mentally, you could just sit down with a textbook. Learning is about taking what you already know—like building blocks—and putting them together in new ways."

"What song did you pick?" Brenda asked, moving on to another student.

The student looked blank and resistant. He thought about it for a few moments. "I listened to '*Midnight Rider*' by the Allman Brothers."

"Why did that song ask you to pick blue and red?" Brenda asked.

"I don't know. It just did." After some hesitation he continued. "Midnight was blue and the rider was red."

And then another student raised his hand. "For Ozzy Osbourne, I drew a black circle blending toward white to symbolize the movement of his life—from drugs to wife and family."

"As hokey as it may seem on the surface, this has a very pertinent objective," Brenda continued. "How we are primed in to what's going on around us. It's amazing how we are on auto-pilot. Based on our senses, what kinds of things are we influenced by and how does that affect how we design? How am I experiencing the world and how can I work that in to my design? Focus on the experience, not the object."

"Why did I buy this water bottle?" Brenda asked, holding up a dark blue Nalgene bottle. "What are my experiences with it? How is the end user going to experience the end product? If it's not good, they won't purchase it, unless it's the only choice they have."

"White noise *influences* us," Brenda said. "Although you don't normally realize it, stuff is going on in your head while you're experiencing things. A Theology professor I had once said human beings end up being so *unauthentic*. Afraid to be alone with ourselves. We surround ourselves with white noise. Ask yourself, can it limit our experiences and our creative potential? Remember the issues we face as designers. Limited resources and our own creative potential. We should always be asking how we can improve ourselves as designers, the end product, and the creative problem solving process."

Brenda then gave the students a "food for thought" assignment—to describe a great thinker, inventor, or innovator, and consider how they could emulate that person's life to make themselves better creative problem solvers. Right now the students will probably not include Brenda on their list of innovative thinkers, but they will someday, for she truly fits no mold.