

The Art of Engineering: Using Fine Arts to Discuss the Lives of Women Faculty in Engineering

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Abstract

According to the theory of expressionism, the most important aspect of a work of art is its vivid communication of moods, feelings, and ideas. We utilized the expressive qualities of fine art to initiate a discussion among untenured women faculty members in engineering about their career struggles and successes. In the third in a series of three workshops for untenured women faculty in engineering, participants visited the Smith College Art Museum in groups of four or five in order to choose one work of art representing an ongoing struggle, and a second representing a recent accomplishment in their lives. Through these images, the participants described both personal and professional struggles and accomplishments in their lives. Examples of struggles included self-doubt, confusion and procrastination, lapses in motivation and drive and the struggle to stay organized as well as departmental conflict, lack of recognition for one's work, the need to publish, and challenges of communication. Examples of accomplishments included recognizing personal strength, attaining professional recognition, developing successful collaborations, and striking a balance between work and family. Choosing and sharing these images allowed the workshop participants to conceptualize and discuss career issues in a novel, representative way and allowed other participants to see their struggles and accomplishments through their eyes. Thus, visual representation of positive and negative aspects of being a part of the engineering academy may be a useful strategy for men and women in engineering to discuss their career issues and to find community support.

I. Introduction

It is well known that women are under-represented in the engineering workforce nationwide [1]. In colleges and universities, fewer women than men become engineering faculty members and fewer women than men make rapid progress up the academic ladder [2]. There are many and varied explanations for these disparities including that there are too few women in the "pipeline," overt and subtle discrimination [3], different career (and life) priorities [4] and the familial and care-taking roles expected of women as wives and mothers. Cole refers to the combination of these patterns as the "accumulating disadvantages" that act as barriers to the success of women in science [5].

Previously we have suggested that peer-mentoring through a caring community would improve the quality of life for women faculty members in engineering and could have an effect on retention and advancement in engineering academe [6]. One of the benefits of a caring community is the opportunity for open and frank discussions in a supportive atmosphere. These discussions can serve to reinforce positive behaviors and situations and offer alternative viewpoints on less productive behaviors and situations. In Wuthnow's terms, "...through

storytelling, individuals turn their (personal) experience into a collective event [and] find community [support] with others in the similarities between their stories and those told by others” ([7], p. 292). Chesler and Chesney previously have observed that the process of sharing experiences can lead to the development of a “narrative community,” which is a community of people with a common story and understanding of the world that lends psychosocial support to its members [8]; see also [9].

Bringing these ideas into practice, in the first in a three-year series of workshops for untenured women faculty in engineering, we used adventure education to quickly develop a supportive community amongst participants; short term results indicated informational, psychosocial and instrumental mentoring benefits [10]. In the second workshop in the series, with the same group of participants, we used participatory theater to build on that community and explore alternative problem-solving strategies through group brainstorming; short term results included recognition that personal problems were common to others and the development of techniques applicable in home institutions [11]. This paper reports on the third and final workshop with the same group of untenured women faculty in engineering - plus four senior women engineering faculty members who acted as role models, in which we explored the use of fine arts to initiate a discussion of career and life struggles and successes for untenured women faculty participants.

We based this workshop on the work of Williams, who demonstrated that using art as a common language enhanced personal reflection and sharing of emotions, in part because it is a medium in which there are no right or wrong answers [12]. Indeed, Reynolds and Nabors report that art therapy has been found to be effective in increasing self-esteem and self-concept, reducing symptoms of depression, and improving group formation in study populations, with the caveat that generalizations are difficult to draw due to small sample sizes, protocol design issues, and subject populations used in the studies [13].

Using fine arts as the basis for a discussion of career and life struggles also may yield deeper personal and group insights through the use of metaphor [12]. According to aesthetic and critical theories, the most important thing about a work of art is the vivid communication of moods, feelings, and ideas. Parsons summarizes the expressionist school (e.g., [14-16]) as holding the view that art represents the articulation of one’s interior life [17]. At the same time, art expresses more than a single person’s interior life at a given point in time; it is interpreted and given new meaning with each interaction with a beholder. Thus, art may generate a combination of moods, feelings and ideas in the viewer that the artist him/herself never experienced directly, and that the viewer could not articulate without the artist’s rendering.

In particular, Parsons [17] identifies four developmental stages of emotional expression in art appreciation, perhaps best understood as layers of meaning that are added as one matures. In the first stage, observers have concrete behavioral understandings of feelings. That is, the feeling of the painting relates to the feelings of people depicted in the painting (smiling people are happy, and so forth). In the second stage, labeled objectivity, observers typically tell a story in the painting, relating figures depicted. Colors are interpreted to express emotion in universal ways (bright colors express happy feelings, dark colors express sad feelings, etc.). In the third stage, the viewer is aware of subjectivity in interpretation. In this case, art expresses individualized feelings, as well as various aspects of experience or states of mind. The interplay of objectivity

and subjectivity in art appreciation was famously described in Roland Barthes's commentary on photography as two voices that must be combined: "the voice of banality (to say what everyone sees and knows) and the voice of singularity (to replenish such banality with all the élan of an emotion which belongs only to myself" [23]. The fourth developmental stage involves a community dialog about art. In this stage, observers are aware of public meanings of art and of a community context in which art is viewed. Art is better understood when subjective interpretations are shared and discussed in community.

In this way, we sought to use metaphor (through interpretation of the fine arts) and expressionism to help women discuss not only the details of their career and life struggles and successes but also the moods and feelings evoked by those struggles and successes. Through these discussions, we hoped to develop a narrative community that lends lasting psychosocial support as part of a caring community.

II. Methods

These principles were tested on a small sample (n=10) of untenured women faculty members in engineering, all of whom had participated in a leadership skills and community-building workshop based on the principles of adventure education two years before (n=14), and some of whom had participated in a leadership skills and community-building workshop based on the principles of participatory theater one year before (n=9). Four senior women faculty members also participated in this exercise to act as role models. The images they selected will neither be presented nor discussed here. As in the first workshop [10], participants traveled to a remote location for three days away from both work and family, and shared all activities during that period. For this exercise, participants were brought to the Smith College Art Museum in groups of four or five to choose two pieces of art that represented a recent struggle and a recent accomplishment in their lives, respectively. Digital photos were taken of these works of art and loaded onto a laptop for display to the entire group during the discussion. At the workshop conference center, each woman was asked to describe the pieces she had chosen, her recent accomplishment and ongoing struggle and how the images represented or symbolized the accomplishment and struggle, respectively.

By discussing subjective responses to art in community, we built into the exercise a fairly sophisticated sense of art appreciation that emphasized the last two of these stages. Participants were asked the following questions to guide their reflection, with prompts intended to raise the developmental level of the responses:

What is it about the work that speaks to you?

How does it relate to your struggle or accomplishment (i.e., is it a direct representation of the struggle or accomplishment, or is it a representation of your feelings about it)?

How does the work make you feel, and how does it compare to your feelings about the struggle or accomplishment?

Think more deeply about some of the details of the work. How do the composition, materials, medium, technique, or other artistic elements convey the message you take from the work? Take note of the artist, the name of the work, and any other information about the context in which the work was created.

Are these things relevant to your interaction with the work? If so, how?

III. Results

We present the results of the discussion in two ways. First, as examples, we include images of some art works chosen by participants to represent their struggles and successes.

Simultaneously, we provide descriptions – paraphrases or their own words – of why these images were chosen and what they represented to the women who chose them. These images are presented within categories that were identified with a post-hoc inductive coding scheme based on the participants' descriptions of their rationales for choosing particular images, according to established qualitative research methods [18-20]. The major themes identified were: (A) balancing work, family and personal life, (B) internal career barriers, (C) external career barriers, (D) optimism about academia, (E) personal/internal strength, and (F) professional/external success. Note that all ten participants chose one success and one struggle image, and one participant chose an additional one challenge image (21 images total for ten participants). The number of images in each of the six categories was nearly equally distributed (A: 4, B: 4, C: 4, D: 4, E: 3, F: 2). A more complete discussion follows in the next section.

A. Balancing work, family, personal life

Four works of art selected by participants reflected their struggles and successes balancing work, family and personal life.

Charles Demuth's *Apples* [22], a drawing of three apples, one painted red, with two others sketched behind in graphite, represented to one woman her inability to balance work, family and self but instead to focus on one at a time. The one apple that is painted red represented her current priority, and the two sketched in graphite represented those areas of her life to which only minimal attention could be paid at present.

Interestingly, this participant's success-image also falls into the category of balancing work, family and personal life. Here she chose *Untitled* by Donald Judd [23], which is a rectangular block sculpture (6" x 27 1/8" x 24") with a cylindrical groove that is attached to the wall along the longer side. The way that the piece juts out from the wall with no apparent support represented to her her ability to appear to "do it all" (i.e. succeed in work and have a family) and "make it look easy."

Another participant chose *Blessing on Wedding Day* by Carmen Lomas Garza [24] to represent her recent success in putting personal and family needs ahead of work demands by getting married and taking three weeks off to celebrate and travel.

Finally, one participant saw her challenge to be blending all the different roles she plays personally and professionally, especially with a baby on the way. She chose Chuck Close's silkscreen print *Lyle* [25], a close-up portrait of an African-American man holding steady gaze. The image itself is a composite of many smaller images, giving the piece a somewhat fractured feel. She shared that this aspect of the piece portrayed her struggle for balance and hope "that all of my small parts (teacher, researcher, wife, mother, daughter, friend) would be able to coalesce well enough to still maintain my own identity."

B. Internal Career Barriers

Four participants expressed self-doubt, confusion and procrastination, lapses in motivation and drive and the struggle to stay organized as internal or personal barriers to career success.

One woman chose a work of abstract art by Larry Bell [26] consisting of a smoky plexiglass cube with metal binding on clear plexiglass base. She described how from within the box (or looking through the box), everything appeared dismal and gray, but in viewing the box from a distance or from the outside, the box appeared only gray inside. She talked about feeling trapped, or “boxed in” and how this can sometimes be a matter of perspective. She shared one of the lessons she took away from earlier experiences in the group that when one is having a very real experience of being trapped, maintaining a sense of the “big picture” can open up new opportunities.

Another participant selected Elizabeth Murray’s lithograph *Down Dog* [27] as a representation of her feelings of confusion and bewilderment. The image caught her eye because she found it unappealing and even disturbing, aesthetically speaking. It raised for her a number of emotions including frustration with certain aspects of her career, which feels fragmented and disjointed, as the somewhat cubist style of the work conveys. The chaos of the piece represented to her the things that she knows she needs to work on, but avoids or procrastinates. She talked about these procrastinated tasks like dogs that are kept in a closet and not walked for a long time, so that when she does return to the task and “walk the dog,” it is an unpleasant experience.

Charles Sheeler’s *Rolling Power* [28], a painting of a steam engine’s wheels in motion (Fig. 1), represented one participant’s self-imposed challenge to create and gather momentum in order make rapid progress at work. In the group discussion, she reported that her perceived occasional lapses in research focus and drive feel like a barrier to her career success.

Another participant chose *Eighteen Rows* by Mary Bauermeister [29] to represent her struggle to stay organized in her teaching and research. This sculpture has eighteen rows of pebbles in a matrix arrangement that gradually increase in size row-wise; she reflected that she wished she could make her work endeavors fit together in that way.

C. External Career Barriers

Four works of art selected by participants reflected specific, external barriers to success in engineering academe.

For example, one participant selected “Untitled from the Brownhead Series” by Laylah Ali [30], in which eight figures in various sizes range around the canvas edge with various orientations. Six have eye masks and teeth, two stick their tongues out, and one has his arm in another's mouth. For the participant who chose this work, “My painting symbolized my struggles with my workplace environment. [It] was an illustration of non-cooperation, [with] masks and downright violence toward each other. This

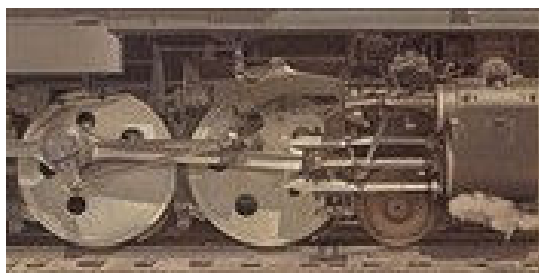


Figure 1. *Rolling Power* by Charles Sheeler [28]. Reproduced with permission.

symbolized (albeit overdramatically) a hostile workplace environment for everyone in my department.”

John Frederick Peto’s *Discarded Treasures* [31] was selected as a depiction of one participant’s struggle to find validation for her interdisciplinary work in an unsupportive department. She was attracted to the depiction of well-used books, which she held to be objects of beauty, in a disordered setting (Fig. 2). Also, she found the title poignant because the work was originally thought to be by a lesser-known artist, and was thus overlooked by the art world. She drew parallels between the treatment of the artist’s work and her own, which she feels is being overlooked in her academic department. This lack of recognition is acting as a barrier to her feelings of career success.



Figure 2. *Discarded Treasures* by John Frederick Peto [31]. Reproduced with permission.

A third participant selected a more concrete example for her career struggle image: *Fruit Dish, Glass, and Newspaper* by Juan Gris [32] (Fig. 3). Here, just the partially-visible word “Journal” in the painting was enough to evoke in this workshop participant that her perceived slowness in publishing peer-reviewed journal articles was a significant barrier to her career advancement.



Figure 3. *Fruit Dish, Glass, and Newspaper* by Juan Gris [32]. Reproduced with permission.

Another participant shared a personal challenge that affects her career as well as her personal and family life. Sir Joshua Reynolds’s portrait of *Mrs. Nesbitt as Circe* [33] brought up for her a lifelong struggle to handle her personal power effectively. In this image (Fig. 4), Mrs. Nesbitt is depicted as Circe, who in Greek mythology has the power to turn men into animals. She shared her sense that when she is empowered, the reaction of male peers and superiors is often one of fear. Since either this feeling or the actual behavior of her male colleagues impedes her communication with them, this painting elegantly captured a current barrier to her career success.



Figure 4. *Mrs. Nesbitt as Circe* by Sir Joshua Reynolds [33]. Reproduced with permission.

D. Optimism about academia

Four participants expressed optimistic and hopeful feelings related to the careers opportunities ahead of them.

One participant chose Francis Frost’s *South Pass, Wind River Mountains, Wyoming* [34] as an expression of a “vista” of wide open possibilities (Fig. 5).

A second participant chose *Strand* by Robert Ryman. [35]. This image is a plain white canvas with small strips of light color around the edge. The participant saw endless possibility for positive change within her department and research work in this abstract image.

Some participants selected images that had been previously chosen by others but which for them had positive meanings. For example, one participant chose *Eighteen Rows* [29], described above, to represent the satisfying ways pieces can fit together in successful research and teaching. Another chose *Discarded Treasures* [31] to represent the pleasures of teaching students whose talents might otherwise have been “discarded.”



Figure 5. *South Pass, Wind River Mountains, Wyoming* by Francis Seth Frost [34]. Reproduced with permission.

E. Personal/Internal Strength

Three women chose images related to personal or internal strength.

One woman chose a pine masthead carving of the harvest goddess Ceres [36]. Taken from the actual prow of a ship, the sculpture represented strength and fortitude, and having weathered more than a few storms. In her own words: “Although I felt battered, I did have strong support ... and so was able to sustain myself and maintain my course.”

Another woman chose a sculpture of St. Catherine [37] (Fig. 6), a philosopher in 4th Century Egypt, which, in her own words, represented her “current and future successes as a woman faculty member in a male-dominated field.” She explained that her identification with St. Catherine - depicted in the sculpture with a book in her hand and with male detractors at her feet - as an educated woman who triumphed over men who sought to undo her. She felt herself as part of a long succession of women who have persevered despite many obstacles to pursue their life’s passion. As she felt inspired by St. Catherine, she shared that she in turn hopes to inspire a new generation of women to pursue their dreams.



Figure 6. St. Catherine [37]. Reproduced with permission.

One woman chose a landscape that was a fairly direct representation of a recent accomplishment in her life outside of academe, completing a triathlon. The image in Bierstadt’s *Echo Lake* [38] reminded her of a lake in which she trained. Her athletic accomplishments, inspired by her *Outward Bound* experience in 2001 with this same group of women [10], were undertaken specifically for metaphorical use in her professional life. She shared that she found she was able to do something she initially perceived as impossible by surrounding herself with a supportive team, breaking the task down into manageable goals, and working consistently.

F. Professional/External Success

Two images of career success arose within the group.

One participant chose an abstract work, *Green Diagonals* by Bridget Riley [39], as a representation of a new algorithm she developed that has recently been patented and put into use by the company by which she used to be employed. In a rather concrete way, the image depicted her mathematical innovation and thus represented a recent career success.

Finally, one participant chose Homer's *Shipyards at Gloucester* [40] (Fig. 7), an oil painting of the construction of a large boat, to represent collaboration at its best. In the group discussion, this woman reflected that working with supportive colleagues in her department, she and they can create something of greater significance than any one of them could accomplish individually.



Figure 7. *Shipyards at Gloucester* by Winslow Homer [39]. Reproduced with permission.

IV. Discussion

The images that were selected by participants to represent their personal and professional successes and struggles fell relatively evenly into six categories derived from participant descriptions of their rationale for choosing particular images: (A) balancing work, family and personal life, (B) internal career barriers, (C) external career barriers, (D) optimism about academia, (E) personal/internal strength, and (F) professional/external success. Within the first category, both successes and struggles were reflected upon and discussed in the group. The contrasts between “doing it all” simultaneously and doing one thing at a time were interesting for the group to reflect upon. Clearly balancing work, family and personal needs is an ongoing struggle for men and women faculty members alike, especially when childcare responsibilities are equally shared. While some academic institutions are better than others at helping their faculty meet their familial (and personal) responsibilities, there is much room for improvement in developing organizational programs and support systems. While there is relatively little that individual faculty members can do other than try to address the demands of work, family and self either in parallel or in series, it was helpful for the group to discover their peers’ strategies for addressing these issues.

Several personal or internal career barriers to success were discussed including self-doubt, confusion and procrastination, lapses in motivation and drive, the struggle to stay organized, and ill-defined self-image. These issues were previously recognized by the participants, but the physical and metaphorical representation of them in the selected works of art initiated a useful discussion. In the discussion, the recognition of shared struggles and concerns helped normalize each individual’s worries and self-doubts. That is, as these internal struggles were shared, the participants began to realize that they were not alone.

Real or perceived external barriers to success that arose included departmental conflict, lack of recognition for one’s work, the need to publish (or perish), and gender-based communication differences. These more concrete issues led to a lively discussion of how the participants might strategize to solve these problems. Especially since they appeared to be external, most of these issues seemed tractable although clearly nontrivial.

The optimistic images of success in academia energized and invigorated the group. Interestingly, even those participants who did not express much optimism about their career potential seemed buoyed by these images and their meanings for the participants who chose them. Similarly, sharing the images of personal/internal strength and professional/external success led to positive and supportive group reactions. Even those women whose image choices did not reflect either strength or success were able to recognize some of their own talents and abilities in these images.

V. Conclusions

In designing and conducting this interventional workshop for untenured women faculty members in engineering, we exploited the expressive qualities of fine art to initiate introspection and a discussion about career and life struggles and successes. According to Williams, the most important aspect of a work of art is the vivid communication of moods, feelings, and ideas [12]. Within this group, personal and professional struggles and successes have been discussed many times over the three years of attending workshops together. While these struggles and successes have of course changed over the years, this discussion's ability to bring out quiet voices, help non-introspective people reflect, and crystallize issues for even the most articulate, was exceptionally high. In keeping with the theories of emotional connection, the moods, feelings, and ideas of participants were emphasized through the use of art to discuss personal and professional struggles and successes, instead of the details in which most of these discussions get mired. Through the use of metaphor, participants were able to recognize aspects of their own struggles and successes in others' choices and descriptions. In one participant's words, "Until very recently, I had never given art (paintings, sculpture, etc.) much thought, so I was a bit skeptical that this activity would be a meaningful one for me. Therefore, I was surprised at what I gained from it."

In this single case study on a small group of women, the images that were chosen were grouped into six major categories based on the participants' rationales for choosing particular works of art. Those included balancing work, family and personal life, internal career barriers, external career barriers, optimism about academia, recognizing personal/internal strength, and celebrating professional/external successes. Due to the small sample size (10 untenured women faculty, 21 images), we did not attempt to use the number of images in each category to weigh the importance of each theme to our participants or untenured women faculty in general. Indeed, the universal nature of the major themes we identified is impossible to assess from the results of this small group activity. Likewise, the impact of the workshop on the participants' personal and professional lives cannot be assessed without long term summative and formative evaluation.

We can conclude that using the visual arts to initiate a discussion of career and life struggles and successes amongst women faculty in male-dominated fields is novel and may be a useful technique for developing peer-mentoring and initiating group problem-solving. Specific aspects of this workshop that may have been critical to its success were (1) a pre-established trusting atmosphere among the group that allowed vulnerabilities to be expressed, (2) genuine caring within the group about the struggles and successes of other participants (developed through prior shared experiences), and (3) the presence and participation of senior, well-established women who, in sharing their own struggles and successes, acted as role models for the less senior, less

well-established women. Therefore, for groups of women for which these conditions hold, a workshop like this may be successful at generating a useful discussion. Otherwise, prior shared experiences and activities may be necessary to establish trust and caring with the group before embarking on the activities described here.

In the long term, we hope that members of a supportive community developed by activities and discussions such as those described here will help initiate similar discussions within members' own personal and professional communities and institutions, with or without the use of fine arts. A persistent caring community such as we are working to develop through our three-year series of interventional workshops could improve the quality of life for women faculty members in engineering, which in turn may increase the retention and advancement of these women, and eventually lead to greater diversity in the engineering academy.

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- [36] Unknown. American. *Ceres*. Ca. 1825-1830. Sculpture, 71 3/4 x 24 1/2 x 25 1/2 in. (182.245 x 62.23 x 64.77 cm). Smith College Museum of Art, Northampton, Massachusetts. Purchased, 1977.

- [37] Unknown. French. Second half of 14th century. Sculpture, 29 1/2 x 10 x 7 1/2 in. (74.93 x 25.4 x 19.05 cm). Smith College Museum of Art, Northampton, Massachusetts. Gift of Mrs. Ronald C. Lee (Louise Day Putnam, class of 1909).
- [38] Albert Bierstadt. American, 1830-1902 *Echo Lake, Franconia Mountains, New Hampshire*. 1861. Oil on canvas, 25 1/4 x 39 1/8 in. (64.1 x 99.3 cm) Smith College Museum of Art, Northampton, Massachusetts. Purchased with the assistance of funds given by Mrs. John Stewart Dalrymple (Bernice Barber, class of 1910), 1960.
- [39] Bridget English Riley. *Green Diagonals, Surrounded by Red and Blue* gouache, pen with colored ink, graphite on paper 15 1/2 x 15 7/8 in.; 39.37 x 40.3225 cm Gift of Nancy Millar O'Boyle, class of 1952
- [40] Winslow Homer. American, 1836-1910. *Shipyard at Gloucester*. 1871. Oil on canvas, 13 1/2 x 19 3/4 in. (34.2 x 50.2 cm). Smith College Museum of Art, Northampton, Massachusetts. Purchased, 1950.

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