

CHANGING LEARNING ENVIRONMENTS THROUGH CHANGING FACULTY

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Abstract — Faculty members play a significant role in determining the learning and working environments at institutions of higher education; therefore, changes in these environments will occur when faculty members see the need for changes, see what types of changes are necessary, and decide to implement the changes. The National Science Foundation demonstration project “Changing Faculty through Learning Communities” facilitates progress toward needed changes by focusing on four strategic disciplines: development and invitation, mental models, personal vision, and personal commitment. The project has developed four strategies to address these strategic disciplines: present speakers to address relevant research, offer workshops and learning communities to facilitate conversations among faculty, provide support for women in undergraduate research to encourage invitation, and provide travel support for women students to encourage invitation. The paper will discuss experiential knowledge gained to date as well as the effect of this knowledge on the planning and implementation of future endeavors.

Index Terms — Changing faculty, Faculty Learning Communities, mental models, promoting gender equity.

INTRODUCTION

In the book “Why So Slow? The Advancement of Women,” author Virginia Valian presents a model in which gender inequity arises through accumulation of small disadvantages, most of which are created by gender schemas held by males and females alike. Valian posits that a set of implicit hypotheses about sex differences, which she refers to as gender schemas, plays a crucial role in shaping the professional lives of men and women. She explains that gender schemas affect our expectations of men and women, our evaluations of their work, and their performance as professionals. As a result, men in professional life are consistently overrated, while women are consistently underrated. Valian suggests that whatever accentuates a man’s gender repeatedly places him at an advantage by giving him an implicit “plus” mark while the perceivable feminine traits of a woman result in a small losses for her, “minus” marks. [1, pp.2]

Over time significant advantages accumulate as the summation of the numerous plus marks received by men increases. Similarly, significant disadvantages are created as

small minus marks received by women add up. Although most individual differences in treatment are typically quite subtle and seemingly small, accumulation of small advantages and disadvantages over time results in significant discrepancies in salary, promotion and prestige. Valian illustrates this point by citing a study [2] that describes a computer simulation of promotion practices at a hypothetical corporation which had eight levels staffed at the bottom level by equal numbers of men and women. A model-specified percentage of the staff would be promoted from one level to the next over a given period of time. The model imposed a small (1%) bias in favor of promoting men. After running the model through numerous iterations, the highest level in the company was 65% male. [1, pp.3] Based on these results, it is clear that even small disadvantages can create huge disparities over time.

If this model of gender inequity is accepted, then initiatives to enhance equity must be similarly pervasive and systemic. Efforts are required to help faculty members uncover their gender schemas, see how their schemas affect decisions they make about women students and faculty, and decide how their gender schemas might be altered so that they arrive at different decisions. Data on the imbalance in numbers of males and females at the undergraduate, graduate, and faculty ranks, as well as studies that help characterize the environments for women at these three levels are helpful. However, none of these studies will help faculty members clearly understand how subtle, but collectively massive, discrepancies construct environments that lead to imbalances.

What is required is a culture change where culture is not a static entity, but a continuously evolving phenomenon based upon emerging consensus, derived both explicitly and tacitly from the people in the culture as they interact with the environment as described by Seel:

Organizational culture is an emergent result of continuing negotiations about values, meanings and properties between the members of that organization and with its environment. In other words, culture is the result of all the daily conversations and negotiations between the members of an organization. ...If you want to change a culture you have to change all these conversations—or at least the majority of them. [3]

If culture change that creates a more equitable and welcoming environment is the desired goal, then the goal of

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the present paper is to describe a project that is underway to help catalyze a culture change in the Colleges of Science and Engineering at Texas A&M University (TAMU). The demonstration project "Changing Faculty through Learning Communities" is funded by the National Science Foundation (NSF) is funding a demonstration project. It began on November 1, 2001 and will conclude on November 1, 2004.

DISCIPLINES IN CHANGING CONVERSATIONS

The critical element of learning and working environments on university campuses is the faculty. Therefore, development of learner-centered educational environments rests on helping faculty develop the mental and interpersonal disciplines that provide the foundation for such environments. It is important to identify disciplines that should be nurtured and developed across the entire faculty with the conviction that if faculty members practice these disciplines, then they will create learning environments that are inviting and welcoming. To create such an environment, the project has identified four strategic disciplines: development and invitation, mental models, personal vision and personal commitment. The term "discipline" in this context does not refer to "enforced order", but a body of theory and technique that must be studied and mastered to be put into practice. [4, pp.10]

Development and Invitation

Understanding processes through which women and men develop intellectually and motivationally provides an essential foundation for faculty members contemplating improvements in learning environments. Further, understanding differences in these processes between women and men and understanding different roles that teachers and mentors provide in the development processes for women and men implies that improved learning environments must address diversity in its many different forms. One important role that teachers and mentors play in the development of women is invitation and encouragement. So the first strategic discipline is learning more about development, differences in development between women and men, and roles faculty play in development.

Examples of our increasing understanding of development processes are numerous and one is provided to illustrate issues involved. Bandura's social cognitive theory [5] shows the key role that self-efficacy plays in motivation. In the model for self-efficacy, Bandura proposed four sources of self-efficacy beliefs: 1) mastery experiences, 2) vicarious experiences, 3) verbal persuasions; and 4) physical and emotional states. However, research indicates that women and men prioritize the four sources differently.

"Certainly, perceived mastery of a given task is critical in developing efficacy perceptions, but the women in this study provided evidence that the influence of particular self-efficacy sources may differ for women in male-dominated domains. Women seemed to rely extensively

on the accompanying confidence development from the relations in their lives while they were honing their mathematics-related skills. Relational episodes gave birth to a relations confidence developed from others, and their relational efficacy informed their judgments of their own abilities profoundly.

In summary, the mathematics self-efficacy beliefs of the women in our sample were nurtured by familial, academic, peer, and work-related influences, and these influences were recalled primarily in terms of the encouragement received or through the vicarious experience that they provided." [6]

Although mastery experiences may be the most important source for development of self-efficacy in men, research suggests that verbal persuasion and vicarious experience may be more important for women [6]. Further, invitations for women to participate in undergraduate research experiences or graduate school may be more important as motivators because invitations carry a meta-message that expresses confidence in the invitee.

Mental Models

Mental models is a discipline through which practitioners refine their skills in reflection and inquiry. Art Kleiner describes background for the term "mental models".

"The concept of mental models goes back to antiquity, but the phrase (to our knowledge) was coined by Scottish Psychologist Kenneth Craik in the 1940s. It has since been used by cognitive psychologists (notably Philip Johnson-Laird of Princeton University), by cognitive scientists (notably Marvin Minsky and Seymour Papert of MIT), and gradually by managers. In cognition, the term refers to both the semi permanent tacit 'maps of the world' which people hold in their long-term memory, and the short-term perceptions which people build up as part of their everyday reasoning processes. According to some cognitive theorists, changes in short-term everyday mental models, accumulating over time, will gradually be reflected in changes in long-term deep-seated beliefs." [7, pp. 237]

Through reflection practitioners become more aware of their reasoning as they move from observable data to action. Through inquiry practitioners develop skills through which they share their reasoning processes with others and learn about reasoning processes by other individuals. In the context of learning organizations, Senge and others [4, 7] have worked to demonstrate the importance of mental models. Their arguments for the importance of mental models and processes through which practitioners master the discipline are equally valid in the current context.

For example, research shows that people tend to invite people like themselves. Presentations of research results along this line are likely to be ineffective unless faculty members develop the discipline to perceive their mental models and realize their importance. Once faculty members surface their own mental models of whom they encourage

and invite and why, they can examine their mental models and decide whether and how changes could be made. The quality of conversation about controversial topics such as the value of gender equity and strategies to achieve it is improved to the extent that the mental models underlying gender and racial inequity are conscious and explicit.

Personal Vision

Faculty members who master the disciplines of mental models and development and invitation will develop an intellectual appreciation of the need for changes in learning environments. However, their capability to imagine diverse types of learning environments that address newfound understanding of the deficiencies of current learning environments may need to be enhanced. Robert Fritz, developer of several numerous workshops to help people create what they want, indicates that one of the principal challenges is helping people reach the point where they know what they want. [8, 9]

"A vision exists within each of us, even if we have not made it explicit or put it into words. Our reluctance to articulate our vision is a measure of our despair and a reluctance to take responsibility for our own lives, our own unit, and our own organization. A vision statement is an expression of hope, and if we have no hope, it is hard to create a vision." [10, p. 113]

Facilitating the discipline of personal vision requires encouragement and practice in cultivating self-understanding, so as to help faculty members know what they care about and how to translate their understanding into compelling pictures of the future. Through ongoing conversations and practice, faculty members develop the capacity for personal vision through which their intellectual appreciation for improved learning environments can be translated into envisioned learning environments.

Personal Commitment

As faculty members envision learning environments that promote equity and diversity, then they must subscribe to the proposition that what they want they have the power and responsibility to make happen. Attempts to create more inviting and welcoming learning environments will fail if faculty members see themselves as powerless to create the necessary changes or if they are convinced that responsibility for bringing about these changes rests with someone else. Therefore, faculty members must see themselves as capable of and responsible for initiating and sustaining desirable changes.

STRATEGIES IN CHANGING CONVERSATIONS

Four strategies have been devised to implement the strategic disciplines mentioned above. The first of these strategies is to present prominent outside speakers to address research related to one or more of the four strategic disciplines. Next, support for women in undergraduate research will be

provided to encourage invitation. Third, travel support for women students will be offered to encourage invitation. Fourth, workshops and Faculty Learning Communities (FLC) will be offered to facilitate conversations related to one or more of the strategic disciplines. The fourth, and pivotal, strategy is to change the faculty culture by changing conversations. This requires an ongoing effort to promote change. Although outside speakers are beneficial, they offer no sustained mechanism for change; therefore, workshops and learning communities are being implemented.

PROGRESS TO DATE

Dialogue Sessions

As the project team began detailed planning, they realized that two undesirable situations might occur. First, faculty members, department heads, and deans might not attend opportunities to listen to and interact with the speakers, might not attend the workshops, or might not participate in the learning communities. Second, faculty members, department heads, and deans might see different events as isolated occurrences, fail to see links among the events, and perceive the pattern of events as a unified project. For example, faculty members might attend one workshop, but not comprehend that many similar events were connected with the workshop. As a result, faculty members might not participate in other related events. Greater support and understanding by the top leadership of the Colleges of Science and Engineering was also needed.

To establish broader recognition of the need for speakers, workshops, and learning communities, the project team invested additional effort to work with deans, associate deans, department heads, and key faculty members to build greater understanding of gender equity among students and faculty members. The project team selected dialogue as the mechanism with which to initiate conversations on a topic with which many people believed they were already familiar. Dialogue is a conversational environment that attempts to encourage deeper exploration and understanding of an issue without attempts to prematurely select potential solutions. It has been promoted by Bohm [11], Isaacs [12], and others and it has yielded impressive results in situations involving disparate parties such as union and management or pro-life and pro-choice adherents.

The first dialogue session was held on 28 February 2002. Twenty-one deans, associate deans, department heads, and key faculty members attended the four-hour session that involved an introduction to dialogue and a two-hour dialogue session. The session was disappointing because each person appeared to present her/his own comments, but no one inquired into or built upon the comments of others. In addition, it was clear from the first part in which the concept and protocols of dialogue were introduced as well as from comments on the follow-up survey that participants were unenthusiastic about any

training that might facilitate the dialogue session. However, the session was also encouraging because a large percentage of the participants shared personal experiences and no one disputed the personal experiences of others. Further, a very high percentage of participants indicated that they would be willing to participate in additional dialogue sessions.

Therefore, a second dialogue session was held on 25 April 2002. Eighteen deans, associate deans, department heads, and key faculty members attended the two-hour session that did not include any training on dialogue. Many of these faculty members and administrators were present at the first session; however, a few of the people in attendance at the second dialogue session were not present during the first session. The second dialogue session was much more productive than the first. One reason for the improvement might have been the experience of the first dialogue session in which people came to present their ideas. Another reason for the improvement might have been the two articles that were distributed prior to the dialogue session. The two articles were [1, chapter 1] and [13]. Although few participants appeared to have read both articles prior to the meeting, participants could refer to research described in the readings and other participants might have thought that there was more substance to the issue because of the distributed research. For a variety of reasons, people built on comments of others, recognized that there were substantive issues that needed to be addressed, and began to search for ways in which the issues might be addressed.

The purpose of the sessions was to initiate an open discussion on the issue of what gender equity might look like in the Colleges of Science and Engineering at TAMU. The intention was to engage participants on questions such as the following.

- Does gender equity consist solely in equal numerical representation? Does gender equity require more than changing numbers?
 - Does gender equity require changes in beliefs and mental models about gender roles?
 - How might constructive dialogue about equity occur?
- The dialogue sessions were intended to build interest and camaraderie among faculty members to encourage future attendance and interest in related topics.

Suggestions that emerged from the dialogue sessions, especially the second dialogue session, included:

- Enhance new faculty orientations with components on gender schemas;
- Enhance engineering student orientations with components regarding individual awareness about gender schemas;
- Add component to the dean's retreat on gender schemas;
- Add component on gender schemas to department heads' retreat in both the Colleges of Science and Engineering.

One key aspect of these sessions is the inclusion of as much diversity in the members of the dialogue group as possible.

Speakers

On November 14, 2002, the project hosted its first speaker, Dr. Virginia Valian. Dr. Valian is a professor of psychology and linguistics at Hunter College and the City University of New York Graduate Center. Her influential 1998 book [1] has placed her in the forefront of those studying the progress of women in academia, medicine, law, and business. During her visit, Dr. Valian interacted with approximately seventy administrators and faculty members via small group discussions, a meeting with eight of the eleven deans, and a meeting with the executive associate dean, department heads and graduate advisors from the College of Engineering. She also conducted two open lectures, which were attended by faculty, staff and students from across the campus.

Dr. Valian's visit prompted her audiences to reflect on a several issues in their individual environments. Some of the questions raised during her visit were:

- There are very few women in our discipline. How can we form a diverse candidate pool if they will not apply for the advertised positions?
- How would this institution go about implementing total turnaround in policy to ensure an equitable environment for all members of our community?
- The diversity argument has not found a receptive audience in my case. How can I convince my colleagues that diversity does not lead to a decrease in the quality of our institution?

In response to these questions and others similar in nature, Dr. Valian repetitively referred to gender schemas as the root of the problem in most cases. She also encouraged her audiences to recognize the benefits of insuring gender equity. Some of the benefits she mentioned included:

- Equity maximizes the chances of hiring the best new faculty members by increasing the candidate pool.
- By modeling diversity, equity demonstrates to women and underrepresented minority students that they have a future- a good future-in academia and the professions.
- Equity increases the likelihood of innovations in teaching, scholarship, and research.
- Equity creates a stronger and more viable institution via a reputation for fairness [14].

Many of the faculty members who attended Dr. Valian's discussions were impressed by the amount of research and data that shows the accumulation of disadvantage as experienced by women in academia and the professions. A common question that emerged after her visit was, "Knowing all of this, what do we do now?" As a follow up to Dr. Valian's visit, a Faculty Learning Community (FLC) on mental models was initiated and is described below.

The second speaker was Dr. Debra Rolison, head of Advanced Electrochemical Materials, Surface Chemistry Branch at the Naval Research Laboratory in Washington

D.C. Since she is an outstanding chemist and a knowledgeable promoter for gender equity the project team thought she would be an effective advocate for change in the Colleges of Science and Engineering. Dr. Rolison visited the TAMU campus on February 14, 2003 as a prelude to the Women in Science and Engineering (WISE) Conference. She interacted with approximately fifty members of the A&M faculty and staff during an open lecture and several small group sessions. She also visited with several women graduate students in the Colleges of Science and Engineering during her visit. Dr. Rolison delivered a powerful message, "Time to Thrive, Not Just Survive: Accumulating Advantage for Women in Science and Engineering." During her various talks, she stated:

"Science and engineering (S&E) departments need more women as faculty-and not only to show their undergraduate students (the majority of whom in some disciplines are now women) that a career in academia is a viable path. Yet applications from women for advertised faculty positions in S&E departments rarely match the numbers of women granted Ph.D.s. The disproportionate absence of women who have chosen not to enter the applicant pool for faculty openings gives notice that an unhealthy environment exists in S&E departments and institutions. The women aren't broken: the system is. And self-reform by the institution is not getting it done, and is especially frustrating in light of the historic opportunity to change the demographics as scientists and engineers hired in the boom years of the 1960s retire."

Workshops

The first phase of a workshop "Designing More Effective Conversations" was held in January 2003 and was attended by graduate advisors from a majority of the departments in the College of Engineering. The second phase of the workshop was held on March 11, 2003. Facilitated by consultants from the Action Design group [15], the workshop was intended to help faculty members make explicit, subtle, but influential interpersonal hypotheses and test them rigorously using observable data. Workshop topics included:

- Understanding dilemmas that block learning and change that might lead to improved research or better teaching;
- Understanding how assumptions, especially unexamined assumptions, hinder conversations and productivity;
- Learning to monitor and adjust assumptions and reactions, even in the heat of the moment;
- Learning to ask questions that shift people's perspectives and move understanding forward;
- Creating a customized action plan for continuing personal and professional development.

In the workshops, these topics were explored in plenary forums and in facilitated case discussion groups.

Participants were also given the opportunity to further investigate these topics in coaching sessions with Action Design consultants from between the two meeting dates. In preparation for the case discussion groups, participants were asked to develop a case study of an important unproductive conversation they would like to learn to handle more effectively. Once in the case discussion groups, the facilitator and other group members reviewed the cases and discussed what each person might have done differently using productive conversation tools presented in the plenary forum. Then, they reenacted the case in a productive manner. In the second workshop phase, participants further developed their skills by exploring a second case study and reviewing video recordings of each case as it was played out.

At the conclusion of the first two-day session of the workshop, feedback from the group participants was very positive. The participants agreed that the content of the session along with constructive coaching by the consultants helped them to understand why certain conversations do not go well. Moreover, the participants agreed that they now saw ways in which each of the conversations might have been more productive. Many expressed interest in furthering their knowledge of the topics covered in the workshop, specifically the use of the ladder of inference [7, pp. 242-246] and the balancing of advocacy and inquiry [7, pp. 253-259] in their conversations with colleagues and students. The single complaint that was registered at the conclusion of the first session was that several participants struggled to commit to two full days due to scheduling difficulties. In light of this, the second phase of the workshop was scheduled for an evening session followed by one full day.

Faculty Learning Communities (FLC)

Mental models is the focus for the first FLC, which has been formed in an effort to sustain conversations about mental models and gender schemas and what roles they play in creating inequity and promoting equity. A FLC is a group of faculty members who agree to meet regularly to probe selected articles from the literature about a strategic initiative and collaboratively build meaning from the readings and conversation. The University of Wisconsin pioneering program, Creating a Collaborative Learning Environment (CCLE), is an original model for FLCs. It has been shown to be effective in enabling faculty members to improve their learning environments and working relationships with their colleagues. [16, 17] TAMU initiated its FLC program, similar to CCLE, in Fall 2000. Both TAMU's FLC program [18] and Wisconsin's CCLE provided models for the current project.

Efforts to organize the group began in December of 2002. Publicity for this community was delivered in the form of e-mails and brochures to each faculty member in the Colleges of Science, Engineering and Geosciences (approximately 750 faculty members). Due to difficulties in finding an adequate number of participants along with subsequent scheduling intricacies, the first meeting did not

occur until March 11, 2003. A similar community for graduate students in the Colleges of Science and Engineering met during April 2003.

The program manager of the project facilitated each of these groups. She is responsible for assembling the reading resources, working out a meeting schedule, obtaining a meeting location, facilitating regular conversations, and meeting individually with each participant to assess the quality of the experience and seek ways in which the experience might be improved. The articles selected for the FLC on mental models are [19], [4, chapter 10], [20], [1, chapters 1 and 6], [21], and [22].

During the four-week learning communities, several common themes emerged. Participants in both groups appeared to possess a heightened awareness of their own mental models and gender schemas. As one person remarked, "The learning community has been very helpful to me. It has provided a setting where I can think about and discuss unconscious attitudes and issues without worrying about how the act of carrying on that conversation would impact my immediate work environment." Each of the participants also noted that it is typically not the overt inequities that women experience that are so detrimental to their advancement. They all concurred that it is the subtle, sometimes inadvertent, inequities that accumulate over time that eventually create such a large disparity for women. For one member, this recognition brought new revelations. "I feel empowered as a result of today's discussion. Now that I can identify some of the subtle inequities that women and minorities face, I can work to change them both personally and professionally." On occasion, several participants expressed frustration at the authors' reluctance to offer no clear-cut remedies for correcting inaccurate mental models. However, as the discussions progressed the complexity of the problem became more evident and the quest for solutions turned into an internal search rather than an external search. One participant concluded, "A person has to be willing to accept that they need to change. The only way to truly change is through critical self reflection."

CONCLUSIONS

Campus-wide, short-term events alone are not likely to create a culture change that emphasizes the four strategic disciplines described above. Instead, changing the majority of conversations about gender equity at TAMU appears to require both campus-wide, short-term events such as speakers and workshops, and small-group, sustained interventions, such as FLC. However, developing these disciplines will help to reduce the small, numerous, daily disadvantages that professional women accumulate. Understanding the long-term commitment that is required, the project has initiated a broad range of interventions.

Synthesizing the growing body of research on gender equity has enabled the project to assemble resources, e.g., speakers, workshops, and syllabi for FLC, to facilitate

change initiatives. The dialogue sessions increased understanding, to a small degree, of the complexity and pervasiveness of the problem. Both speakers have raised the awareness of the importance of gender equity and challenges involved in enhancing it. Helping faculty members understand the value and priority of participating in sustained, informed, and facilitated conversations about gender equity has begun. However, limited involvement of the faculty and graduate students in the initial FLC offerings demonstrates the magnitude of the challenge. Future effects of these change efforts are still to be determined.

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