

## **Stories of Change: Faculty in Reflective Dialogues**

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## **Stories of Change: Faculty in reflective dialogs**

### **Abstract**

Over a two year period, a group of faculty from California Polytechnic State University, San Luis Obispo (Cal Poly), met monthly to explore the role of reflection in transforming engineering education. This dialog group at Cal Poly was part of a larger Consortium to Promote Reflection in Engineering Education (CPREE) coordinated by the University of Washington. During the first year of the project the group at Cal Poly included faculty from the College of Engineering, but during the second year the group expanded to include faculty from other colleges (Liberal Arts, Business, and Science and Math) and students. The group consisted of 40 individuals with consistently 25 at each dialog meeting. We grappled with questions mostly philosophical in nature: What is reflection? Aren't we reflecting all the time? Does reflection lead to transformation? What is the difference between transformation and change? How can we ask our students to reflect if we don't have a reflective practice? As we concluded the two-year experiment in Spring of 2016, some faculty who participated in the dialogs reported changing both personally and professionally. In order to document and understand the nature of the changes we embarked on this research project. We interviewed 10 faculty from Engineering and Liberal Arts. The interviews were coded and analyzed through inductive narrative techniques. The results point to some profound themes. Most striking is that the practice of reflecting together on our own teaching led to more in-class active learning and an enhanced learning environment. This in turn led to faculty reporting deeper learning for students. Some faculty also reported changes in their own personal realm that resulted in a sense of greater well-being. Examples of these changes are included in this paper.

### **Introduction**

There is little doubt that reflection is a powerful tool in learning. The process of taking time to consolidate and organize the acquisition of ideas or to hear how others have done the same is a profound tool. Through the Consortium to Promote Reflection in Engineering Education (CPREE) coordinated by the University of Washington, our university participated in research and in an exploration of methods to increase the practice of reflection in engineering education. We took a decidedly different approach than other universities in the consortium. Instead of endeavoring to increase reflection in the students, we the faculty, began a reflective process ourselves. One of the reasons we believed this to be a valid area of exploration is that if we could intervene in the system of education at the level of faculty, then we might have a greater impact on student learning outcomes. In addition, we very much believe in the well-being of all individuals within a system and desired to connect with like-minded faculty. We met monthly for two years to discuss many aspects of reflection and the role reflection has in education. As we neared the end of our time together many individuals reported changes in personal and classroom practices. This paper attempts to capture and organize these reported changes. The paper first summarizes the theoretical foundations of this dialog process and of reflection. We then describe the activities and structures we used in the CPREE meetings at Cal Poly. This is followed by a description of the research methods used to collect and analyze the stories. The bulk of the paper summarizes the ways in which people reported changes in their teaching and personal life. Finally, the paper concludes with the next steps for this research.

## Theoretical foundations

The role of reflection in learning was introduced by John Dewey<sup>1</sup>. He is quite clear about the central role this cognitive process plays in knowledge acquisition. His definition of reflection is that “all reflection involves, at some point, stopping external observations and reactions so that an idea may mature” (p.209). Many others have encouraged reflection for growth and learning<sup>2,3</sup>. Reflection specifically in engineering education is less prevalent<sup>4</sup>. The one area that reflection does show up as a robust practice is when service learning is used as a pedagogical method<sup>5,6,7</sup>.

Several researchers report reflective activities in the area of professional development for teachers. Boerboom et al<sup>8</sup> found that reflection with peer educators helped teachers develop action plans in response to student evaluations beyond what was developed individually in isolation. Mackay and Tymon<sup>9</sup> used reflection to explore the tacit assumptions in teaching practice. They found that the lecturer’s difficulties in reflection paralleled student’s reported difficulties. These parallels proved to be a rich area of inquiry for the instructors. Ruth<sup>10</sup> traces the use of dialogical journals between two colleagues as a way of learning together. This approach specifically looked for similarities in professional practice within business and education. The purpose was not to present a solution, but to consider this reflective process as a method for professional development. Breen et al<sup>11</sup> presents an interesting case study where five mathematics lecturers engaged in dialogs to discuss the benefits and difficulties of reflection. They used John Mason’s Discipline of Noticing as the basis of their reflective dialog with the objective to develop professionally as caring individuals involved in a teaching practice. This thoughtfulness grounded in theory is a refreshing and useful model.

The reflective process also extends to personal change through psychotherapy<sup>12,13</sup>. Of particular interest to us is the concept of universality. Universality is a concept introduced by Yalom<sup>14</sup> which he developed after leading many group therapy sessions. He indicates that ideally therapists desire that group members be comfortable sharing their innermost thoughts and feelings; that they feel safe enough to be vulnerable with relative strangers. There are several different ways to achieve this level of security within a group of people. Universality is the idea that when group members become aware of similarities between themselves and other group members, they become more comfortable and feel less alone. In knowing that there are others struggling with similar hardships, members no longer feel isolated and believe they will receive the support they need, because another group member understands what they are going through. It seems that this process occurred somewhat in the CPREE dialog groups. It is a challenge for group members to open up about their struggles, but having a comrade who can relate, the original group member’s problems become more manageable.

It is important to note that this current paper is a follow up to Harding et al.<sup>15</sup> discussion of the CPREE dialog process at Cal Poly. That paper fully explores the role of collaborative inquiry in transformation and how it was used as a foundation for the work in CPREE. This current paper builds on that analysis by adding data collected through interviews and including a perspective of personal change through professional development. In addition, this paper was written after the completion of the full two years of the project.

## CPREE reflective dialogs

The dialog meetings occurred each month for two years. We met for a two-hour period in various location around campus. We always sat in a circle without tables. There was a leader who initially called the group together and provided the logistics necessary to meet. There was also a consultant who facilitated discussions and reflected on process. About half the group had been meeting together previously, collaborating on various other projects, but the other half of the people were new to the processes of dialog. Meetings began with what we call a “check in” where participants were invited to share anything that was on their minds. This practice serves two purposes, the first is that it allows us to put aside those distractions that prevent us from being present with each other and secondarily it helps us to get to know each other on a personal level. People often said things that were quite provocative, such as a conflict in a department or a personal health struggle, but we suspended our urge to engage and practiced a kind of deep listening. We believe this practice contributes to a safe space for authentic self-reflection and change. After the check-in, we would debrief on homework. This homework was a chance for us to experiment with change or reflection in our own life. It was sometimes the case that many participants forgot about the homework and this forgetting was the topic of discussion. We then transitioned into a time of dialog, reflecting on transformation or change. Sometimes we had a volunteer describe a situation in their own life that we all could then use as a kind of case study. These processes resulted in deconstructing the underlying assumptions, paradigms, and mental models that we all take for granted. It was sometimes emotional and sometimes cognitive, but always engaging. At the end of each session we decided together the homework for the next meeting. We did not have any rules or structures about attendance or participation. We did not have a goal or anything that we had to accomplish, our only purpose was to meet and reflect together.

Two of the authors (Schlemer and Harding) of this paper were participants in the CPREE dialogs. The third author (de Greef) is a research assistant who performed the interviews and much of the data analysis. In writing the paper we decided to refer to our own participation in the activities of the CPREE community as a way to describe the process by using first person point of view. This is in contrast to our references to the research participants who we refer to in third person.

## Methodology used for interviews and coding

In order to recruit faculty for this research project we introduced the research idea during one of the last meetings of the CPREE group. A follow up email was sent to all participants (including those not attending the last meeting). From this we received 10 volunteers. They were from a mix of disciplines (Engineering and Liberal Arts) and both women and men. If the volunteers had been from

Have you personally changed in any way through your participation in CPREE?
<i>If "yes" answer</i> Please tell me about that change.
What aspect of yourself was changed?
Can you think of the conditions that allowed this change to occur?
<i>(if this wasn't expressed)</i> Have you changed anything about your classroom practices?
<i>(if this wasn't expressed)</i> Have you changed anything about your disposition as an educator?
<i>If "no" answer</i> Do you want to change?

Figure 1: Interview questions

only one discipline or gender, we would have continued to recruit. Two graduate students interviewed the faculty members. The interviews were scheduled in a way that the interviewer did not know the faculty member. The interviews were conducted in the faculty offices and were recorded using a cell phone. Faculty were asked the sequence of questions listed in Figure 1 along with demographic information (Table 1). On occasion, the interviewer asked follow-up questions for clarity. The audio recordings were transcribed using an online service (rev.com) and were reviewed for accuracy. The interviews lasted anywhere from forty-five minutes to an hour and a half. When the transcriptions were complete, researchers used the program Dedoose (dedoose.com) and an iterative inductive coding technique to identify patterns and categories. This type of narrative analysis is common in the social sciences to analyze artifacts that include text<sup>16,17,18,19</sup>. The researchers coded the transcripts individually before coming together to consolidate codes for accuracy. This was an iterative collaborative process that we realize is subjective in nature, but we feel the resulting areas of change are robust and supported by the details and wholeness of the interviews. It is also important for us to recognize that this analysis is a story of ten faculty and may not be generalizable to other populations, although we do feel others can learn from our successes and mistakes.

## Interviewees

Of the ten people interviewed, seven were from Engineering and three from Liberal Arts. Four were tenured or tenured-track and six were lecturers. All but one had been at the university for more than ten years. The one faculty who had been here two years, has several years of teaching experience at a different university.

Table 1: Demographics of interviewed participants

Participant ID	Disciplinary Field	Years at Cal Poly	Tenured, Tenure Track or Lecturer	Gender	Years in CPREE
Participant #1	Aerospace Engineering	18	Tenured	Female	1 years
Participant #2	Industrial Engineering	10	Lecturer	Female	2 years
Participant #3	Civil Engineering	20	Lecturer	Female	2 years
Participant #4	Industrial Engineering	17	Tenured	Male	2 years
Participant #5	Communications Studies	14	Lecturer	Male	1 year
Participant #6	Mechanical Engineering	21	Lecturer	Female	2 years
Participant #7	English	17	Lecturer	Female	1 year
Participant #8	Civil Engineering	10	Tenured	Male	2 years
Participant #9	English	10	Lecturer	Female	1 year
Participant #10	Mechanical Engineering	2	Tenure Track	Male	2 years

Nine of the ten faculty interviewed found CPREE dialogs pleasant and engaging. Two reported life changing dispositions that they attributed in part to participation in CPREE. The other faculty interviewed were able to point to positive changes that improved teaching. The faculty member that did not have a pleasant experience was unable to attend all the meetings and could not find another way to contribute. He also felt he was at a different place developmentally, having thought about and used reflections extensively for years. This contributed to his feeling of being isolated from the group.

## Results – Outcomes

As we looked for patterns in the changes that the faculty report we were surprised by the depth and breadth of changes. It appeared that as faculty reported self-reflection of their own teaching practices through participation in the CPREE dialogs, this led to changes in both the techniques or pedagogical decisions in the classroom and the design of the learning environment. Because of these changes it seemed to faculty that there were increases in students learning and engagement. Several faculty also reported incorporating reflective practices into their life outside of work. In Figure 2 below we present a conceptual organization of the outcomes.

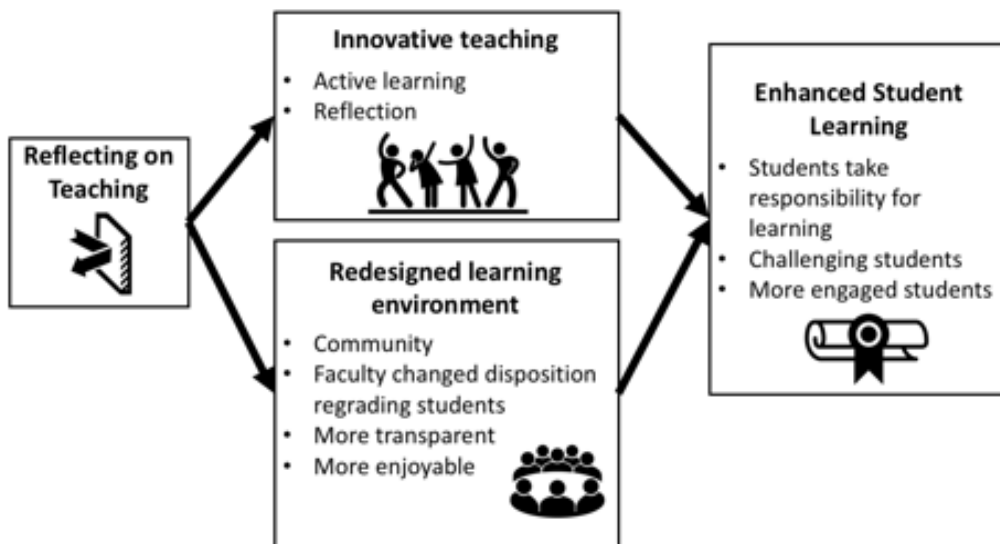


Figure 2: Outcomes reported due to participation in CPREE dialog community at Cal Poly

Below are quotes organized around the major themes identified in Figure 2. The quotes are used to illustrate the concept and do not represent a sampling. They are not a quantitative representation of the prevalence of the concept in the interviews. We have provided some context and interpretations for these quotes, but feel the excerpts speak for themselves.

### Reflecting on Teaching

Because the CPREE dialogs were centered around reflection in engineering education, most conversations within the groups had some aspect of this area of inquiry. Initially we considered how to encourage or enable students to reflect, but we quickly understood that we ourselves needed to have a reflective practice. How could we ask students to reflect if we didn't?

Often our dialog group “homework” assignments related to this. This self-reflection carried over to reflecting on the process of teaching. Within the interviews, faculty describe the process of reflecting on their own teaching as an iterative, vulnerable, and ongoing process.

*A lot of self-reflection happens in CPREE and so I would say definitely I have changed how I approach tweaking my class. I'm definitely doing more thoughtful tweaking like reflecting on how did that go? How did the students think about it? (Participant #6)*

In Participant #8's interview he described an iterative process of reflection.

*It's their reflection, it's my reflection on how I'm presenting it, and then switching, and you know try it again, different engagement mode. And then their reflection mode, “do they get it?” And then in my assessment I give it back to them, and they assess themselves, and so it's just this snowball of reflection and feedback, reflection and feedback. (Participant #8)*

This participant also points to the value of failure as a reflective moment.

*You can think you know exactly what you want to do in a class, and it can totally fall apart, but that's a good moment for reflection: How can I reach my audience again? Flip this around without feeling like ... I'm disconnected or not good enough (Participant #9)*



### **Innovative Teaching**

The self-reflective process with a group of people who were also attempting to be better educators led to a desire, confidence and ability to try more innovative and active learning techniques in the classroom. Within the community we had created, our failures were a common topic. It was refreshing to hear from faculty, who have been teaching for many years, confess a moment of failure in the classroom. This openness allowed a culture of innovation to develop.

*Identifying the common thread of reflection, CPREE has given me more confidence in exploring flexible and active learning techniques (Participant #8)*

*I still am a little panicked, like, "Oh we can't take time to do [reflections] in class, because there's so much to cover," or whatever, so I'm starting to lose that panic and realize the value of having time to articulate in your own words what you're thinking, feeling, what you learned. (Participant #2)*

*[CPREE] forced me to reflect on the active learning techniques that I was pursuing and see how it all tied together and then solidified that process for me so now .... I realize the material is actually secondary to ... the presentation mode and the engagement mode. If you cover all the material and the students walk out with 10% [or] If you cover 50% of the material [and] students walk out with 40% of that? That's a bigger success. (Participant #8)*

This participant expressed a hunger for more conversations about active learning. Our university's Center for Teaching and Learning (CTLT) is an effective resource for this.

*I would like to see that next step be "Let us see how people are doing it". How does a chemistry guy or a business girl do it? How does everybody do it? What does it look like in engineering? How do you do it? What is the practice? (Participant #7)*

Faculty were particularly energized to integrate more reflection in the classroom. This includes the faculty deeply considering the role of reflection in learning. Many of us had used reflection as a tool for reinforcing learning, but we heard from each other the various ways we thought about reflection and through this were able to consider alternative modes and methods. We grappled with questions such as, should we grade the reflection for quality or should we ask for anonymous reflections? These conversations had the effect of increasing the capacity to consider reflection in the learning process.

*I have changed my teaching to incorporate reflection where I didn't before. (Participant #3)*

*I went from using reflection as a defensive tool to get students to buy into my teaching philosophy, to more oriented toward ... developing prompts that allow them to see the model in its more fuller (sic), practical, more comprehensive way. (Participant #3)*

*I think at least it keeps me motivated to think more about reflection in my classroom (Participant #10)*

One participant referred to the conversations he had with students in class.

*When I ask questions like ... "Why are you here? Why are you in this class?" And ... I actually mean it and we actually slow down and really talk about why they're here, I've had comments [on course evaluations] like "I'm really impressed [the instructor] would even address these topics, and I got a lot out of those discussions, it made me really think about why I'm here in engineering school and dealing with all these stressful classes" (Participant #4)*



## **Redesigned Learning Environments**

In addition to innovative teaching techniques, the faculty report creating learning environments where students and faculty experience life-giving interactions in their community. Faculty are notably more transparent and thus enjoy teaching in a new way. Some started experimenting with changes in grading and attendance rules. Others considered the usefulness of lecture versus time for peer learning. One faculty began having students take walks during class to create an interruption in the habitual classroom structures.

Faculty indicate that community develops when students are free to take an active role within the learning environment. Students appear more engaged in the classroom, more excited about the



material being presented, and free to follow their passions. This included a profound change in the environment from one of competition to one of collaboration.

*Trusting them and asking them how they feel about their projects and things has made the class relationship so much better, so much more natural. People know each other's names, they understand their interests, like, "Hey, you still working on that project? I know a guy who could help you." It's more like a community at this point. (Participant #9)*

One participant referred to a change in her attendance policy which had an impact on the way students interacted.

*You can come [to class] if you want, it's up to you, and this space is a cool space because this is where you get to figure out your ideas, bounce them off of your peers, who are very critical of each other... They can take that feedback differently than other students. (Participant #9)*

In this same classroom students freely discussed their individual research topics which increased the connectedness of the students and faculty.

*People come into class now with like little snippets, like news clips and things like, "Hey did you see this? Look, I took a picture of this sign." Like there's more of a community aspect. Like someone's like, "Can we have a Facebook page for our class?" "No, but it's a nice thought." Someone wanted to do like a Twitter account for one class, just to kind of ... If you found something funny that was like bad communication, you could share it. It's like this idea that our classroom extends beyond the time we're supposed to be together is kind of cool too. (Participant #9)*

Faculty report changes in disposition regarding students. This change occurred as we listened to and challenged each other in CPREE about classroom practices. These conversations often revealed the hidden assumptions we hold about education and learning. Several times we talked about cheating and plagiarism. Some of us have very different ideas about this academic challenge and these conversations sometimes became heated. Within CPREE we had the time and space to really consider these topics in an atypical way.

This participant in the interview reflected on the learning environment that is needed for learning.

*I don't know if within a class transformation can happen, but certainly comfort, safety, freedom, not feeling like you're going to be berated or there's going to be a penalty because you do something different [is important]. (Participant #2)*

In this interview, the participant noticed her own drifting attention and connected this to her ability to understand students in a new and understanding way.

*I'm not perfect in this yet, but .... sometimes, hopefully not often, I'd be irritated with students for asking the same thing. It's like, "I just said that." Now, something has clicked in my brain, and I'm not going to be able to tell you exactly when it happened, but something has clicked in my brain, like, "Oh, yeah. I understand." They might not have been paying attention and didn't get it. They might have had their mind drift, like I'm having to re-ask you [the interviewer] the questions. It's just a normal thing. It's nothing. That's just the way it is and to move forward from that, rather than be irritated, I recognize the situation and go forward from there. (Participant #2)*

Gaining understanding of the student's challenges was something several faculty mentioned.

*I think I figured their world a little bit more, as a student, as an engineering student. Like getting to see what they feel about themselves is what I learned last quarter. We've been doing a lot more talking in the classes because I do feel more comfortable now with that context, like the pressures they're under and everything, which are enormous. (Participant #9)*

*I want to get to know the students individually, value them individually (Participant #8)*

Some indicated a real shift about who they are in the classroom. Faculty became more transparent and honest in the classroom. This led to less stress and a more enjoyable experience.

*All of these things are things I got from CPREE like it doesn't have to be [that] I turn into this other person to go in a classroom. Whereas before, I kind of wanted to hide things. I'm okay with kind of letting my freak flag fly a little bit. That's been freeing. It's been kind of nice. (Participant #9)*

*It really is less stressful for me. It isn't less work; it is less stress because I feel it is more organic. It is coming from an organic process rather than something I am imposing. If it had not come from within me, I don't know if it would become part of me. (Participant #7)*

*I'm finding that using reflective techniques makes the material much more enjoyable for me (Participant #8)*

*It's so much better. I love going to class now when we do things, where before I was like, "Oh God, today's going to be this lecture." It's all one-sided, but I ask them to tell me how they think about it (Participant #9)*



### **Enhanced student learning**

Because of the changes that faculty made in instructional techniques, they report shifts in the learning approaches of their students. Of course, these increases are from the faculty's point of view which could be different than the student point of view, but these assessments are encouraging.

Faculty were able to free up the classroom time, resulting in students taking more responsibility for their own learning. Having open discussions with peers and time to critique allowed a shift in the responsibility for learning, which in turn somehow enabled deeper learning.

*It makes me feel like I'm actually teaching them something because they're thinking for themselves. Finally, I think that I have breached the idea of what critical thinking is in technical writing for engineers. (Participant #9)*

*Now I have the confidence behind me to know, even if it bothers them, even if they're struggling, that it isn't my failure (Participant #9)*

This interviewee points to a dramatic change in the role of the teacher in the learning process.

*I don't think I can go back to being the type of teacher that is driving it, and making it move in the direction I want. I realize I have objectives to meet, but I don't think I can teach that way again ... I have transformed into this teacher that trusts them and trusts the discipline itself to take the students where they need to go, with the right preparation. (Participant #7)*

Faculty feel more confident and comfortable in challenging students on levels that go deeper than the classroom material. The shifting of responsibility allowed faculty to inquire about deeper understanding and personal connections.

*[Because of CPREE], .... I'm more equipped.... [to say to students], "well what are you going to do about it?" Instead of feeling like I need to fix it (Participant #9)*

*[Students say] "because I have to pass this class because this is a support course." Those answers just don't suffice anymore. It's like, "No, no, no, I need a deeper connection. Because if you don't know why you care, then no one's going to care." (Participant #9)*

Faculty report more engaged student learning and higher quality outcomes due to classroom engagement. Faculty also found that they themselves, were learning.

*I was really surprised with the answers [the students] came up with. I think they discovered strengths about themselves that they would not have been able to identify, had they not been asked to reflect. (Participant #7)*

*In fall and winter, I had the best reports because they cared. They were connected. They were in here in the office, excited about their interviews, like, "Look at this research I found. This is so cool." It was funny, because one girl wrote a paper about coding. She wanted to recommend to a certain professor that he emphasize this other code. She just kept getting so excited about this research she was doing with her peers. She's like, "Look at this, I interviewed this other person and talked to this professor," and would come in and report the data to me and I was learning too. (Participant #9)*

*I think that some of the reflective practices allow them to encounter the material even deeper and maybe hopefully with some lasting effects. (Participant #4)*

*I was kind of surprised at the more emotional subjective connections that people were making because they were allowed to. (Participant #9)*

*[I'm] more comfortable doing whatever it takes to convey and instill the material in the students thinking process. I get a very visceral response from the students.... And I have a lot more participation and ... it seems to just open up the possibilities of what can be, what we can do in the classroom (Participant #8)*



### **Changes in personal practice**

Participants indicated an appreciation of reflection and an increased ability to reflect on one's own life.

*[participation in CPREE] has made me think about reflection every day, in my personal life, and really in my teaching (Participant #7)*

*I'm trying to create more space in my life that I just reflect back on things, too. I've made a hair's width of progress on that, but I see the benefit (Participant #2)*

*What I'm saying is for me to be able to look at me, to be able to see what I'm doing and how other people would see me doing it, understanding then what I think isn't the only way to think. Right? That's not trivial, to be able to stand back, look at it, and look at yourself. Say, "Oh. Oh, now I understand why that other person has this reaction." (Participant #1)*



### **No change or unfavorable experience**

Two faculty members indicated that the CPREE experience was not one they cared to continue. One faculty actually felt that he came away with a negative view of others in the group.

*I'm more cautious in actually sharing my opinion with my colleagues from engineering. (Participant # 5)*

*I'm so done with CPREE..... I feel like, academically, I have one more tool in my toolbox, which is this idea that I can construct a prompt and I can give students time and space to reflect and respond to the prompt (Participant #3)*

*I thought the invitation [to CPREE indicated the group] wanted to be even better communicators and I'm a communications scholar, so I'm being invited in to possibly contribute to maybe making the engineering discipline better and stronger and maybe in exchange make me a better engineering communicator. (Participant # 5)*

*I don't think [CPREE] was as inter-collaborative as it could have been, and I think it was also not as mutually respectful as it should have been. I view a colleague in engineering as being an expert in multiple components that I know nothing about and I would like to know more about, but I'm not sure if a colleague in engineering might necessarily approach me with the same manner. (Participant # 5)*

## **Conclusions and further research**

Through this research we have documented reported changes in faculty disposition attributed to participation in the CPREE community dialogs. Some individuals reported profound changes that began with thought-provoking self-reflection. The self-reflection then led to experimenting with innovative teaching practices and creative designing of the learning environment. These classroom changes resulted in the faculty noticing deeper students learning. Faculty also reported their own increased sense of well-being in the educational process. There were two people who reported little or no change due to participation in the dialog groups.

Reflection on teaching was facilitated by the nature of the dialog groups. When faculty heard their colleagues contemplating the nature of learning or discussing failures, this led to a sense of safety which allowed for the deep consideration of the nature of learning and the assumptions in education. This created a culture of innovation where faculty are more creative and bold in experimenting in various aspects of instructions. Faculty incorporated more active learning and reflection. There was more discussion and peer learning. The learning environment was also a subject of investigation. Some faculty adjusted grading practices while others changed policies regarding attendance. All these taken together produced deeper learning for the students as reported by the faculty. Students seemed more engaged in their own discovery and more connected to each other. Faculty experienced renewed excitement and joy in the educational process.

Even though this is a small set of ten people who self-selected to report their experiences within a community dialog, we feel the results do point to outcomes that are desirable for engineering education. The interviews have also led us to think about the process of change and what is necessary for faculty development. These insights point to the next steps in this project which are to use the interviews to describe a model of change. In this model, we would like to include that there may be individuals who felt the dialog process facilitated their development, while there were others who did not.

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