



## What Can Reflections From an "Innovation in Engineering Education" Workshop Teach New Faculty?

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# What Can Reflections From an "Innovation in Engineering Education" Workshop Teach Workshop Designers and New Faculty?

## Abstract

This paper tracks and discusses the changes in written reflections of attendees at a week-long faculty development workshop on innovation in engineering education. Reflections largely dealt with the various motivations of workshop attendees and their perceptions of the workshop experience. While some concerns (e.g. time scarcity) remained constant throughout, the reflections also began displaying a greater sense of self-authorship by the mid-point of the workshop. The changing motivations and perceptions of faculty workshop attendees have direct implications for how new faculty can be prepared for professional development activities; in particular, experiences as workshop "students" can help faculty develop empathy for the students they serve as teachers. Based on our data, we present several recommendations for both faculty development professionals and new faculty members, as well as literature relevant to developing reflective practices. This paper is part of a longitudinal study on engineering faculty workshop experiences intended to inform a user-centered design approach to faculty development initiatives.

## Introduction

The importance of a user-centered design approach for learning experiences has been articulated by multiple popular pedagogical manuals. Fink's 2003 book, *Creating Significant Learning Experiences*, urges the consideration of situational factors, including learner characteristics.<sup>1</sup> Wiggins & McTighe's *Understanding by Design* depicts students as the primary clients of a client-centered practice, with success hinging on how well end-user goals are met.<sup>2</sup> Biggs & Tang<sup>3</sup> describe the highest-level teaching as realizing that "it's not what [teachers] do but what students do that's the important thing" (p. 19). In the case of faculty development workshops, taking a user-centered design approach requires an understanding of the perceptions and motivations of faculty as workshop attendees.

Current literature on faculty largely depicts them as teachers in their own classrooms; their experiences as "students" in the context of the faculty workshop "classroom" have gone largely unrecorded. The effects of faculty workshops offered by professional conferences and on-campus teaching and learning centers are typically measured with quantitative data. To complement and contextualize these numerical statistics, we need rich depictions of the qualitative "how" of the faculty attendee experience.

Understanding these experiences may enable faculty development professionals and the new faculty they serve to better prepare for and improve faculty workshops. For example, knowing

what to expect both intellectually and emotionally during workshops may make new faculty more willing to sign up for them. As another example, knowing potential motivations and preconceptions articulated by attendees from other workshops may help faculty development professionals elicit and respond to motivations and perceptions at their own workshops.

This specific paper examines how the self-described perceptions and motivations of faculty participants evolved during the course of a large week-long workshop on curricular innovation in engineering education. After explaining the perceptions and motivations that comprise our study results, we will discuss their implications for the practice of new faculty and faculty development professionals. This paper is part of a larger ongoing qualitative study of faculty workshop experiences.

### **Research Question**

The subset of the study addressed by this paper focused on the following research question: How do attendees' motivations and perceptions of a faculty workshop change during the duration of the workshop?

### **Methodological Framework**

#### *Qualitative approach*

We chose a qualitative research methods approach because our goal was to paint a detailed description of how workshop attendees articulated their experiences. Qualitative studies do not necessarily result in generalizable findings; we acknowledge that no two professional development situations are the same. However, understanding the stories of others may help readers reflect differently on their own situations.

#### *Generating data from normal workshop activities*

The faculty workshop we studied had been running in a consistent manner for several years before our research began. Since we wanted to investigate attendee motivations and perceptions of the existing workshop design, we chose to restrict our data to that generated by normal workshop activities.

A brief description of what "normal workshop activities" consisted of is helpful at this point. The workshop we studied was the week-long "Designing for Student Engagement" summer institute offered by the Collaboratory (formerly the Institute for Innovation in Engineering Education, or I2E2) at Olin College, a small, all-engineering undergraduate teaching college based in Needham, MA. The workshop is developed and facilitated by Olin faculty and has been running

under its current design since June 2011. It was based in a large open space set up as a design studio, with attendees grouped into teams that had their own table and bulletin board space. Workshop time alternated between lectures with a projector in the design studio space, team project work time in the design studio space, and small group discussions in individual classrooms throughout campus.

### *Study participant demographics*

The workshop was advertised online; attendance was voluntary, and attendees or their institutions were expected to pay a tuition charge. This research study was not initiated until after attendees had begun to register; it had no effect on the workshop advertisement and recruitment process. As part of the workshop application/sign-up process, all participants submitted a brief biographical sketch and summarized a curricular innovation or revision project that their institution was undertaking or contemplating. The workshop was designed primarily for engineering faculty, but attendees also included administrators, staff, and faculty from non-engineering disciplines such as math, biology, and entrepreneurship.

Most attendees were non-local; many were international. Of the 49 workshop attendees, 42 (85%) opted to participate in the study. Of the 7 nonconsenting participants, 6 came from international institutions; we speculate that language/culture barriers may have been factors in decisions to participate. The attendees participating in this research study displayed diversity across multiple categories: gender, age, nationality, institution size and type, and position within their institution.

### *Researcher positionality*

Because of the qualitative nature of this work, our research efforts and relationships with study participants were influenced<sup>4</sup> by our “skills, interests, needs and point of view” (p. 330). Both researchers came from a separate institution (Purdue University) which had no affiliation with designing or facilitating the workshop. One author of this paper (Mel) is an alumna of host institution Olin College and has prior relationships with workshop facilitators; the other author (Emily) was new to the Olin context and brought a fresh perspective to our work. We did not participate in the workshop; instead, we were introduced to attendees as PhD students in engineering education who were doing a project on faculty workshops. In other words, we were presented both as outside researchers and as “junior members” of their line of work, and study participants related to us as such when discussing their experiences.

### *Data collection: focusing on written attendee reflections*

Within the existing workshop activities, written reflections were the data source that most

directly addressed our research questions about faculty motivations and workshop perceptions. All attendees were given time to hand-write brief thoughts on their hopes, worries, etc. for the week at the start (Monday) and mid-point (Wednesday) of the workshop. This paper draws largely on the data from these written reflections, although ethnographic observations and group conversation data from the larger study assisted in contextualizing the results.

Monday reflection prompts were: I am here because \_\_\_\_, This week I hope to \_\_\_\_, I am worried that \_\_\_\_, and something I can do to make this week a success for me is \_\_\_\_.

Wednesday reflection prompts were: I like \_\_\_\_, I wish \_\_\_\_, I should \_\_\_\_, and I hope \_\_\_\_.

There was no similar reflection activity performed on Friday. Workshop facilitators described the purpose of the written reflection activity as "helping attendees adjust their learning trajectories for the remainder of the workshop" as opposed to being for workshop evaluation.

### *Analysis*

We began with an inductive coding method to analyze the transcribed reflections, grouping similar responses together and identifying emergent themes from within the data. This emergent approach was intended as a pilot to inform the selection of theoretical frameworks for observing faculty workshops in subsequent years.

Our unit of analysis was the faculty participants as a group, as opposed to tracking changes in an individual participant over time. Because of this approach, all participant responses for a particular day were aggregated. Handwritten reflections of study participants were transcribed and stripped of identifiers before analysis. We performed multiple iterations of the inductive coding process, member-checking informally with workshop facilitators and attendees between iterations to see whether our identified themes resonated with them.

### **Findings**

The findings we present below are the summaries and themes that met with general agreement during the member-checking process. Phrases in quotes are taken verbatim from attendee reflections.

#### *Monday reflections (workshop start)*

**I identify myself as a good teacher** who is "passionate about student learning" and wants to "improve my learning and teaching skills" to "enhance [my] students' learning experience" so they "enjoy our program as well as learn from it."

**As a “good teacher,” my job is to bring good-teaching artifacts back home so other people will change.** I want to "gain knowledge," "ideas," and "techniques" to take back as external artifacts "portable to a variety of campuses." Change happens when I take the right *things* home - - things like "tools to help in the curriculum change process" or "ways to get students doing more stuff in class." I've heard that "active learning" and "group dynamics" are examples of *things* I might pick up at the workshop.

**My implementation of these good-teaching artifacts will change my students into better students.** "I want my students to be invested in their education" and "care about my specialty" enough to "pursue further learning." Even the "quieter wallflower[s]" and the ones who "run away from the STEM fields" should be "craft[ed] into good, effective, & happy professionals" who move "away from formulaic answers towards authentic engagement."

**My higher-ups supported and sent me to [this workshop] to "learn from the trainers"** at "school" to "learn the Olin way of thinking" and "understand how Olin is achieving such success." Our disciplines may include engineering, but we also want to bring the useful artifacts to business, economics, general studies, math, physics, and science/technology studies, to name a few.

**I can't wait to meet and learn from my peers** and "interact a lot" with "future collaborators" from "different experiences and backgrounds." If I'm "willing to share my successes & failures" and "ask how they would solve problems," I can "learn what other institutions have done" and "feel the differences between engineering education in different countries." I worry about "my shyness."

**I worry we won't have enough time.** "5 days might not be enough," so I should "dedicate the time to think about the structure of our program", reserving "moment[s] to reflect on my... specific challenges but not be constantly preoccupied with them." I worry I won't be ready and "may need more practice" once I leave, because doing things "without an adequate knowledge base will result in a lot of... wasted time."

**I want to "actually change something in my home institution" and worry I'll be blocked** by the "culture" of my students, government, or nation; the "institutional requirements of teaching & assessment may compromise new approaches," and experiences may be "not relevant to my school's settings"

**I also worry I'll be inadequate and overwhelmed** by "so much info" because my situation is "quite different than others" -- are the peers I look forward to meeting *really* my peers? Will everyone else (except me) be an engineer, an education researcher, a faculty member?

**I worry about my English.** (Many responses were written in broken English, and many of these expressed concern about their language abilities.)

**I'm going to try *really* hard to be “open” and “flexible” here!** "I may not understand all activit[ies], but I will try to do it," "ask for help," and "be as active as possible." I should "not have too many expectations." If I "work very hard" to stay "focused" and "engaged," and "explain all my ideas" "even if in a first moment I disagree," maybe I'll be okay.

*Wednesday reflections (workshop midpoint)*

**I like "interact[ing] with participants from different institutions" with "similar problems"** and "seeing... how they are already dealing with that." "Working in multiple groups" exposes me "great differences in people and programs," and identifying with other attendees reassures me that I2E2 is the right place for me to have come to.

**The content is valuable.** I like "every minute of this seminar" and "the ideas presented so far." **But we're going too fast -- I need more time to "assimilate and integrate" all this!** While I like the "intensive tasks," we're "tired" and need "more time to learn about everything." We're "so busy," I feel "like a coconut in a tumultuous ocean." I "feel really rushed [in my] group" and want "more unstructured time to engage with my group." "Why does lunch have to be used for learning? [We] need down time." I also need "more time to engage in individual work" where I "don't have to engage so extensively with others" and can "spend time periodically thinking through what I can do back home based on this, very concretely." "I'm desperately trying to "write down more stuff;" "access to resources" like "more reading materials/activities" would help. In the meantime, "coffee is my friend."

**Our favorite sessions so far are** [the example Olin course called] Stuff of History, brainstorming, motivation, and course design, but we don't "see how the personas tie into this" yet.

**The format could improve.** I wish Tuesday morning had "less lecture and more group projects," and I wish we had "more discipline specific high content level examples." The focus of sessions could be more clearly explained; we "need more on why we are here."

**Standing in the shoes of an Olin student was great.** I like the "little bits of Olin" "team projects that simulate student experiences," since these let us "be like students [and] understand their view." Perhaps it'll help me in "creating courses more attractive to prospective students."

**I'm still looking for specific artifacts for changing others at home.** I like "the presentations by Olin faculty about their approaches to teaching" and the "sharing on difficulties encountered" by Olin. I want "more in-depth discussion of these practices [and] experiences" to "get more information about curriculum" from "other Olin stakeholders such as industry advisory board members, prominent alumni, [and] local employers," and want to "invite Olin faculty to my campus" and "work with Olin researchers." I hope I can "remember all the good ideas" and "share this with others at my college" to "motivate faculty" at home.

**Looking forward, I want to "stay connected to people I meet," "especially Olin [people],"** for "future projects" over the "next years." They "have the same passion of learning."

**I'm starting to shift to thinking about "working on myself" first.** "I should think about my motivation first before mak[ing] self motivation for students" and "review my programs with the goal setting framework." (Participants talk less about their fixed identities as "good teachers" who can copy-paste a translated version of Olin to their home context; they're starting to use language that suggests recognition of transfer, which requires individual synthesis and adaptation.)

**I'm beginning to think about my role once I go home at varying levels of concreteness.** I could "adapt and try some [of] these ideas" and "methodolog[ies] to our ecosystem" in a "very different program." I should "practice what I've learned as soon as possible." I hope "more people [at home] will get involved" in "discuss[ing] what learning means," and "not only for engineering students." We need to "redesign" to "develop a culture" that "understand[s] the importance of intrinsic motivation and autonomy from the student perspective" so we get "positive results and engagement of students," though metrics for that are still unclear; perhaps "better grades... in exams" could work. I need to "find a right balance between traditional... and project [based learning]."

**Discussion**

Synthesizing across workshop start and mid-point data allows us to answer the research question regarding how changes in workshop attendee perceptions and motivations unfold over time. Three patterns emerged. First, some perceptions and motivations simply remained the same. Second, other perceptions and motivations transformed, but not necessarily in a way that pointed to a transformation in the participants themselves. Finally, there was a group of perceptions and motivations that showed clear transitions towards self-authorship as a way to think about transferring workshop learning back to participants' home institutions. We present these findings in the following tables with discussion.

Table 1. Perceptions and motivations that remained the same

| <b>Workshop start</b>   | <b>Workshop mid-point</b>  |
|---|--|
| I worry about being overwhelmed and time-crunched.                                  | My worries have played out; we <i>are</i> overwhelmed and time-crunched, we're going too fast.         |
| I want to learn about specific good-teaching artifacts and practices to bring home. | Learning about specific good-teaching examples from Olin is great; we want more of that to bring home. |
| I want to connect with others.  | Connecting with others has been great; we should keep doing it, especially with Olin facilitators.     |

Time shortages are a well-known issue for faculty at all levels<sup>5</sup>, so it is unsurprising to see these concerns come up during a faculty workshop. The other two elements of the table share a mid-week focus on bringing contacts and practices specifically from the host institution. Compare this to Table 3, where self-authorship is demonstrated by both a broader focus (on institutions beyond Olin and disciplines beyond engineering) and a narrower focus (on personal



transformation).

Table 2. Perceptions and motivations that changed, but did not indicate participant transformation

| <b>Workshop start</b>   | <b>Workshop mid-point</b>   |
|---|---|
| I should participate with “openness.”   | (Originally a standalone category at the workshop start, all comments about an attitude of “openness” are twined into the themes of “connecting with others” and “being overwhelmed” at the mid-point.) |
| I want to change things back home and worry I will not be able to. My worries are general rather than specific. | I want to change things back home and worry I will not be able to. Some worries are still general, but others express concrete hopes, fears, and plans.   |
| I worry about my English proficiency.   | (Not mentioned in mid-point feedback.)  |

Table 3. Perceptions and motivations transitioning towards self-authorship as a method of transfer

| <b>Workshop start</b>   | <b>Workshop mid-point</b>  |
|---|--|
| I self-identity as a good teacher; I’m here to learn how to transform colleagues.                           | I am focusing more on “working on me” first.   |
| I want to bring home concrete artifacts from Olin so I can change my students.                              | I still want more concrete artifacts from Olin, but also have specific adaptations of my own to try. I am thinking broadly about fostering a learning environment that fits my culture rather than focusing on copying detailed classroom practices. |
| I want to apply workshop concepts to non-engineering disciplines, but I am not sure if this will be taught. | Workshop ideas are not discipline-specific; I can adapt them on my own, since they are about fostering learning environments that fit my culture.  |
| The workshop is a “school” I am attending.  | (No “school” framing is used on Wednesday.)  |

This category of themes showed participants beginning to transform their views on what their role as a faculty workshop attendee and engineering education change agent might be. Baxter-Magolda and King use the term *self-authorship* to describe the perspective we saw emerging<sup>6</sup>. At the workshop's start, participants presented their role as being "good teachers" whose job it was to "attend school" and bring home "concrete artifacts" created by an external party so that "other people" could be changed. By the week's mid-point, participants no longer referred to the workshop as a "school" and had begun articulating their responsibilities for self-authorship and self-transformation as a parallel to the cultural changes they wished to see at their home institutions. Participants still requested concrete artifacts about "good teaching" created by an external party, but this was set among comments about creating and adapting strategies of their own to fit their specific cultural context.

Based on group interviews, ethnographic observations, and informal member-checking conversations with participants, we speculate the transformations seen in this category of themes may have been strongly aided by role-switching during the workshop. When they discussed these themes, attendees spoke of -- and displayed -- "aha" moments that came from alternating between standing in the shoes of a student and experiencing someone else's curriculum in one workshop activity and then stepping back into their role as a teacher and curriculum author in the next. We hypothesize that this combination of abstract ideas and concrete experiences enabled participants to construct ways to transfer ideas to their home institutions and cultivate the empathy needed to develop a user-centric design approach to their own courses.

### **Applications and Recommendations**

#### *For faculty workshop designers*

Our main recommendation for faculty workshop designers is to include activities where attendees role-switch between the concrete experience of being a student *in* a learning situation and the more abstract experience of thinking as a teacher *about* a learning situation. Providing attendees with reflection prompts to reflect on these dual perspectives and transfer insights between them can assist in this regard. In this way, even the imperfections and constraints of faculty workshop design can be turned into opportunities for greater consciousness and learning on the part of attendees.

For example, concerns about time scarcity persisted throughout the workshop. It was discussed by attendees as a common challenge of faculty life and simultaneously experienced as a challenge of "student" life in the workshop as faculty tried to absorb the information they thought they "should" be learning. Workshop designers could draw parallels between attendees' experiences as "students" in the workshop and the hectic schedules of the students the attendees

normally teach: how did you cope when you felt overwhelmed by too much information? How did you focus on material during sessions that had many learning objectives versus a focused few?

As another example, stories by workshop facilitators about their own experiences resonated greatly with attendees. In all datasets collected for the broader study, including the written reflections analyzed in this paper, participants consistently clamored for more stories. Their comments express astonishment that others have been in similar situations and felt similar emotions; for some participants, the feeling of not being alone was sufficient to alleviate some worries. For instance, a portion of participants expressed initial concerns about transferring workshop material to non-engineering classes, then commented that hearing about and participating in specific cross-disciplinary workshop experiences had inspired them to tackle their own concerns. In addition to providing storytelling opportunities as part of workshop activities, workshop designers could once again draw parallels between attendees' experiences as "students" in the workshop and the potential for storytelling to become a classroom activity for the students that attendees normally teach: why did you benefit from this story told in this context at this time by this person? What would the parallel opportunities for storytelling be within your own course designs?

We also recommend that faculty workshop designers consider how they can assist new faculty in applying the recommendations for them that follow.

*For new faculty engaging in professional development*

**Set affective as well as intellectual expectations for your workshop experiences.** Emotions are a crucial part of the learning experience. For instance, participants often worried about fitting in with other workshop attendees and feared not being able to transfer workshop concepts back to their home institution. This was consistent across workshop attendees regardless of their level of experience. Despite having a significant fraction of seasoned professors attending the workshop, only one of our 42 written reflections did not express one or both of these anxieties. New faculty may be reassured by learning these feelings are common to experienced faculty as well.

**Watch how other faculty have engaged with workshop experiences.** Fear of the unknown is a powerful motivator for avoidance, especially when one has many other obligations to fulfill, as new faculty do. Modelling has a strong positive correlation with self-efficacy; when new faculty see other faculty go through workshops successfully, or hear stories about them doing so, they are more likely to believe they can do the same. The longitudinal study this paper belongs to will eventually develop a collection of faculty workshop experience reports that can be used for such a purpose. In the meantime, simply asking experienced colleagues and faculty development

professionals to describe their own workshop experiences may already help new faculty more concretely envision and situate a workshop within their personal development plans.

**Prepare specific strategies for engaging with other workshop attendees.** Having ideas about the possible concerns and viewpoint progressions of other workshop attendees, such as those described in tables 1-3 of this paper, may provide new faculty with conversation starters that can then alleviate the common fear of “not fitting in” and address the common desire to be found and participate in a community of like-minded teachers from different institutions.

**Deliberately practice reflection skills.** All the above recommendations can be implemented in the context of developing a deliberate reflective practice. In fact, new faculty who hone their reflective skills may find themselves surpassing experienced professors in this regard. Engineers are trained to find and execute solutions to problems, so it was no surprise that our dataset of written reflections contained a large proportion of decisions, action steps, and conclusions. However, we informally observed that the reflection statements often omitted descriptions of the events leading to their conclusions and left out the affective (emotional) aspects of the situation. Describing situations and the emotions associated with them allows reflections to be richly remembered, shared, and discussed with others, opening up opportunities for new faculty to receive spontaneous coaching from other workshop attendees. If reflective skills are found to be underdeveloped in experienced faculty, possibilities open up for reverse mentorship. New faculty who learn effective reflection skills can teach these skills to more experienced faculty who may have rich experiences to reflect on but no well-developed protocol to reflect with.

We recommend the following 4-step protocol for new faculty reflection, based on Hogan’s 1-page summary<sup>7</sup> of Spencer’s 103-page book.<sup>8</sup> The 4 steps are Situation, Affect, Interpretation, and Decision (S.A.I.D.) and can be done in under 15 minutes after a significant learning event (for example, a workshop activity or an intense teaching day). The first two steps (Situation and Affect) were the ones frequently skipped by faculty of all levels in the workshop we observed, so faculty development professionals may want to pay particular attention to demonstrating and giving feedback on those.

1. Situation - describe what happened. (Example: “The workshop leaders gave a long lecture on the importance of active learning. After 10 minutes, I noticed I wasn’t paying attention anymore and was sitting slumped in my chair, doodling in my notebook.”)
2. Affect - describe how you felt during the situation. (Example: “I was bored and restless, and felt a little guilty for not paying attention -- but it was also frustrating; I wished they would stop talking and let us get back to work!”)
3. Interpretation - analyze what happened; what sense can you make of this? (Example: “In hindsight, I realize the irony of the experience; they were showing us how our students felt when we lecture on and on instead of letting them actively learn. In fact, I’ve gotten

annoyed with students for displaying the same posture I just displayed.”)

4. Decision - what will you do differently tomorrow as a result? (Example: “I have a long lecture planned for tomorrow; my slides are already done, and I don’t feel like I can change my plans at the last minute. But maybe I can tell my students tomorrow that I realize the long lecture will be a challenge for them, and add a 1-minute stretch break every 15 minutes; I can find an extra 4 minutes of time. I’ll send an email to the teaching and learning center asking if someone could observe my class in the next few weeks; maybe they could help me think of ways to shorten my lectures while still getting the key points across.”)

For further reading, we recommend Schön's brief essay on knowing-in-action<sup>9</sup>, which defines and describes the importance of reflection for an engineering audience, as well as Boud’s discussion on how to decide which incidents to reflect upon and when.<sup>10</sup>

### **Potential Future Work**

As mentioned previously, this paper is the first output of a longitudinal study of engineering faculty workshop attendee experiences. Ethnographic observations and group interviews were collected during the workshop in addition to the dataset of written reflections analyzed here, and we plan to return for additional data collection during the Summer 2014 workshop session. Also planned is a follow-up study with the Summer 2013 cohort whose responses were analyzed in this paper; by conducting phone interviews 6-18 months after the workshop ends. The intent of the follow-up study is to see if there are additional trends in the perceptions and motivations of faculty and what aspects of their professional development experience remain poignant and/or useful after returning home. Finally, our research includes ongoing dialogue with Olin facilitators about how to improve the workshop under study. Modifications to the reflective prompts and discussions on how to open workshop materials and research findings to the public are ongoing.

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