



## **A Pedagogy of Larger Concerns: Grounding Engineering Faculty Development in Research on Teaching Conceptions**

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# Pedagogy of Larger Concerns: Grounding Engineering Faculty Development in Research on Teaching Conceptions

## *Abstract:*

This paper presents how the results of a study on teaching conceptions have come to exert both a philosophical and practical influence on the faculty development services offered at an engineering-specific teaching and learning center. The study examined the teaching conceptions of eight university professors who were recognized for their outstanding teaching. A set of concepts or elements were identified that played important roles in the teaching lives of those professors. Together, these elements form a conception of the teaching endeavor entitled a *Pedagogy of Larger Concerns* (PLC).

## *Introduction*

In research-focused universities, a lot of teaching takes place in the labs and classrooms, and much of that teaching is very well done, even excellent. This statement, however, is contrary to the numerous critiques found in the teaching and learning scholarship that are critical of the overall teaching enterprise at these research-intensive institutions. From the perspective of a faculty development professional, those critiques might be viewed as justification for the work we do, and vivid signposts for where we should concentrate our efforts. Unfortunately, they also harbor a subtle deficit-perspective trap that can influence how we view our faculty clients, how our clients view themselves, and the kinds of interactions in which faculty members and faculty developers might engage. It would be easy and natural to focus on everything that is wrong and adopt a perspective aimed at fixing all of the obvious shortcomings in the preparation for and practice of teaching in research universities. That viewpoint, however, misses much of the larger picture and places too much of the onus to change on the faculty members.

## *Background*

In 2006, the author completed a study that was aimed at shedding some light on the parts of the university teaching picture that for too long had been left in the dark: the good teaching.<sup>[1]</sup> The research was initially inspired by the disjuncture between the plethora of negative critiques of teaching in research universities and the author's personal experience as a graduate student and instructional consultant in those settings. Excellent teaching in those settings had been generally overlooked in the literature, and much of the existing research on effective teaching was focused on instructors' actions – what they did in their classrooms, rather than their thinking – what they thought they were doing.

Research efforts have been underway for much of this past century to understand variables that make up effective teaching. However, until the last few decades, most of the research focused on teachers' characteristics, learners' behaviors, and environmental factors. Cognitivist research turned our attention to understanding the mental activities of learners and the frameworks of goals, expectancies, beliefs, and values, within which cognitive activity occurs.<sup>[2]</sup> Within the cognitivist research paradigm, and to some extent the more recent neuroscience research, teaching effectiveness literature is generally focused on what students bring to their interactions with each other and how teachers might modify the learning process and context in response to

students' cognitive or brain-based needs. That research has resulted in well-supported learning theories and many excellent pedagogical models (e.g., cooperative learning, problem-based learning). Nonetheless, research on why effective teachers are able to be effective was limited. The 2006 study described here sought to explore the teaching conceptions of outstanding professors in order to improve our understanding of the basis of their effectiveness.<sup>[1]</sup> The results of that study influence how faculty development is currently practiced at the Center for Engineering Learning & Teaching (CELT) at the University of Washington. For as Christopher Clark (1995) proposed, "the mental lives of teachers are at least as important to understanding and supporting the profession as are their visible behaviors."<sup>[3]</sup>

### *Teaching conceptions*

Few researchers, instructional developers, or knowledgeable teachers would deny that cognitivist research continues to have a profound and positive effect on postsecondary teaching. However, much of the research fails to overcome old, unexamined assumptions about the teacher with regard to learning. Clearly, teachers continue to be conceived of as the embodiment of a set of pedagogical techniques, institutional policies, and content knowledge, with little consideration for teachers themselves as cognitive beings who bring their biases, values, beliefs, judgments, assumptions, and epistemologies into their work.

As our concern for research- and evidence-based teaching has increased, so must our understanding of the many forces at work that shape an individual faculty member's teaching. Research is helping us to better understand learners and learning, and we are slowly coming to the realization that faculty members themselves are learners. Faculty members' ways of knowing are bound by the same familial, cultural, and social influences as are their students'. In Fenstermacher's (1979) discussion of research on teacher effectiveness, he highlighted the problems inherent in not taking teachers' thinking into account.<sup>[4]</sup> He described two schemas "for getting from research to practice" (p. 169). The nature of those schemas, he proposed, dictated the nature of the research. In the first schema, which he termed the "conversion schema," the focus was on providing teachers with "a rule or precept," and the nature of the research was to find causality or correlations between what teachers do and their students' behaviors. Fenstermacher found that this schema (and its associated research) "fails because of the way the knowledge it yields is used" (p. 169). Using the conversion schema philosophy, effective teachers would be those who simply followed the pedagogical rules. The second schema was the "transformation schema." He proposed that "the purpose of presenting the results of research as evidence is to encourage the transformation of teachers' beliefs from being subjectively to objectively reasonable" (p. 169). He proposed the following:

If the transformation schema were to be adopted as a guide to how teachers may benefit from research on teaching, then the character of this research would have to be altered...The researchers' attention would turn to the subjectively reasonable beliefs that teachers hold. An examination of these beliefs and the study of evidence bearing upon them would become the initiating focus for teacher effectiveness research. (p. 169)

Research has shown that teachers' actions are closely related to their individual beliefs and assumptions about who their students are (or should be), how students should learn, what

knowledge is, how knowledge is constructed and by whom, who controls knowledge, and what their roles are as teachers.<sup>[5, 6, 7, 8,9, 10]</sup> The assumptions they hold regarding these questions are outcomes and reflections of their individual epistemological conceptions. Those conceptions play such significant parts in the construction of faculty members' conceptions of teaching that it is now acknowledged that attempts at improving teaching effectiveness must take these individual conceptions into account.<sup>[5, 11, 9]</sup>

Research into conceptions of teaching<sup>[e.g. 7, 11, 12, 13]</sup> are important exceptions to the norm in teaching-effectiveness research. From this research have come much better understandings of the possible effects of teachers' ways of knowing, prior knowledge, motives, values, and beliefs on their teaching practices. The study described in the following section extended this important category of research.

### *Research resulting in a Pedagogy of Larger Concerns*

The study was grounded by two hypotheses: that faculty members in research universities hold teaching conceptions that have a priori effect on their teaching, and that effective teachers in those settings are learner/learning-centered. Eight professors (cases) from different disciplines who had been identified as exceptional teachers were selected for the study. The research was not intended to highlight the effective actions of those professors, as there are many studies that focus on teaching in higher education.<sup>[14]</sup> By selecting professors who had already proven their teaching effectiveness, the study could concentrate on developing a better understanding of what those effective teachers were thinking.

Since the research was intended to explore the individual conceptions that faculty members bring into their teaching, a phenomenographic multi-case methodology was chosen. Phenomenography research is intended to study the various meanings that individuals assign to a similar experienced phenomenon in order to discern the essence of the phenomenon in light of multiple possible meanings.<sup>[15, 16, 17]</sup> In this type of qualitative research the intent is to capture a participant's firsthand account and interpret that data from the perspective of the participant—a second-order perspective. This is different from the goal of most other conventional research that relies upon the researcher's first-order perspective for data analysis.<sup>[18]</sup> A second-order perspective is a precarious position to identify and sustain, and it was important that the researcher maintain an awareness of that perspective throughout the conduct of the study so that data interpretations, which are the researcher's first-order accounts, were not conflated with participants' first-hand accounts.

The research was designed to mitigate the effects of the prior knowledge and ways of knowing of the researcher by first asking the participants to provide reflective narratives of teaching experience. Those narratives were open-ended and intended to give the participants an opportunity to think about and articulate aspects of their teaching lives that they believed were most important. Second-order perspective statements and explanations were drawn from the narratives, and interview protocols were developed that were unique to each individual. During the following interviews, participants were asked to read and respond to the second-order statements. That process provided member checks that helped to clarify and explicate the individual second-order perspectives. Each participant was asked questions that were derived from an analysis of that participant's reflective narrative, as well as a set of common questions

that were modified with regard to their individual narratives. Each participant was interviewed twice, with a goal of clarifying second-order perspective accounts. Member checks were used throughout the study to help retain the integrity of their accounts and to provide the necessary individualized focus.

Two types of complementary data analyses were used: descriptive and interpretive. These were consistent with Philippsen’s (1982) description of qualitative case studies as consisting of “two interdependent levels, qualitative description and qualitative abstraction” (p. 6),<sup>[19]</sup> both of which are necessary if a reliable cross-case comparison is performed. The descriptive analyses were done case by case and were focused on developing rich, second-order understandings of individual participants’ conceptions—what Ashworth and Lucas (2000) termed “lifeworlds.”<sup>[20]</sup> Those lifeworlds became the essence of each individual case and provided another opportunity for member checks to be performed. Individual case findings were also developed from the descriptive analysis. The second analysis was interpretive and comparative across all eight data sets and was intended to find important categories and themes that cut across multiple cases. Findings from the second analysis were compared for consistency with participants’ second-order perspective statements and resulted in the development of a set of elements entitled a *Pedagogy of Larger Concerns (PLC)*.<sup>[1]</sup>

### *A Pedagogy of Larger Concerns*

A common thread in the data that linked each of the eight effective professors was that they conceived of their teaching as being both driven by and substantiating a set of fundamental human interests. Those professors were effective because they understood the enormity, the seriousness, and the meaningfulness of the teaching endeavor. Table 1 provides an inventory and short explanations of the teaching conceptions that grounded their teaching. Altogether, those conceptions form a PLC, a cohesive approach to teaching that is overwhelmingly learner/learning-centered.

Table 1. Five teaching conceptions of a Pedagogy of Larger Concerns.

Conceptions forming a PLC	Definition/Explanation
1. Teacher’s power is leavened with responsibility.	Teaching decisions and actions are guided by knowledge of the effects teachers can have on students’ current and future success.
2. Students are synonymous with a positive vision of future.	Teachers recognize their students’ potential to do good in the world and strive to enable that potential.
3. Learning to learn takes precedence.	Teachers understand that a primary goal of education is to empower students by helping them to become expert learners.
4. Teachers are essential to student learning.	Teachers view their role as being and doing the things that eventually students will learn to be and do themselves. Teachers model a passion for knowing and demonstrate how knowledge is acquired. Teachers create and guide students to informative experience and then facilitate ways to reflect on experience to make it meaningful.

5. New learning fits to the student's lifetime of learning.	Teachers recognize that they have a small (albeit important) role to play in each student's lengthy process of learning and development. This awareness helps them to take into account their students' pasts and futures.
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The PLC conceptions were drawn from research on a group of professors who were already recognized for their outstanding teaching. It is the author's contention that focusing on that group simply made it easier to identify the conceptions that comprise a PLC, and that various combinations of those five teaching conceptions can be found throughout the faculty in research universities, regardless of discipline, the level of a professor's experience, or the teaching culture in a department. A study of 55 faculty members at a research university by Beyer et al. (2013) helps to support that contention.<sup>[21]</sup> That study focused on the reasons why faculty members chose to improve their teaching, and several conceptions were identified that were similar to PLC conceptions. The study included faculty members who were randomly selected, as well as faculty members who were known to be thoughtful or effective teachers, including nine who had received teaching awards. Among their findings, the researchers reported that many faculty members had a "desire to give something to their students that went beyond the boundaries of the particular courses they were teaching" (p. 58). The importance of helping their students learn how to learn, preparing their students to have impactful lives, and possessing positive perspectives of their students and what they could achieve were findings that parallel PLC conceptions and help to demonstrate how widespread those conceptions may be.

Some of the PLC conceptions may have found their spark in a professor's earlier student experience when the joy of learning was discovered, or they may have originated along with a professor's commitment to a career in knowledge-making, or they may have taken root while teaching when they witnessed a student's transformation from an uncomprehending state to a knowledgeable state. For the eight professors in the study, their conceptions came from a variety of sources including those just mentioned, but building and sustaining a PLC involved several factors, shown in Table 2, that were common to all of the professors.

Table 2. Six of the factors necessary to build and sustain a PLC

Building and sustaining a PLC	Definition/Explanation
1. Teaching is a personal choice and commitment.	Teaching poorly was understood as being incompatible to achieving a long academic career. However, the autonomy built into the job provides the flexibility to decide just how good a teacher to become.
2. Work ethic as core to teaching	No academic in a research university expects to advance professionally as researchers by working normal 40-hour work weeks. A commitment to both research and teaching is understood as a commitment to even more work.
3. Teachers get as much as their students.	Teachers understand that even though teaching is a caring profession, it is not a selfless profession, and the more effective they are at promoting learning, the more personally fulfilling teaching becomes.

4. Effective teaching has a reflective foundation.	Teachers understand that there are important lessons to be learned by examining past experiences as both students and teachers, and this provides an essential tool for drawing meaning from current experiences and for making teaching decisions.
5. Maintaining a metacognitive awareness of students' learning	Developing the ability to stay attuned to their students and recognize whether learning was happening, even while in the act of teaching, is understood as essential to making just-in-time adjustments and taking advantage of opportunities to improve learning.
6. Collegial support is important.	Teaching can seem like a solitary and isolating activity at times, so opportunities to discuss teaching concerns and plans with colleagues can be essential to building a professional attitude toward teaching.

### *Implications for faculty development*

From its inception, faculty development at the Center for Engineering Learning & Teaching (CELT) has focused on promoting the best research-based teaching practices, but as Felder et al. (2011) pointed out in their review of engineering teaching and learning centers, there are other important elements to consider when planning faculty development activities.<sup>[22]</sup> Those elements range from offering individualized consulting services to presenting teaching workshops to groups of faculty members. They also vary with regard to how much faculty interacts with knowledgeable faculty-development professionals or are mentored in some way by colleagues. Additionally, faculty development can be differentiated by whether it is discipline specific or campus wide, voluntary or mandatory, focused on faculty and/or graduate teaching assistants, or by the issues it is intended to address (e.g., promoting active learning, imbedding educational technology, supporting student diversity). Each of these elements, and others, should be considered when designing a cohesive faculty development program.

The design of faculty development services at CELT is grounded in an assumption that the learner/learning-centeredness of PLC conceptions is present in the engineering faculty. There is no down-side to this assumption, since learning or human development theories and research-supported best teaching practices are fundamentally learner/learning-centered. This assumption, however, is tempered by the knowledge that the multiple responsibilities and commitments in an academic's life can affect the efficacy of those conceptions. As such, determining the extent to which an individual faculty member is or is not learner/learning-centered is important for providing appropriate advice and support. Our approach, then, uses the Wulff et al. (2005) alignment model that acknowledges the complexity of teaching in higher education and "suggests that for teachers to be effective in achieving learning goals, they must engage in an ongoing process of aligning the content, themselves, and students in a specific context" (p. 4). Our faculty development services are primarily focused on individual consultations and an array of complementary methods that help to build alignment, strengthen our faculty members' existing learner/learning-centeredness, enable the development and spread of those tendencies, and show how making improvements in teaching practice is both achievable and PLC affirming.

Below is a description of a few of those faculty development services and interactions with engineering faculty members that correspond with a PLC.

*Overall approach:* To enact the five PLC conceptions shown in Table 1, we decided that our services should (a) help both faculty members and their students to develop an understanding of how learning happens, in order to enable alignment and promote the development of self-regulated learners; (b) help faculty members to collect and use appropriate information to develop a better understanding of how their students were experiencing their courses; (c) help faculty members to utilize more contextualized understanding of their courses and students in the development of classroom activities that build alignment and promote better learning; (d) provide opportunities for students to experience the positive effects of their assessment feedback on their own learning, and with those experiences, to accept more responsibility for their learning; and (e) help faculty members to see that making teaching and course improvements is manageable and beneficial. Additionally, we decided that our faculty development efforts would be more successful if the six elements described in Table 2 were taken into account.

*Individual consultations:* Whether to engage in faculty development services offered at our center is a choice that individual faculty members get to make. By providing services that initially required minimal commitment of their time and demonstrated improvement fairly quickly, it was usually straightforward for faculty to commit to continuing involvement with our center. Our instructional consultant has averaged over 42 consultation clients per quarter during the last three academic years (fall to spring quarters). On average, 80% of those clients had previously worked with our instructional consultant. Our approach addresses the notion that *teaching is a personal choice* and allows each faculty client to make a preliminary commitment with which they are comfortable. An initial consultation meeting allows for our consultant to determine a client's needs and to suggest an appropriate course of action. When a client has a problem that must be addressed immediately, the course of action is usually clear, which is to advise them on how to make a suitable change or to implement a new or better instructional technique. Oftentimes that advice is accompanied with a suggestion to allow the consultant to conduct a classroom observation or some other type of formative assessment in order to determine the effectiveness of the change and/or to guide further improvement.

It is often the case that the emergency-type problems are related to fundamental misalignments, such as the professor mistakenly assuming that students possess sufficient prerequisite knowledge when first coming into a course, or that the students understand the professor's expectations for course assignments, or that they know how to participate well in groups. These types of misalignments may manifest as poor performance on exams or homework, or lack of engagement in class. The professor may interpret those situations as a lack of effort or interest from the students, or may simply be at a loss to explain what is happening. Some type of just-in-time formative assessment is usually called for in those cases.

*Classroom observations:* When a professor requests help in improving presentation skills or interaction with students, one or more classroom observations are often an appropriate starting intervention. The observation results in two types of data: descriptions of what took place in the classroom, and the observer's questions and impressions about what took place. The observation report becomes the basis for post-observation consultations wherein the professor's intentions are discussed in relation to what was observed. The post-observation conversations have several



purposes, including helping professors reflect on specific teaching decisions they made and relate them to their impact; helping professors make teaching decisions based on more objective understandings of their students and course contexts; modelling metacognitive considerations for the professor; and highlighting aspects of the class to which they should be paying attention.

*Mid-term classroom assessments:* One of the most effective services we offer engineering faculty members is our classroom assessment process. The process begins with an initial consultation with a professor and preparatory examination of course syllabi and other materials. The consultant then conducts a specific focus-group assessment called a Small Group Instructional Diagnosis (SGID) in a class session during the mid-part of a term. The SGID takes 20 to 30 minutes of class time (depending on the number of students). Half of the time, the students are in small groups discussing aspects of the course that are helping them learn and areas for improvement. The students are asked to only list the items on which their entire group agrees. The other half of the time is used as a whole-class discussion of issues that each group listed. Each issue is discussed, and the students are polled to determine areas of consensus. Each of the group sheets are collected, as well as the consultant's notes on whole-class consensus items.

The feedback data is coded, transcribed, and entered into a computer database, and a report is produced. The entire process from collecting the data to producing a report is usually completed within one day. The professor is then contacted, and a meeting is set up to go through the report and discuss appropriate responses. Our center currently conducts over 40 of these assessments during a two or three-week time span every term. The short turn-around time is important, because it provides an opportunity for the professor to use the data to guide appropriate improvements during the term so that the students can benefit from the feedback they provided.

This mid-term assessment process reflects and reinforces a PLC in several ways. The post-SGID meeting with the consultant provides multiple opportunities for reflection using consensus data that is more targeted and less contradictory or ambiguous than is often the case with qualitative feedback from individual students. The coding of the feedback enables reports that present data in categories and in charts that are similar to data representations with which research faculty (especially in engineering) are more familiar, moderating much of the difficulty they may have previously had interpreting student qualitative feedback. Since some of the data gathered in this process is focused on things that are helping students learn, it can be very encouraging and affirming for the professor. It is also easier to accept and take feedback seriously that is perceived as more balanced and thoughtful. The thoughtfulness of the students' comments and suggestions can improve a professor's attitudes toward and future interactions with students.

The timing of the assessment and post-SGID meeting allows the consultant to suggest improvements that can be implemented in a short timeframe and can have positive effects on the students. The professor is encouraged to go back to the students and thank them for their feedback and discuss any planned changes. Those discussions with their students are often the only experiences that students have wherein they see the direct connection between their feedback and their experience in a course. They recognize that they can have a voice in their own educations and that if they are thoughtful, reasonable, and articulate, they can have a positive impact on their learning. The discussions are also often the first opportunities they have to talk about those issues with their professors, and that can improve rapport and lead to further

formative collaborations. Each term, several of our SGID clients request that our consultant conduct a follow-up session with their students. The session is called a Last Class Interview (LCI) and is intended to collect students' feedback on any course or teaching improvements that were initiated by their mid-quarter feedback. A general question that is always asked during the LCI is whether the students noticed a positive improvement in the course that they related to the feedback they provided at mid-quarter. To date over 94% of over 5,200 students in 162 courses reported improvement that was initiated by their feedback.

The process as a whole reinforces PLC considerations and builds the alignment mentioned previously; it improves both professor and student experiences in a course, it makes learning and teaching more enjoyable and more successful, it provides several reflection points for both students and their professor, it helps students develop more awareness of learning, it creates opportunities for poignant conversations between a professor and students, and it often results in the professor's commitment to an on-going improvement process. The coding process and database produces more informative and actionable data, and each time an assessment is conducted, a longitudinal report can be produced that shows some of the impact of past improvements, providing a better basis for reflection.

### *Conclusion*

Faculty development centers exist because too few faculty members in higher education had adequate formal training or professional development as teachers prior to being placed in teaching positions. However, faculty members have a great deal of on-going experience in education upon which they can reflect and make improvements in their teaching and courses. On the whole, they also care a lot about learning and learners, and those positive tendencies can be nurtured with the right kinds of support and resources. The context of research universities is such that faculty members have a great deal of autonomy to choose to improve their teaching or not, but their choices will always be grounded and sustained in their experientially derived conceptions of teaching. If our goal is to increase the numbers of effective teachers on engineering faculties, then we must devise means for those teachers to understand their own conceptions, to ask themselves why they do what they do, and to consider who their endeavors are intended to serve. Engineering faculty members should consistently be presented with opportunities to reexamine their teaching experiences and intentions, and to find their own pedagogy of larger concerns.

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