

# 10

## Threshold Concepts of Teaching and Learning that Transform Faculty Practice (and the Limits of Individual Change)

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### The Lightbulb Problem

How many ideas does it take to change a professor's teaching practices? How many professors have to change in order to improve student learning across a curriculum? Faculty-centered pedagogical change has guided curriculum transformation for the past thirty years, at least since "the age of the faculty developer" of the 1980s met the "age of the learner" in the 1990s.<sup>1</sup> Teaching centers and faculty development efforts have largely pivoted on the evangelical belief that if you can get professors to change the way they conceptualize the relationship between their teaching and student learning, then their course designs and teaching practices will change—and student learning will improve. This paradigm of individual change implies a theory of overall curriculum transformation that is premised on the eventual mass conversion of the faculty—or at least enough to get to a tipping point—to change the curriculum and the very culture of higher education. It has been a reasonable and mostly all-consuming hypothesis.

We are both directors of centers for teaching and learning who have been working within this paradigm of individual change for a long time (about fifty years combined, mostly in research universities). We have seen the effectiveness of this approach and have learned a great deal about how and when this approach is effective, and we spend most of this chapter exploring what we have found to be the most effective concepts and approaches at the heart of the faculty change strategy. We divide our discussion into two related parts: (1) approaches that start with research and theory about

learning and (2) strategies that start with expert thinking and disciplinary practices. Both belong to the learning paradigm and are learning-centered approaches; and both, in different ways, open up a spectrum of learning that moves beyond the cognitive to include the fullness of what we think of as *embodied* approaches to learning (our variant term for what is more widely called engaged learning).<sup>2</sup> Although not the only ways to go about effective faculty development, these are, we believe, emblematic of approaches that characterize the best of the current state of the faculty change paradigm.

However, we want to conclude then by asking, are they enough to transform the academy? If the goal is to put transformative learning at the center of higher education, will that ever be achievable through strategies that depend on enough professors having a lightbulb moment about student learning? By framing the question this way, we adamantly do not mean to villainize or pathologize faculty attitudes and practices. Of course, there is resistance on every campus. But we believe that the limits of the faculty change model are likely rooted more in the system of higher education and the way environmental pressures ultimately trump individual traits and motivations. Yet, in addition to the considerable pragmatic environmental factors, we wonder also if there is not something intrinsic to the *learning* paradigm itself that points beyond the faculty change paradigm. Is there perhaps a fundamental incongruence between change strategies focused on individual faculty (and often bounded courses) and approaches to teaching and learning that in their very core concepts lead beyond individual courses to programmatic goals, beyond the formal curriculum to cocurricular and experiential learning, and beyond a narrow gage of cognitive development to a more integrative embrace of affect and metacognition? If so, then a turn to a more structural approach to change is inevitable. However, such a shift should be guided by the best principles, or *threshold concepts*, that have driven the faculty change model over the past thirty years. This is what we want to explore before returning to the question of limits of individual change.

## Threshold Concepts of Teaching and Learning

In order to explore this set of questions about what it takes for faculty to see their teaching—and student learning—differently, we want to co-opt the idea of threshold concepts. Threshold concepts are typically employed as a means for analyzing the relationship between the epistemologies of their disciplines (or interdisciplines) and strategies for making those essential ways of thinking visible and accessible to their students.<sup>3</sup> According to the original essay by Meyer and Land,

a threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress. As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape, or even world view. This transformation may be sudden or it may be protracted over a considerable period of time, with the transition to understanding proving troublesome. Such a transformed view or landscape may represent how people “think” in a particular discipline, or how they perceive, apprehend, or experience particular phenomena within that discipline (or more generally). It might, of course, be argued, in a critical sense, that such transformed understanding leads to a privileged or dominant view and therefore a contestable way of understanding something.<sup>4</sup>

Although later in this chapter we talk about threshold concepts as a way of conceptualizing how students encounter disciplinary knowledge in courses, here we want to turn the idea of threshold concepts onto the subject of teaching and learning, and faculty change, itself. That is, we want to use threshold concepts in a more self-reflexive way and ask: What are the fundamental, integrative concepts at the heart of transformative pedagogy? What is it that faculty need to understand about teaching and learning in order to have a “transformed view” of the pedagogical landscape? Just as teaching designs in any given discipline should be tailored to helping students negotiate these thresholds, we believe the heart of faculty change has to begin with methods that help faculty approach these thresholds. Are there a few threshold concepts of teaching as a practice that are responsive to transformative student learning?

Consider the three great questions of teaching: What do I want my students to learn? How will I create an environment where they are most likely to learn that? How will they and I know whether or not they have achieved? Coming out of traditional graduate programs, most faculty are pretty well prepared for the first question, a little bit prepared for the third, but not well prepared at all for the second. If there are threshold concepts for teaching, then recognizing that second question as worthy of ongoing inquiry is certainly the first important threshold concept: recognizing the complexity of what Lee Shulman named “pedagogical content knowledge,” the body of knowledge that helps teachers understand the best ways to organize, adapt, and represent knowledge in a given domain. Pedagogical content knowledge constitutes the boundary zone between our knowledge about learning and the constructs and practices of any given discipline or profession. It implies dissolution of the artificial division between content and ways to teach content; and it stands as the first

order of threshold concepts about teaching and learning. It also opens the door to both approaches to faculty change we want to address: theory-driven approaches (connecting research on human learning to student learning) and practice-driven approaches (connecting disciplinary epistemologies and expert *practice* to student learning).

### Approaches Driven by Learning Theory and Research

In 1996, the Searle Center for Teaching Excellence at Northwestern University initiated a year-long program to help both junior and senior faculty members explore the research and theoretical literature on human learning and incorporate some of the implications of that literature into their teaching practices. Four years ago, the Research Academy for University Learning (RAUL) at Montclair State University initiated its own considerably expanded version of that program, called the Engaged Teaching Fellows Program. For the 2010–2011 academic year, more than sixty Montclair faculty members sought admission into the program, and twenty-four were selected to participate, half tenured and half within their first five years on the faculty. In late August 2010, the participants met for three full days of highly interactive workshops and discussions, with follow-up sessions scheduled for November, January, and March. Between the formal sessions, the fellows maintained Internet contact with each other and with the director of RAUL while working on the revision of a single course.

While the faculty participants explored a variety of ideas from the research and theoretical literature, three fundamental concepts (or threshold concepts) stood at the heart of their explorations and subsequent course revisions: (1) Humans construct knowledge rather than receive it. (2) Extrinsic rewards such as grades can have the effect of reducing interest and the likelihood that students will take a deep rather than a strategic or surface approach to their learning. (3) Major social forces such as what Claude Steele calls stereotype threat can shape the learning and academic performance of students.<sup>5</sup> Let's explore each of these ideas briefly and see how they changed traditional approaches to teaching and learning.

One of the prevailing notions about teaching and learning in many disciplines is the implicit assumption that if people encounter the key facts of any area of study, they will learn. Thus, teaching in those traditional classrooms often consisted of the delivery of information, which students were expected to transcribe into their notes, subsequently study and memorize, and reproduce on an examination (or in some cases, merely recognize a correct answer on a multiple-choice examination). Over the last fifty years,

a variety of research and theoretical work has produced a different model of learning that calls for greatly different pedagogical practices.

In that revised model, humans construct a sense of reality and then use those constructions to understand new sensory input. Students do not arrive in class as blank slates ready to absorb whatever the professor may say. Rather, they arrive with an array of mental models of the world, and they use those models to understand everything they encounter, including the lectures they hear, the textbooks they read, and any experiments they may do. Thus, their preexisting models will often have more influence on their ultimate understanding than will anything they encounter in the course. In physics, that may mean students arrive with a pre-Newtonian concept of motion and leave with that same idea, and the difference between the top students and those who score lower is largely determined by how many formulas they can memorize rather than any conceptual understanding. In history, students often arrive with the notion that all societies in all of time operate pretty much the way they think their own world works, and they will take those ideas and try to wrap fifth-century Greece or nineteenth-century United States around them.

### **Natural Critical Learning Environments**

After an exploration of this initial concept and the research and theoretical literature that supports it, faculty members in the Engaged Teaching Fellows Program begin to devise learning environments (what the program calls natural critical learning environments) that will challenge existing constructions.<sup>6</sup> In broad terms, this means identifying the key paradigms that students are likely to bring to the study of the subject and creating compelling intellectual challenges to those concepts. This process often means faculty members will be exploring ways to put their students in situations in which their existing models will not work, an environment that the program calls “expectation failures.” All faculty design their teaching in some form to do this implicitly, and we build on their current practices. What we emphasize in the program is how course designs might more deliberately take into account the prior conceptions students bring to a course, and how faculty might do more to elicit those conceptions and make use of them in setting the agenda for the course; this also allows us to discuss how creating a natural critical learning environment depends on the alignment of many aspects of course design, including thinking about how course elements might work together or at cross-purposes.

One of these elements that can work at cross-purposes is assessment and grading, the extrinsic system of rewards and punishments that has considerable influence on how students approach learning. Beginning in a

series of studies in Europe in the 1970s, researchers identified three broad approaches that university students take to learning. Some students take what the literature calls a surface approach, simply trying to replicate everything they encounter. Within such an approach, students memorize, regurgitate on an examination or paper, and then purge their minds. Others take a strategic approach, driven largely by the desire for higher grades. Such students seldom become risk takers, fearful that any extra intellectual explorations will jeopardize their grade point averages, and they seldom become adaptive in their expertise, able to transfer their knowledge to novel conditions. Only those who take a deep approach are likely to learn conceptually. Learners who take a surface approach are often driven by fear, expediency, and the desire simply to survive the academic experience; strategic learners, although they value learning, are often driven by recognition for their successes (in the form of higher grades). Only the learners who are more likely to take a deeper approach, so the research and theoretical literature suggest, will pursue the meaning behind the text and think about implications and applications of ideas.

Participants in the Engaged Teaching Fellows Program encounter this literature as well as the research literature on extrinsic and intrinsic motivation. That literature explores the positive and negative effects extrinsic rewards can have on fundamental interest, including the finding that if humans feel manipulated by an extrinsic reward, often their intrinsic interest will decrease. The fellows explore that literature and the possible influences that grades and appeals to grades can have on interest and on the kinds of approaches students are likely to take to their studies. How might assessment and grades be used in order to increase the chances that students will take a deep approach to their learning? Such questions lead the fellows to consider the implications of the following: Are humans most likely to take a deep approach to their learning when they are trying to answer questions or solve problems that each individual learner regards as important, intriguing, or just beautiful? If so, how do we reform a traditional educational environment in which learners are seldom in charge of the questions? How could the use of grades be better integrated with the conditions that might lead to a deeper approach to learning? Perhaps the key threshold concept here for faculty is that grades can be a driver for a deeper approach but only under certain conditions, conditions that may require rethinking of certain pedagogical practices, such as making more use of formative assessment; allowing independent goal setting; raising the challenge level of performance assessments (and supporting that higher bar); and making more room for questioning, uncertainty, and risk taking.

Finally, the fellows explore a body of literature that began to emerge in the 1980s and 1990s about the influence of social forces on the learning

of university students. Much of that consideration focuses on a phenomenon that psychologists Claude Steele and Joshua Aronson dubbed *stereotype threat* and *stereotype vulnerability*. Steele, Aronson, and now a whole host of others have found that anyone who is a member of a social group about which there is a widespread negative social stereotype will likely feel the sting of that social notion even if he or she personally rejects that stereotype.<sup>7</sup> The research the fellows explore suggests that such an influence occurs because, at minimum, the targets of the negative image resent, sometimes on a subconscious level, that anyone might think of them in terms of that negative stereotype. As fellows in the program begin to explore the implications of that research, they also begin to consider these central questions: Who is learning within my class and who is not, and are there demographic patterns in that learning that stem from broader social forces such as stereotype threat? If so, how can an educator respond to those forces?

### The Promising Syllabus

The upshot of all these considerations (and the exploration of other ideas from the research and theoretical literature) is the creation of something the program calls a *promising syllabus*, which is more than the pieces of paper distributed to students on the first day of class—it is a whole new way of conceptualizing and organizing a class. The contours of that kind of revolutionary syllabus first began to appear in the study of university teachers who were having enormous success in fostering deep approaches to learning.<sup>8</sup> In broad terms, it contains three parts: (1) the promise<sup>9</sup> or invitation, usually conveyed in a story that raises a central and compelling question; (2) an explanation of what the students will be doing that will help them achieve that promise, accept that invitation; and (3) the beginning of a conversation between teacher and students about how both will come to understand the nature and the progress of the students' learning.

The emphasis of this approach is on intrinsic appeals, on giving students a strong sense of control over their own education, on raising questions or problems that will capture the students' interests. With that syllabus, the fellows attempt to create their own version of a natural critical learning environment, weighing the implications of the research and theoretical literature.<sup>10</sup> Many of those new courses will contain some of the changes already implied as well as incorporate experiences for students that go outside the classroom and include elements of service learning or fieldwork, opportunities for students to explore questions and problems in both an academic and extracurricular setting.

The threshold concepts implied in this process have impact on three significant areas of faculty practice: planning, execution, and evaluation. Faculty begin their planning not with questions about what they will do or “cover” in the course, but with explorations of what paradigms students are likely to bring to the course and how the course might challenge those paradigms, helping students see the problems they face in believing whatever they may believe. The planning deliberately attempts to foster deep approaches to learning rather than the vague notion of “learning the material,” and it raises important epistemological questions about the nature of knowing within any discipline and across disciplines.

It also means that faculty must often move outside their own disciplines in preparing the class, recognizing that most disciplines and most graduate programs do not provide the scholar with any research-based insights into what conditions are most likely to foster certain intellectual outcomes. In some cases, that approach simply means, for example, that faculty abandon the notion that students must be marched up Bloom’s taxonomy of cognitive abilities (whether faculty are familiar with Bloom’s famous taxonomy or not), learning to recall the material before they can ever analyze, synthesize, and evaluate. In place of that notion emerges an integrative rather than a linear approach to learning in which students become engaged in mastering all levels of cognitive activity simultaneously.

As fellows begin to consider questions of evaluation, they focus increasingly on formative evaluation, on helping students improve their work long before any summative judgments (the final grade) are made about their efforts. Such an approach to evaluation also means faculty plan activities to help students understand and adopt the criteria of the class and discipline as they attempt to join a new community of knowledgeable peers. It means they help students develop the ability to judge their own work and move as much as possible, and for as many students as possible, from extrinsic to intrinsic motivation.

Part of that reconsideration of evaluation means, of course, that faculty rethink how they might bring students into the grading process. In the course of doing so, they consider several broad questions about grades: What does the grade represent in terms of intellectual, physical, emotional, professional, or any other kind of ability? (What can the A student do that the B student cannot do?) Does the grade represent where students are in reference to a standard, each other, or themselves? What are the implications for the learning environment in answering this question? Does the grade represent where students are in their abilities at the end of the class, or is it a compilation of where they have been during the course of the term?

Classes that invite students to an enterprise that is “bigger than the class itself,” to something that has immediate significance outside the



confines of the course, seem to have the greatest influence on both students' approaches to the learning and their satisfaction with their learning and the educational experience. Although it is impossible to generalize, in such classes, students are more likely to take a deeper approach to their studies by becoming engrossed in the pursuit of big questions and projects. Retention rates are higher in those classes, but more important, students are more likely to understand conceptually, to think about implications and applications, and the entire experience is likely to have a sustained, substantial, and positive influence on how they will subsequently think, act, and feel.

### Approaches Driven by Expert Thinking and Disciplinary Practice

The deep learning approaches just described speak to a way of thinking about teaching that echoes the exhortation from Michael Wesch that "We are not teaching subjects, but subjectivities."<sup>11</sup> Creating critical learning environments that emphasize teaching "subjectivities" rather than subjects is not intended to diminish the importance of content but to return content to the larger context of form and process where it originated: in the fullness of thought and action, belonging to fields of knowledge and communities of committed practitioners. This is an important bridge between the center of universities (core practices around epistemic knowledge) and the periphery (the experimental and cocurricular-engaged learning practices that often draw on more reflective and affective pedagogies).

This has been the promise and effect of an approach to classroom inquiry that begins with faculty looking at their own disciplinary practices as what we might call the *practices of expertise*. This stream of thinking also has its grounding in research and theory, including work on cognitive apprenticeship and research on expertise (exploring differences between experts and novices, as well as expert and nonexpert practitioners). Although this approach is informed by theory, as a faculty development approach it focuses more on faculty disciplinary practice. In 2000, the Center for New Designs in Learning and Scholarship at Georgetown University started a national project known as the Visible Knowledge Project, with an emphasis on studying the impact of new technologies on student learning, primarily in the humanities. The approach that follows evolved from this work and has streamed with several other influential projects and approaches.<sup>12</sup>

Exploring the practices of expertise helps mediate conversations with faculty about two-way processes for making thinking and learning

visible, just as the Engaged Teaching Fellows Program helps faculty better understand how students bring into the classroom their “mental models of the world.” Faculty in a practice-driven model focus on how to make their goals and mental maps of their disciplines and teaching structures more explicit and operational in their designs. To do this they need to understand that expert practice, based on expert knowledge, is quite diverse in nature, including formal and informal knowledge, experiential knowledge, and self-regulating knowledge. One of the problems with expert knowledge is that much of it becomes habitual and therefore tacit in the teaching process and thus requires effort to reclaim in ways that allow faculty to break down their own mental actions into smaller tasks as part of the instructional process. When faculty participate in processes that help them slow down and look closely at what they are expecting of students and how those tasks often compress many different features of thinking and knowing, they are better able to recognize what it takes to design a sequence of tasks that approximates expert thinking—albeit, of course, not at expert levels of performance. (Here, *expert thinking* means the models we use to guide our instruction of novices and the cultivation of their intellectual development in a domain.)

As with the Engaged Teaching Fellows Program, this process also tends naturally to lead to a focus on formative stages of learning, what we call in the Visible Knowledge Project *intermediate thinking processes*.<sup>13</sup> Before you can work with faculty on course designs that address intermediate processes, the faculty have to find value in making student thinking visible at key moments that are not high-stakes assessments. Such low-stakes and intermediate assessments come in many forms, including a recent flourishing of interest in various forms of reflection and analysis that students might use to document their own learning processes.<sup>14</sup> For faculty already engaged with certain forms of pedagogies (those using certain digital and social media, as in the Visible Knowledge Project, or community-based learning or service learning courses), the focus on visible intermediate thinking and self-reflection arises naturally. This is not so for all faculty. This is where an approach that begins with the nature of disciplinary knowledge and expert practice becomes a meaningful point of entry.

### Thresholds and Bottlenecks

The first of these points of entry brings us back to *threshold concepts*. Threshold concept theory posits that at the core of every discipline, a few key concepts represent fundamental ways of thinking and practicing in that field. Threshold concepts are distinguished from other building block

concepts by their *integrative* nature: “A threshold concept is thus seen as something distinct within what university teachers would typically describe as ‘core concepts.’ A core concept is a conceptual ‘building block’ that progresses understanding of the subject; it has to be understood but it does not necessarily lead to a qualitatively different view of subject matter.”<sup>15</sup> Examples of threshold concepts that emerged through the original research in 2003 include “opportunity cost” in economics, “limit” in mathematics, and “signification” in literary and cultural studies. The naming of a single concept or idea as a threshold concept belies the broader valence of the term that unfolds through the threshold concept literature. Sometimes threshold concepts are explicit in instruction but require a lot of practice and application within authentic settings in order to truly understand how to *think with* a particular concept. In other cases, threshold concepts are more implicit, such as the concept that “historical thinking is constituted by the construction of an interpretation of the past based on multiple sources.” In this sense, threshold concepts are not merely concepts to be memorized but are more like signature intellectual moves in a domain.

Threshold concepts also share the key feature of frequently representing what David Perkins called *troublesome knowledge* (in that they may run counter to students’ lived experience or values, or the concept may just be counterintuitive in the context of everyday life). The idea that students can take a protracted amount of time to grasp threshold concepts—and that students will vary in their ability to cross the threshold—is a critical dimension of the usefulness of threshold concepts as a component of curricular improvement. They help faculty attend to what critical disciplinary concepts and ways of thinking look like from the students’ experience and provide a bridge between the teacher’s (expert practitioner) and the students’ (novice learners) experience.

When you get faculty thinking about threshold concepts—especially their troublesome nature—in their fields, they begin to look differently at how threshold concepts often require some period of time for grasping, and consequently that some students will take more time than others to pass through the threshold. Similarly, students can appear to have a grasp on threshold concepts, but it may turn out that their understanding is only mimicry or at least very thin. One consequence of taking threshold concepts seriously is to recognize that one does not acquire them by merely listening or learning passively; the more authentic and active the learning context for acquiring threshold concepts, the more likely that performance of knowledge will be a better representation of enduring understanding.

The troublesome nature of threshold concepts—and the protracted nature by which students pass through them—is what gives thresholds the quality more of a passageway than a door. Meyer and Land use the term

*liminality* to refer to this in-between state while students are engaging and absorbing the threshold concept.<sup>16</sup> The notion of troublesome knowledge and liminality has numerous implications for faculty development and pedagogical design, not the least of which is to help faculty think about whether they are making all the intermediate steps for understanding explicit and available to students as part of their struggle to understand. When you work with faculty around threshold concepts, they are able to think about both variation in student learning and the troublesome nature of a discipline's core concepts together. This can be a key shift for faculty, to connect those "key paradigms" and "compelling intellectual challenges" of their disciplines to a more systematic way of understanding student struggles through the threshold, struggles that might otherwise be written off as bad student behavior or poor preparation. It also provides a different way of approaching what the Engaged Teaching Fellows Program called *expectation failures*, by understanding the constructs that "put their students in situations in which their existing models will not work" as intrinsic to what it means to *think with* the threshold concepts of a discipline.

Not all difficulties with learning are due to the troublesome nature of threshold concepts. Students can encounter a wide range of "instructional bottlenecks." This is an important component of a similar project at the University of Indiana called Decoding the Disciplines, which has developed a multistep process for helping faculty think about the tacit knowledge of the fields that underlie their ways of knowing and working. This process includes identifying "instructional bottlenecks," which they define as tasks that are difficult or troublesome for students, and then identifying "the steps the expert would go through to accomplish the task the students have not done well at. This is a difficult process for experts to do, because much of their knowledge operates so tacitly, they are not aware of possessing knowledge inaccessible to their students."<sup>17</sup> Once a professor identifies a bottleneck and engages in the hard work of thinking through all the steps of expert practice entailed in the activity, then it is possible to think systematically about (1) how those steps get modeled, (2) how students have the opportunity to practice the steps, and (3) how they can receive feedback on their practice. As students (and faculty) slow down to accommodate each stage of these processes, faculty also need to ensure they are finding ways to keep students motivated to see the connection between particular tasks and larger ideas.

At Georgetown we have combined these two approaches into a faculty development initiative called the Bottlenecks and Thresholds Initiative.<sup>18</sup> There is a natural compatibility between threshold concepts and instructional bottleneck approaches. We believe this is a particularly rich marriage of the two approaches, primarily because threshold concept theory lacks a

pedagogical design or faculty development element; similarly, the instructional bottleneck approach—being strong in design and development—can break down difficult intellectual activities into smaller manageable parts without losing sight of the more complex integrative picture.

### Embodied Learning

Bottlenecks, thresholds, and the broader approach of thinking about expert thinking are all effective ways to help faculty see a fuller range of *learning* (beyond cognition) through the lens of disciplinary practice. Even on a pragmatic level, the Decoding the Disciplines project talks about at least three different categories of bottlenecks: *practical* bottlenecks (e.g., students don't know how to read selectively or actively), matters of *understanding* (e.g., students may not understand how to deal with multiple perspectives); or *affective* (e.g., they lack emotional engagement in the subject or let their values unselfconsciously shape their ability to be critical or analytical). Most importantly, though, these approaches that help faculty think about the knowledge they are trying to teach are fundamentally and ultimately about *practice*, about what David Perkins would call a “flexible performance capability” with knowledge, about what can be done with knowledge and in what settings. And once faculty shift from thinking about knowledge as content to knowledge as practice, they move out of the territory, as John Seely Brown puts it, from “learning about” to “learning-to-be.”<sup>19</sup>

This larger context of knowledge, of learning to be, belongs not typically (or exclusively) to classrooms but to experience and communities of practice. In the right faculty development context, focus on disciplinary thinking can lead to what we came to call in the Visible Knowledge Project *embodied pedagogies*, learning strategies and course designs that engage affective as well as cognitive dimensions, not merely through the role of emotion, but through personal significance, motivation, creativity and intuition, through expressions of self-identity and subjectivity, all as the foundation of intellectual engagement. In this context, working with embodied pedagogies can help faculty think about teaching their courses with two core ideas: (1) the importance of self-knowledge and experience as a primary means of bridging the identity of learners with disciplinary knowledge and (2) the significance of emotion and embodied cognition in intellectual development for the whole spectrum of expert development—as crucial in initial engagement of novice learning as it is with more advanced stages of integrated understanding.

For faculty, the challenge is not only to make room for emotional engagement but also to model how to engage emotion in cognitive and critical thinking. Faculty who recognize the importance of affect and

personal development in embodied pedagogies develop instructional and assessment tools to accommodate these fuller dimensions of learning, rethinking how knowledge construction is connected to self-construction, cognition to affect, and knowing to not knowing and uncertainty.

When faculty confront practice-focused and knowledge-focused approaches to embodied pedagogies, a much wider range of participation is possible in transformative education programs. This, for example, has been the case with the curriculum infusion programs implemented at Georgetown, where faculty across the curriculum create short modules around mental health and wellness that are organically connected to the intellectual content of the course.<sup>20</sup>

The threshold shift here is not only about helping students connect life and learning; it implies a revaluing of reflective and integrative thinking as a cornerstone of transformative education inside and across disciplines. If theories of active learning (and natural critical learning environments) imply movement between thinking and doing, or theory and experience, embodied learning approaches add a third element to theory and experience: reflection. Here, reflection is intimately tied to metacognition and helping students be reflective and adaptive with their knowledge. Yet it is probably not possible to teach students to be metacognitive: that ability arises from experience. But the implication for course design and student learning is that we can do more to create the kind of experiences that are more likely to give rise to metacognition and to create occasions and give guidance for students to be reflective and make meaningful connections about their learning, over time, and among all the elements of their education.

These approaches also give faculty a wider pedagogical lexicon by which to think about multiple forms of assessment (formative and summative) that help bridge curricular learning to cocurricular learning and wider experience. They can inform the development of integrative, reflective writing that accompanies traditional assignments or connect learning experiences to a larger narrative of learning; they can inform new approaches to using digital tools and social media to help faculty design classrooms as intellectual communities; and they can help create intellectual and pedagogical bridges between traditional classroom designs and the kind of learning that characterizes high-impact practices.

### **The Limits of Individual Change**

As effective as these approaches are with faculty and as beneficial as they are to students, the question persists: Are they enough to transform an institution or higher education? Is it reasonable to hope that effective faculty

change strategies, supported by internal funding for faculty developers and centers for teaching, and buttressed by changing reward structures, would lead to new structures and priorities? Our experience cautions us to believe that this model can only take us so far (and has). Competing influences in the higher education environment are fierce. And in many institutional types, it is unlikely that the reward structures will change very much, if at all. It may be that another powerful threshold concept of *institutional* change is accepting the limits of *faculty* change as a transformational strategy. If not just the faculty change paradigm, then what else?

One way to think of complementary (not alternative) strategies to faculty change is what we think of as the “least/most strategy.” That is, rather than always asking how we can get faculty to change the ways they teach or address student learning, we might ask a different question: Where are the places that an institution can put the least amount of new resources to get the most impact? We can imagine targeting this question at several different levels. First, are there ways to develop course-modification strategies that do not require major course redesigns but have substantial payoff in impact on student learning? This is what we have found at Georgetown, for example, in our curriculum infusion programs, where faculty create short modules connecting students’ lives with their learning in ways that are intrinsic to the course’s intellectual material. The heart of curriculum infusion’s success has been encouraging each faculty member to implement the model in ways that are grounded in who they are and integrated with how they already teach. And although professors participating in curriculum infusion programs come already equipped with the threshold impulse to help students make this connection, they need not have had a series of other threshold insights in order to implement the change. The program is effective because it in essence fixes a broken circuit that exists in the academy—in the location of the classroom. Faculty want to enable students to see the personal relevance of course material but often don’t know how (and don’t want to give up much time or content); students want to make those connections but rarely have a way of doing so without needed structure and scaffolding.

The key point is that in order to make curriculum infusion work, we have made a calculation about where to make the investment for change—and it is not primarily in changing faculty, *per se*, but in creating an environment that allows faculty to *step into* (and out of) a program that has a life of its own. The least/most principle is at work here because we have invested primarily in building a model, supporting a cross-campus team to execute the model through work with faculty, providing modest stipends to faculty and student health providers to participate, and building a community that has a structural identity beyond any individuals. From

the perspective of course design, the short curriculum infusion modules represent very modest modifications for a relatively high payoff in impact.

Not all improvements in student learning can work this way. Nor will a targeted program such as curriculum infusion transform an institution or even the nature of student learning by itself. But the least/most principle might also be applied at the next order of magnitude in thinking about the curriculum. That is, where might an institution make a *differential investment* in a few key model courses that have high influence on students and that, through their centrality in the curriculum, become models of what can and should be done with the student experience? On the one hand, this shifts the focus of change from faculty to students: If we invested more heavily in transforming students as learners early in their college careers, might they be better prepared to make the most of—and perhaps agitate for a certain kind of learning—a whole range of learning environments, active, passive, surface, strategic, and deep?

But it also shifts the way we think structurally about differential investment in the curriculum—and where centers for teaching and other faculty development efforts might invest their time. What would it look like to transform courses such that faculty who choose to teach them adapt their teaching strategies to fit those course structures (and thereby perhaps undergo many of the same changes in practice and perspective on student learning that traditional faculty development processes imply), but the transformed curricular structures are not embodied in the professors but in the enduring course practice, which is not dependent on who is teaching it?

In other words, what would it look like to make an investment in transforming *courses* that in turn might transform *faculty* rather than investing in changing faculty, hoping in turn they will transform their courses? Such course-focused differential investments have some models, of course, such as the pioneering Studio Physics courses at Rensselaer Polytechnic Institute and subsequently at MIT, or the implementation of universal course design at the University of Kansas along principles of cognitive apprenticeship, and many others. And some emerging electronic portfolio practices are also working to this effect, where faculty can modify some of their teaching practices in light of a larger architecture for student learning that transcends the level of the individual course. But ePortfolio practices are as yet rarely central to an institution's core curricular practices, nor are they typically understood as a different way of comprehending faculty change.

More importantly, we have only begun to imagine how such course investments could carry the full range of embodied learning dimensions implied in the theory-driven and practice-driven approaches we have discussed. At Montclair, for example, the Research Academy for University



Learning has been engaged in an effort, with the support of a grant from the Creative Campus Initiative, to work with Peak Performances, the folks who bring visiting performing and visual artists to campus, to form and guide an interdisciplinary team of a dozen or fewer faculty members who are building a course on creative thought. That team is employing all the major conclusions drawn from more than a quarter century of research and theory on university learning and how best to cultivate it. It is also employing the best practices of twentieth-century classes on creative thought, including a highly successful course developed by Paul Baker, and adding to those experiences the insights of recent research and theory.<sup>21</sup> This effort to fashion a new course is intended to create an institutionalized context for something that will transform the learning experience of students and might itself lead to a later effort with a team of faculty members to build, for example, a course on scientific thinking that similarly draws on holistic and integrative principles of learning.

Such collaboratively designed courses would be research based and evince the key thresholds of teaching and learning we have discussed as a matter of structure and practice, without necessarily requiring the faculty who teach them to re-create the same journey of discovery around the key thresholds, one professor at a time. These kinds of courses, and other examples we have discussed, also require institutional investment in the kinds of facilitative scaffolding that will sustain them—in centers for teaching and other modest targeted investments that keep partners across academic, student affairs, and other spheres engaged in connecting, by design, the periphery to the center.

It may also be the case that these kinds of change strategies—focused on course and program structures and less on faculty change—are the logical consequences of the threshold concepts intrinsic to the learning paradigm: that designing for transformational learning inevitably takes us beyond the boundaries of the individual course or even the formal curriculum. Perhaps it is inevitable that once we all start to design for the integrative nature of threshold concepts, or recognize the linkages among prior knowledge and personal and intellectual development and the dynamics of social learning, that the path to curricular change can no longer exclusively run through individual faculty development and faculty change but must take a more structural approach. Such a shift might be the logical and necessary consequence of thinking beyond courses to programs, beyond discrete knowledge domains to integrative approaches to learning and transformative education.

Will the thoughtful implementation of a wider repertoire of change strategies transform the academy? We can only hope. But we do believe that our best chance is to see with clear eyes both what has worked so

effectively to transform teaching and learning on our campuses and why by itself it will likely never be enough.

## Notes

1. Mary Deane Sorcinelli, Ann E. Austin, Pamela L. Eddy, and Andrea L. Beach, *Creating the Future of Faculty Development: Learning from the Past, Understanding the Present* (Bolton, MA: Anker, 2006).

2. Our use of *embodied pedagogies* shares a great deal with the term *engaged learning* (a much more common term), which has taken on a wide range of meanings, from merely active learning to civic engagement. For the most part, the terms could be interchangeable; we use the term *embodied* here to emphasize learning that includes but goes beyond cognition to fold in sensory as well as emotional engagement, and knowledge as “experienced through the body as well as the mind.” For an earlier elaboration of embodied learning, see Randy Bass and Bret Eynon, “Capturing the Visible Evidence of Invisible Learning,” *Academic Commons*, January 7, 2009, [www.academiccommons.org/commons/essay/capturing-visible-evidence-invisible-learning](http://www.academiccommons.org/commons/essay/capturing-visible-evidence-invisible-learning).

3. Jan H.F. Meyer and Ray Land, *Threshold Concepts and Troublesome Knowledge: Linkages to Ways of Thinking and Practising within the Disciplines*, Enhancing Teaching-Learning Environments in Undergraduate Courses Project, Occasional Papers Series (Edinburgh: University of Edinburgh, Coventry and Durham, 2003); “Threshold Concepts and Troublesome Knowledge (2): Epistemological Considerations and a Conceptual Framework for Teaching and Learning,” *Higher Education* 49 (2005): 373–88; Ray Land, Jan H.F. Meyer, and Jan Smith, eds., *Threshold Concepts within the Disciplines* (Rotterdam, the Netherlands: Sense Publishers, 2008).

4. Meyer and Land, *Threshold Concepts and Troublesome Knowledge*, 1.

5. Claude M. Steele and Joshua Aronson, “Stereotype Threat and the Intellectual Test Performance of African-Americans,” *Journal of Personality and Social Psychology* 69, no. 5 (1995): 797–811, [www.ncbi.nlm.nih.gov/pubmed/7473032](http://www.ncbi.nlm.nih.gov/pubmed/7473032).

6. Ken Bain, *What the Best College Teachers Do* (Cambridge, MA: Harvard University Press, 2004).

7. In addition to the work cited earlier, see some of the recent work on stereotype threat: Joshua Aronson, Michael J. Lustina, Catherine Good, Kelli Keough, Claude M. Steele, and Joseph Brown, “When White Men Can’t Do Math: Necessary and Sufficient Factors in Stereotype Threat,” *Journal of Experimental Social Psychology* 35, no. 1 (1999): 29–46; Jean-Claude Croizet and Theresa Claire, “Extending the Concept of Stereotype Threat to Social Class: The Intellectual Underperformance of Students from Low Socioeconomic Backgrounds,” *Personality and Social Psychology Bulletin* 24, no. 6 (1998): 588; Steven J. Spencer, Claude M. Steele, and Diane M. Quinn, “Stereotype Threat and Women’s Math Performance,” *Journal of Experimental Social Psychology* 35, no. 1 (1999): 4–28; Claude M. Steele and Joshua Aronson, “Stereotype Threat and the Intellectual Test Performance

of African Americans," *Journal of Personality and Social Psychology* 69, no. 5 (1995): 797–811; Claude M. Steele, Steven J. Spencer, and Joshua Aronson, "Contending with Group Image: The Psychology of Stereotype and Social Identity Threat," *Advances in Experimental Social Psychology* 34 (2002): 379–440.

8. Bain, *What the Best College Teachers Do*.

9. In this case, a promise means an opportunity, as in a "promising situation," rather than a guarantee.

10. Ken Bain, "Understanding Great Teaching," *Peer Review* 11, no. 2 (2009): 9–12.

11. Michael Wesch, "From Knowledgeable to Knowledge-able: Learning in New Media Environments," in "New Media Technologies and the Scholarship of Teaching and Learning," ed. Randy Bass, special issue, *Academic Commons*, January 2009.

12. Two prior related projects include the Peer Review of Teaching Project, led by Dan Bernstein (University of Kansas), and the Course Portfolio Project, led jointly by Pat Hutchings and Lee Shulman (Carnegie Foundation for the Advancement of Teaching). Both projects focused on faculty practice and close examinations of student work and performance.

13. The term comes from Sam Wineburg; see his *Historical Thinking and Other Unnatural Acts* (Philadelphia: Temple University Press, 2001).

14. This is especially true of the crucial role of reflection in the growing range of ePortfolio practices. See, for example, Kathleen Blake Yancey, "Reflection and Electronic Portfolios," in *Electronic Portfolios 2.0: Emergent Research on Implementation and Impact*, ed. Darren Cambridge, Barbara Cambridge, and Kathleen B. Yancey (Sterling, VA: Stylus, 2009).

15. Meyer and Land, *Threshold Concepts and Troublesome Knowledge*, 1.

16. Meyer and Land, *Threshold Concepts and Troublesome Knowledge*, 10.

17. David Pace and Joan Middendorf, "Decoding the Disciplines: Helping Students Learn Disciplinary Ways of Thinking," *New Directions for Teaching and Learning*, no. 98 (Summer 2004); Leah Shopkow, "What Decoding the Disciplines Can Offer Threshold Concepts" (paper presented at the second Threshold Concepts across the Curriculum Conference, Kingston, Ontario, June 2008), 3.

18. See <http://cndls.georgetown.edu/bottlenecks-and-thresholds>.

19. John S. Brown, "Minds on Fire: Open Education, the Long Tail, and Learning 2.0," *EDUCAUSE Review* 43, no. 1 (January/February 2008): 16–32.

20. See the case study by Joan Riley and Mindy McWilliams on Georgetown's curriculum infusion initiative in this volume.

21. Robert Flynn and Eugene McKinney, eds., *Paul Baker and the Integration of Abilities* (College Station: Texas A&M University Press, 2003).