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Assessment Beyond Performance

Phenomenography in Educational Evaluation

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Abstract: Increasing calls for accountability in education have promoted improvements in quantitative evaluation approaches that measure student performance; however, this has often been to the detriment of qualitative approaches, reducing the richness of educational evaluation as an enterprise. In this article the authors assert that it is not merely performance but also how learners think and how their thinking changes that we should be measuring in educational program evaluation. They describe a mixed-methods evaluation model based on the qualitative method phenomenography that can be used to evaluate how learners think in multiple contexts, from skills training to employee development to higher education, and how their thinking may change over time. They then describe two evaluation studies making use of this approach and provide suggestions for evaluators interested in using the phenomenographic model.

Keywords: *educational program evaluation; qualitative research; phenomenography; student learning*

Calls for Accountability and the Limitations of Traditional Measurement

Over the past several decades, calls for accountability in U.S. education have grown louder, reaching a crescendo with recent publications targeted at bringing about large-scale reform in secondary, and to a somewhat lesser extent, higher education (e.g., No Child Left Behind Act of 2001, Education Sciences Reform Act of 2002, National Commission on Accountability in Higher Education of 2004). During this time, in fact, accountability might be said to have reached "watchword" status in the education field (Earl & Fullan, 2003, p. 283). This message is clear in the 2005 U.S. Department of Education report Scientifically Based Research Methods (2005):

> Proposed evaluation strategies that use neither experimental designs with random assignment nor quasi-experimental designs using a matched comparison group nor regression discontinuity designs will not be considered responsive to the priority when sufficient numbers of participants are available to support these designs. (pp. 3586-3587)

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To meet these demands for accountability, U.S. educational institutions and programs of all kinds have increasingly relied on quantitative assessments of performance, including standardized tests, to provide data on how well they are educating learners (Linkon, 2005).

Calls for accountability in evaluation research are appropriate, particularly where public money is utilized for research that improves the products and services intended for the public good (House, 1990). However, when positivistic methods become the only acceptable manner of conducting evaluation research, while studies utilizing interpretive methodology are marginalized, research as an enterprise suffers.

A key question is this: Is performance all we want to measure? The educational enterprise ideally seeks to improve learners' ability to think—to create novel approaches, ideas, and solutions—and not simply to perform well. With this in mind, the American Association for Higher Education (Astin et al., 1993) asserts in its statement on promoting effective assessment that

> educational values should drive not only what we choose to assess but also how we do so. Where questions about educational mission and values are skipped over, assessment threatens to be an exercise in measuring what's easy, rather than a process of improving what we really care about. (p. 2)

If what we really care about is improving learners' ability to think, we should be measuring that. Put another way, to provide meaningful information about how well students are learning, assessment must capture student thinking, and not just student performance. Ramsden (2003) wrote that learning is reflected not necessarily in a change in behavior, but rather in a change in how people "understand, or experience, or conceptualize the world around them" (p. 4). Measuring this sort of change, more subtle and potentially more complex than change in behavior, requires an educational evaluation model that reveals how learners think and measures change in their thinking over time.

The purpose of this article is to describe such a model and illustrate how it can be used as part of evaluation of any program that promotes learning, using two case studies from a higher education setting as examples. The model is based on the research approach *phenomenography*. In brief, phenomenography is a method and accompanying set of theoretical assumptions that seek to identify variation in the ways people conceive of and approach learning-related experiences (Marton & Booth, 1997), that is, the way they think. By identifying this variation, evaluators can later design instruments to capture a learner's conception or approach at a single point in time and thus measure change in conception or approach over time. This method can be used in multiple contexts, from skills training to employee development to higher education, and can help supervisors, managers, and educators identify learners whose conceptions are more and less comprehensive, ultimately to evaluate a learning program's effectiveness and provide guidance tailored to the learner.

Focus on Variation and Change: A Phenomenographic Approach to Evaluation

What Is Phenomenography?

First developed by educational researchers in Sweden in the 1970s, phenomenography has most often been used to describe variation in the ways people experience learning in various contexts. While many researchers working in other methods seek to shed light on the

common ways in which groups of people approach various phenomena, phenomenographers look for the differences among people in such approaches (Marton, 1989). In Marton and Booth's (1997) words, phenomenographers "seek the totality of ways in which people experience … the object of interest and interpret it in terms of distinctly different categories that capture the essence of the variation" (p. 121). Phenomenography seeks to holistically describe how individual learners conceive of a particular experience, so that the full range of possible conceptions is described (Marton, 1988).

Phenomenography's Relationship to Other Research Approaches

In many respects, the phenomenographic approach resembles other brands of qualitative inquiry. For instance, it relies on in-depth interview data; it seeks to reveal understanding of phenomena from the participant's point of view rather than the researcher's or broader society's; and it views the person as inseparable from the phenomenon in question, in the sense that truth about the phenomenon does not exist in isolation from the perceiver (Marton, 1981; Trigwell, 2000). To illustrate, phenomenography is similar in many respects to the phenomenological approach, which seeks to "come to a deeper understanding of what persons go through as they conduct their day-to-day life in the language of everyday life" (Hultgren, 1989, p. 50).

The phenomenographic approach is unique among qualitative methods, however, in two important respects. First, rather than searching for common themes among participants suggestive of shared experience of a phenomenon, as is the case with phenomenology (van Manen, 1990), phenomenography looks for the ways in which learners vary in the manner in which they conceive of the same phenomenon (Marton, 1989). Second, rather than viewing the phenomenon itself as the subject of study, as phenomenology does (van Manen, 1990), phenomenography takes as its unit of analysis the range of ways of conceiving of a phenomenon (Marton, 1981), examining a whole group of people. This focus on differences among individuals in a group makes phenomenography particularly well suited for program evaluation. Phenomenographic work provides program developers with a profile of the variation in experience across all of the participants in the program.

Phenomenographic research has been used primarily in education; however, it is beginning to emerge in other contexts as well. For example, the phenomenographic approach has been used to identify conceptions of competent work among engineers in an auto manufacturing company (Sandberg, 2000), conceptions of the value of information-technology research among information-technology researchers and practitioners (Bruce, Pham, & Stoodley, 2004), conceptions of uses of technology in surgery among surgical nurses (Barnard & Gerber, 1999), and conceptions of leadership among nurses in an intensive care unit (Rosengren, Athlin, & Segesten, 2007).

Variation as Hierarchical

Phenomenography is, in Marton's (1994) words, "the empirical study of the limited number of qualitatively different ways in which we experience, conceptualize, understand, perceive, [or] apprehend various phenomena" (p. 4424). Thus implicit in the method is a theoretical assumption that there are, in fact, a limited and definable number of possible ways humans conceive of phenomena, typically learning-related phenomena. The findings of a phenomenographic study are presented as categories of ways of conceiving of particular phenomena (Marton & Booth, 1997). In a seminal study, for example, Säljö (1979) described five conceptions of learning held by students: increasing knowledge, memorizing, acquiring facts and skills, abstracting meaning, and interpreting information to understand the world.

Säljö (1979) presented these five conceptions not as independent of one another but rather as related in hierarchical fashion, so that embedded in a particular understanding (e.g., abstracting meaning) is an awareness and understanding of all those conceptions that might be considered less sophisticated (e.g., acquiring facts and skills, memorizing, and increasing knowledge). Generally, in phenomenographic studies, people are assumed to move from less to more sophisticated conceptions of a particular phenomenon in hierarchical fashion; that is, each new level requires an understanding of, and retains components of, those that came before (Marton & Booth, 1997).

In another phenomenographic study, for example, Reid and Petocz (2002) identified six distinct ways in which students understood statistics, and these six could be ordered in terms of breadth and depth of understanding. At the least sophisticated levels, students focused simply on techniques; at more sophisticated levels, students focused on using data for some purpose; and at the most sophisticated level, there was a focus on generating meaning from the data. As the individual learns, she or he also gains awareness of these differences in perspective, or of the variation in experiencing the phenomenon (Trigwell, 2000).

Note that in the Säljö (1979) study, what is being examined is students' understanding of their own learning experiences. In the Reid and Petocz (2002) study, by contrast, it is the way of understanding a particular subject matter that is of interest. The phenomenographic approach can be used to assess learning in both kinds of situations.

Development in Phenomenography and Variation Theory

Phenomenography has recently taken up questions of the nature of learning more explicitly. Based on the concern that phenomenography lacked a theoretical direction (Säljö, 1994), phenomenographic researchers began to turn from particular research questions (e.g., What is the variation in experiencing *X*?) to more theoretical questions (e.g., What does it mean to talk about variation in experience? and How does this variation come about?). What has emerged is a "theory of variation" (Pang, 2003, p. 150), which holds that to learn within a given area, people must be aware of variation in ways of understanding knowledge in that area (Bowden & Marton, 1998; Marton & Booth, 1997; Marton, Runesson, & Tsui, 2004; Pang & Marton, 2005). Furthermore, for people to focus on some aspect of a phenomenon, that aspect must change while other aspects remain stable, producing variation of another kind. When we encounter something new, we must be able to contrast it with other manifestations of the phenomenon, which we either are experiencing at the moment or have experienced in the past (Pang, 2003). For example, we notice a bright color because we also see darker colors, or because we have seen darker colors in the past (Lo, Chik, & Pang, 2006).

Thus phenomenography also provides a unique definition of learning: developing one's conception of a phenomenon by experiencing variation in that phenomenon (Marton & Booth, 1997; Marton & Trigwell, 2000; Pang, 2003). This occurs through experiencing the object of learning in new ways, and integrating the contrast between the current and former understanding into one's conception of the object of learning.

Phenomenography and Variation Theory as Compared to Other Ways of Investigating Learning

In focusing on experience, phenomenographic researchers are interested in the underlying differences in individual learning. Learners who experience a situation in different ways may have different outcomes, and it is this difference—this variation—that phenomenography seeks to understand (Marton & Booth, 1997). *Experience* here is defined as an individual

sensing discrete phenomena in a particular situation, so that a way of experiencing a particular situation is "a way of discerning something from, and relating it to, a context" (Marton & Booth, 1997, p. 112). This differs from other uses of the word *experience,* for instance from Dewey's (1938) broader notion of experience as the juncture of past and present encounters, or from the more immediate, prereflective awareness described by Merleau-Ponty (1968) and other phenomenological philosophers.

The phenomenographic approach to understanding learning also differs from psychological approaches to investigating learning (Linder & Marshall, 2003; Marton & Booth, 1997). Phenomenographers are interested in different ways of conceiving of a phenomenon, and the impact these differences might have on learning outcomes. By contrast, cognitive psychological approaches to studying learning focus on the mental processes by which learning occurs (e.g., forming mental representations, remembering, solving problems, etc.); however, the central phenomenon of the learning experience itself—the ways in which the person conceives of and experiences the context of learning situation—is of lesser interest. Put another way, while other approaches investigate how and why people learn, phenomenography probes the content and form of the experience of learning itself (Marton & Booth, 1997). Because it assumes an inextricable relationship between the individual's learning and the learning context, phenomenography resembles social constructivist approaches (e.g., Vygotsky, 1978); however, it differs from these approaches in that it seeks to merge individual learning experience and learning context into a single learning phenomenon. As Marton and Booth (1997) wrote, "The world is not constructed by the learner, nor is it imposed upon her; it is *constituted* as an internal relation between them" (p. 13).

Phenomenography and Evaluation

Phenomenography and Quantitative Research

Although phenomenographic study itself is purely qualitative, many phenomenographic studies have provided the basis for well-known quantitative measures of learners' conceptions of or approaches to teaching and learning. Phenomenography generates categories that describe specific conceptions of and approaches to learning in particular contexts (Marton & Booth, 1997). These categories can later be tested quantitatively via instruments based on the original qualitative work. Such instruments tend to be used in pre- and postprogram assessments: They are not used to measure people's skills or approaches at one moment in time but rather to measure change in approach or conception over time. The Approaches to Studying Inventory (ASI; Entwistle & Ramsden, 1983), for instance, was initially developed in the early 1980s (Entwistle & Ramsden, 1983), and later revised (Entwistle & Tait, 1994) based on phenomenographic qualitative interviews, and has been broadly employed to measure learners' approaches to learning and change in approach (e.g., Arnold & Feighny, 1995, Eley, 1992; Sadler Smith, 1996). Other quantitative instruments based on phenomenographic interviews include the Approaches to Teaching Inventory (ATI; Prosser & Trigwell, 1999; Trigwell & Prosser, 2004), the Approaches and Study Skills Inventory for Students (ASSIST; Tait, Entwistle, & McCune, 1997), the Reflections on Learning Inventory (RoLI; Meyer, 2000), and the Conceptions of Learning Inventory (COLI; Purdie & Hattie, 2002). Categories generated from qualitative phenomenographic studies can also be tied to other quantitative data as covariates or in correlational analyses. For example, Crawford, Gordon, Nicholas, and Prosser (1998) used data from a phenomenographic study of students' conceptions of mathematics to develop an instrument to measure such conceptions and later correlated scores on this instrument with scores on an approach-to-learning questionnaire.

Either or both of these qualitative and quantitative phases can be employed in an individual study so that a study can be purely phenomenographic (e.g., Akerlind, 2003), purely quantitative but based on phenomenographic work (e.g., Hambleton, Foster, & Richardson, 1998), or both (e.g., Prosser, Trigwell, & Waterhouse, 2000). Thus phenomenographic work generates description of variation in people's conceptions or approaches but also spurs quantitative work designed to identify changes or patterns in those conceptions and approaches. In the case studies we offer later in this article, we describe one project using just the qualitative component, and one using qualitative and quantitative components.

Phenomenography as a Tool for Improving Learning

Like other types of qualitative inquiry, phenomenography is a means of exploring lived experience, and in this sense it can take the form of exploratory research. However, phenomenography also easily lends itself to a more applied sort of research, what Bowden (1995, 2000) has referred to as *developmental phenomenography.* In this case it is

> undertaken with the purpose of using the outcomes to help the subjects of the research, usually students, or others like them to learn. . . . The outcomes from these research studies can . . . be used to develop generalizations about better and worse ways to organize learning experiences in the particular field of study. (Bowden, 1995, p. 146)

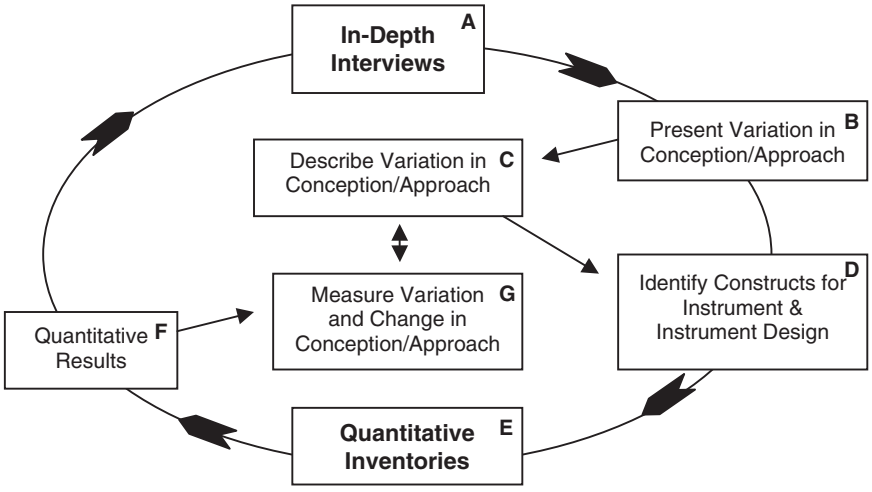
It is with Bowden's understanding that we approach phenomenography: as an instrumental activity, one that ultimately can help us to help others learn more effectively. It does this by elucidating the differences among learners' experiences and thus suggesting what learners might do to experience the learning situation more effectively.

Phenomenography makes three critical assumptions that render it particularly well-suited for evaluation of programs that promote learning. These are that (a) there are differences in the ways people conceive of and approach learning in particular environments; (b) some of these different ways are more conducive, and others that are less conducive, to effective learning; and (c) through life experience or training, people can change these conceptions (Marton, 1994, Marton & Booth, 1997). Thus a phenomenographic approach may be called for when programs aim to change learners' conceptions of ideas within particular realms (e.g., conceptions of the laws of physics, of literary genres, or of the law of supply and demand), or of particular acts, roles, or experiences (e.g., conceptions of effective project management, of teaching, of caring for patients, even of learning itself). Change in conception can be thought of as "learning that enables the learner to experience a phenomenon in a way she has not been able to experience it previously" (Marton & Booth, 1997, p. 155).

Phenomenographic data can provide direction for teachers or trainers to identify learners in need of guidance and to help learners expand their thinking. For the program developer, it also provides insight into whether a program is meeting its goals. Phenomenography is, above all, a practical tool for improving education: The perspective it offers on differences in learning experience can enable educators to more deeply understand why and how their learners struggle, and how this struggle might be overcome (Entwistle, 1997).

To summarize, rather than measuring learning outcome as performance, in phenomenographic studies we are measuring learning outcome as change in conception of or approach to the learning object. (Note that this model is not characteristic of all studies making use of phenomenography but rather only of those using phenomenography as a tool for evaluating learning.) This evaluation model is depicted in Figure 1.

Figure 1
Phenomenographic Evaluation Model



The Two Cases

To illustrate the phenomenographic method displayed in Figure 1 and its potential for a more complex evaluation of educational outcomes, we describe evaluations of two programs that were designed to improve teaching and learning at a private research university in the Midwest. In both of these cases, the topic of interest is how participants conceive of and approach the experiences of learning and teaching themselves.

The first case, a study of student approaches to learning in a peer-led team-learning intervention in the sciences, demonstrates the qualitative component of a phenomenographic study (Stages A through C in Figure 1). In this case, we used a strictly phenomenographic approach. That is, we conducted in-depth, loosely structured interviews with a relatively small number of people; analyzed the resulting transcripts by searching for descriptions of an individual's conception of some aspect of the learning experience; categorized these individual descriptions into a small number of key conceptions (which we believe fully describe the variation in conceptions of this particular experience); and then considered the relationships among these conceptions (Micari, Light, & Schnierle, 2006). Our next step is to construct an instrument based on these findings (Stage D). Thus, the first case illustrates the use of phenomenographic interview-based work in laying the foundation for later instruments that might measure change in conceptions held over time.

In the second case, we illustrate quantitative and qualitative components of the model from Figure 1. We describe a study of faculty members' change in conception of teaching after participating in a yearlong faculty-development program. In this case, we conducted phenomenographic interviews (Stages A through C in the model in Figure 1) and employed a widely used quantitative instrument, one based on qualitative phenomenographic work, to measure change (Stages E through G) (Light, Calkins, & Luna, 2005).

Case 1: Student Approaches to Learning in a Peer-Led Small-Group Workshop Program

Here we evaluated a peer-led team-learning initiative designed to improve students' performance and retention in difficult introductory courses in science, engineering, and mathematics disciplines. In this program, students meet weekly in small groups of five to seven, with a peer facilitator, to work through challenging conceptual problems related to their course material. The peer facilitator coaches, but does not lecture to, the group, helping them work through the problems themselves. One of the program's main goals is to help students develop as learners: to make their approaches to studying more effective, and to refine their ability to think conceptually and thus solve problems more creatively and effectively.

In previous evaluations of this program, we had found that students in the program earned higher mean final grades and were retained within course sequences at higher rates than students not in the program, even when prior academic differences were accounted for (Drane, Smith, Light, Pinto, & Swarat, 2005; Swarat, Drane, Smith, Light, & Pinto, 2004). However, because the program was designed to develop students' approaches to thinking and learning, an additional evaluation goal was to learn whether the program had an impact on how students approached learning. As a step toward this goal, we undertook a phenomenographic study of the different ways in which students approach learning in the context of the program (Micari et al., 2006) and plan to develop an instrument based on our findings to measure students' change in approach throughout their participation in the program.

Method

There were two phases of data collection in this study, an initial phase during the 2003-2004 academic year, and a second phase during the 2004-2005 year. We used a semistructured interview guide, which encouraged students to talk about issues important to them that related to the research question, even if those issues were not explicitly addressed in the interview guide (Patton, 2002). Questions probed students' experiences as learners in the program, and included "Why did you join the program?" "How do you usually study for the course?" and "Think of a time when you felt you learned really well. To what do you attribute your success?" Twenty-nine students took part in the initial study, and an additional 16 in the second phase.

After we had collected the initial round of data, two researchers read the transcripts focusing on how students thought about learning in the context of the program, which in turn might reveal some fundamental variation among students' conceptions of and approaches to learning. We then read the transcripts several more times, each time narrowing or redirecting our focus based on the themes emerging from the conversations (Lincoln & Guba, 1985), and seeking to make sense of individual comments within the context of the individual interview and in comparison with the group of interviews as a whole (Marton, 1988). Through this process, we identified two dimensions of the learning experience that we wanted to further explore: first, the "learning intention," or the students' conceptions of the ideal learning state, and second, the "learning constraints," or barriers to that ideal state that students identified.

For the Phase-2 interviews, we modified the interview questions somewhat to more closely focus on our areas of interest. We analyzed data in Phase 2 in the same manner as in the Phase-1 analysis, however, this time focused not only on the dimensions of experience identified in Phase 1 but also on the variation in the ways in which students described those dimensions. In our analysis, we considered individual comments within the interview transcripts, rather than on each interview as a whole. This is in keeping with Marton's (1988)

Table 1
Approaches to Learning in a Peer-Led Small-Group Workshop Program

		Learning Constraints	
Approaches to Learning	Learning Intention	Some Constraints to Learning Intention	Some Factors in Moderating Constraints
A	Reducing anxiety by finding clarity	Fear, low self-confidence	Friendly peers and facilitator, more study time
B	Increasing involvement through application of ideas	Watching rather than doing problems	Being encouraged to actively work through problems
C	Gaining control over learning through developing an integrated system for understanding ideas	Seeing concepts in isolation	Being coached to see how diverse concepts are related

approach, in which "boundaries separating individuals are abandoned and interest is focused on the 'pool of meanings' discovered in the data" (p. 143). Through this process, we identified three distinct approaches to learning. (We describe these approaches in detail in a later section of this article.)

Our next step in the analysis process was to reread the Phase-1 transcripts to ensure they supported the approaches described—that is, to check whether individuals could be described as tending toward one of the three approaches. (We should note that we did not expect that individuals would express characteristics of strictly one category, but rather that each would tend toward one of the three categories [Marton & Booth, 1997].) Because each transcript showed characteristics of one of the three categories, and because there were no sections in any of the transcripts that did not seem to apply to any of the three approaches, we felt that the three categories reasonably described the range of approaches demonstrated in the transcripts. Next, to check for consistency of interpretation, two researchers each read five of the transcripts initially read by the other; they agreed on all transcripts (i.e., placed the transcripts into the same category) except for several cases where one had placed a transcript between two categories and the other had placed it in just one of these two. Because the categories are intended to represent a continuum, and not a series of points on which individuals must discretely fit, we felt this degree of disagreement was acceptable.

Results

Through our analysis, we identified three approaches to learning (referred to later as A, B, and C) in the context of the program. (Again, it is important to note that this does not imply that the students themselves fall into one of these three groups but rather only that they have a tendency toward one of the three approaches in this particular context [Marton & Booth, 1997].) Each of these ways of experiencing learning was characterized by two key dimensions: learning intention and learning constraints. The student's learning intention is her or his effort to move toward an intended learning state and away from a less-desired state. Learning constraints are the factors that the student feels may prevent him or her from achieving the learning intention. We also identified ways in which students felt the program helped them overcome the constraints. See Table 1 for an overview of these dimensions within the three approaches.

Approach A. Students who tended toward Approach A put most of their energy into simply trying to get through the course. Here students did not feel self-sufficient in achieving their academic goals, and this lack of self-sufficiency created a fair amount of anxiety. Students tended to seek out resources that would support them in making it through the course, but not necessarily in learning the material more effectively. They sought to reduce anxiety and ultimately to find clarity in the material.

For example, one student described a desire to reduce stress by better managing his study time:

> I think it's poor time management. It's a really big thing for me. . . . I pretty much sleep during the day, and I stay up very late. . . . I think if I set a certain time for each thing that I have to go over each day then I wouldn't feel so overwhelmed.

Another student who tended toward approach A talked about progressing from "not really understanding" to "actually figuring it out," and connected this change to an increase in confidence:

> Just talking about what's going on in class is always helpful, 'cause it's not like you are just sitting there and reading and not really understanding; it's actually figuring it out with someone else that's helpful. . . . [I]n tests last quarter, I used to be so nervous . . . 'cause I didn't know what I was doing. This quarter, I am definitely just more confident in what I am doing.

Approach B. In contrast to Approach A, Approach B was characterized by striving to engage in the course in a meaningful way. Students tending toward Approach B felt only a small amount of anxiety about getting through the course, and they were interested in engaging with the material at a deep level, rather than just learning it for the exam. These students were aware that they needed to interact with the material to learn well, even if they were not always fully able to achieve this because they spend more time watching professors than actually "doing" science. Students here strove to become actively involved in creating meaning out of the material rather than simply absorbing it, and to approach the material as principles to be applied, rather than merely a mass of information to be memorized.

For instance, one student expressed a sense that she sometimes takes a passive, rote approach to learning; however, she also recognized that a more active approach is preferable. She first said,

> Sometimes the class goes quickly, and you're copying [the information] down and also trying to think about it before you ask a question that is really obvious. So you don't want to stuff everything in [your mind], which is what I end up doing.

Then, however, when asked to describe her definition of *learning,* she answered,

> If you are sitting in class and your teacher is talking about a topic, and you feel like you know more than just the equation. You know where to apply it in the real world, where you can apply the information and more that just memorization. Learning is just really getting comfortable with the material and knowing why and where to use that.

This student is acknowledging a difference between memorizing material (learning at a superficial level) and learning it in a way that will allow you to use it in novel situations (learning at a more profound level).

Another student felt that the large lecture class pushes students to memorize information but does not allow them to apply it, thus hampering their learning. This student described the program as a contrasting environment:

> I think that some of the classes go through the material too quickly, because maybe you only meet two or three times a week. . . . I feel they pack as much as they can into a 50-minute lecture period, . . . but you wouldn't understand because you don't have a chance to use it. Any of that sort of clarification that, I think, [the program] can give you.

Approach C. In Approach C, students put their efforts into trying to learn more effectively, and to better understand how to accomplish this. They became independent in the sense that they relied on themselves as much as, or more than, external supports to enhance their learning. They described feeling comfortable about their ability to work with the material, as well as a growing desire to adapt the way they study to better understand course content.

One student described knowing that ideally, students would make links among concepts, but that this does not always happen:

> Learning in chemistry means understanding the concepts. To understand the concepts, it's not just reading something and being able to reproduce it, but it is really being able to put things together, linking this concept to that concept and understanding the bigger picture. . . . If you are learning about, say, naming compounds . . . but you don't really understand why there are prefixes, how the prefix of each element corresponded to how many atoms . . . [Interviewer: "You could learn the prefix—"]—but not necessarily understand what it means.

Another student who tended toward Approach C talked about trying to improve her own approach to learning by watching how others learn:

> Learning is all about morphing it, or making it translatable, to other people, because not everyone has the same mode of thinking. . . . When I don't get a concept even after the facilitator has explained it to me, a student in my workshop might come up with a different way, too. So sometimes I get three ways. Then I adapt one of those ways to mine, or I might just take it as it is and just learn it that way.

These students are describing learning at a level that presupposes comfort with the material and an acknowledgment that memorization alone is not enough. Students who are taking this approach, then, must already be aware of the previous two approaches. This suggests to program staff that helping students work through anxiety (a goal in Approach A) and approach problems actively (a goal in Approach B) may help free students to focus on improving their own learning (a goal in Approach C).

Implications for the Program

Although the main purpose of this evaluation project was to identify the differences in approaches to learning within the program, gaining a sense of how many participants tended toward each of the three categories was of interest to the program directors. A preliminary effort to categorize participants put 12 into Category A, 11 between A and B, 19 into B, 3 between B and C, and none squarely into C. That only a few students tended toward Category C may reflect the difficulty with which students in the program gain the sense of mastery that is presumably a prerequisite for taking a deeper approach to learning (Norton & Dickins, 1995; Rossouw & Parsons, 1995).

This information provides a snapshot of the approaches of students participating in the program; however, it does not tell us anything about whether or how the program helps students develop more effective approaches. Our next step in this evaluation is to design an instrument based on this qualitative work to measure change in students' approaches over time. This will allow us to see whether students are progressing toward more sophisticated

approaches to learning, which the program is designed to encourage. It can also help us determine whether particular workshop groups encourage particular approaches to learning, thus allowing us to do targeted training with peer facilitators and group participants. Furthermore, we could consider what accounts for the differences in students' approaches, ultimately designing interventions to help students see greater variation among ways of approaching learning, and to encourage students to move from one approach to another, increasing their chances for success.

In regard to running a program like the one studied here, the findings we have at this point suggest that a one-size-fits-all approach may not be appropriate. The program's peer leaders can be trained to identify different approaches to learning that students might take, and to work effectively with students who take each approach. Students worried simply about making it through the course, for instance, may need extra reassurance, whereas students more focused on improving their learning may respond well to direct critique. Peer leaders could also be trained to help students develop approaches that might help them more deeply understand the material.

This case illustrates the qualitative research component of a phenomenographic research-based evaluation study.

Case 2: Faculty Approaches to Teaching in a Faculty Development Program

This study made use of a quantitative instrument developed through previous phenomenographic research and qualitative phenomenographic research itself. The study examined the learning experiences of participants in a faculty development program at a large Midwestern university. This is a yearlong program for junior, tenure-track faculty designed to promote deeper understanding and expertise in learning and teaching in higher education, foster evidence-based approaches to learning and teaching, and help participants develop or revise a course. Structured to promote critical inquiry and professional reflection (Light, 2003; Light & Cox, 2001), the program also accepts the phenomenographic premise that teachers who notice variation in ways of experiencing teaching—most notably the difference between teacher-focused and student-focused teaching—are more likely to take student-focused approaches to teaching (McKenzie, 2002). (There are two broad orientations concerning teaching commonly held in the literature; these distinguish between faculty who view teaching as the transmission of the teacher's knowledge to the students and those who view teaching as facilitating conceptual change in their students [Akerlind, 2003; Gow & Kember, 1993; Kember, 1997; Kember & Kwan, 2000; McKenzie, 2002; Pang, 2003; Prosser & Trigwell, 1999].)

Qualitative Component

To identify how faculty conceived of teaching and how their conceptions of teaching had changed during the course of the program, we conducted 25 semistructured interviews at the beginning and end of the program focusing on conceptions of teaching and learning. This research corresponds to Stages A, B, C, and G of the model in Figure 1. Questions included "What is teaching?" "What is student learning?" "Does teaching inform your learning in your research?" and "Does your learning in research inform your teaching?" We further asked participants to describe a course that represents how they teach, with specific follow-up questions about their teaching methods and assessments. In the postinterview, we also asked them to

Table 2
Conceptions of Teaching Among Program Participants

Type	Category	Description
I Teacher-Focused	A	Teaching as transmitting concepts of syllabus
	B	Teaching as transmitting teacher's knowledge
II Transitional	C	Teaching as helping students acquire concepts of syllabus
	D	Teaching as helping students acquire teacher's knowledge
III Learning-Focused	E	Teaching as helping students develop conceptions
	F	Teaching as helping students change conceptions

describe how their teaching had changed as a result of participating in the program (if they believed such a change had occurred) (Light, Calkins, & Luna, 2005).

We analyzed the interview data in stages. In the first stage, one researcher read through all interview transcripts to identify passages concerning the conceptions of teaching. In the second stage, the first researcher and two additional researchers independently coded those passages. Our analysis of the transcripts revealed six conceptions of teaching that parallel those described by Prosser and Trigwell (1999), and that relate to the approaches to teaching on which the ATI was developed (Prosser & Trigwell, 1999). We collapsed the six categories into three types (see Table 2). Teachers with Type I conceptions view teaching as transmitting information and concepts to their students, without considering students' prior knowledge of the subject. A professor of science, for example, explains that teaching means that you "have communicated some information to somebody else that [you] believe that they hadn't known." This professor seems to view teaching as merely conveying knowledge to tacitly receptive students, without taking their prior knowledge into account.

Teachers holding Type II conceptions understood teaching as helping students acquire content and concepts, drawing on the students' prior knowledge. A professor of engineering, for instance, describes this understanding of teaching:

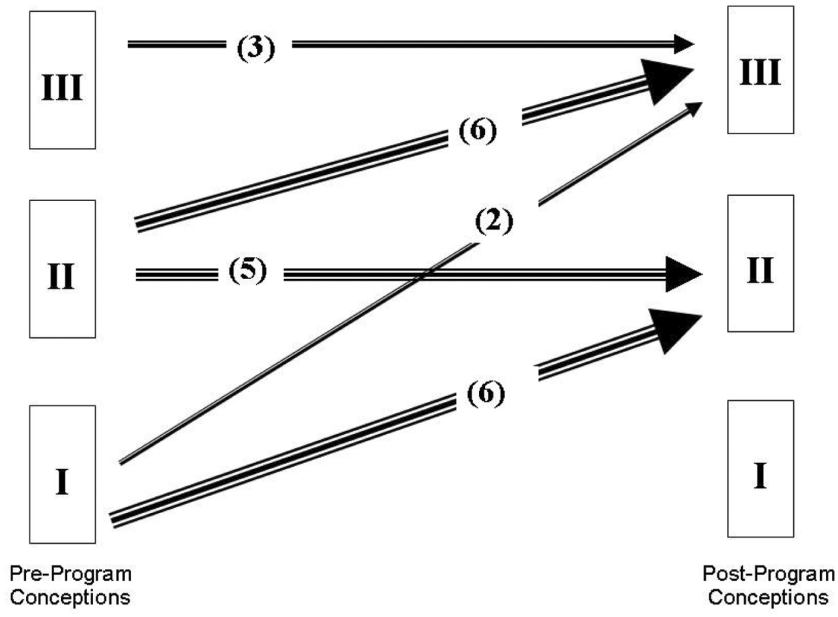
> Now I have this confidence that I can explain something to you that would allow you to learn the basics of it, and then go away and learn even more if you need to or if you want to. And even if you don't need to or want to, that you are going to be better off for learning what I have to explain to you. So teaching is more enabling . . . than just this classic filling-up-the-pitcher-with-knowledge.

In this case, the professor's view of teaching falls into the transitional Type II stage. Teaching is more than transmission ("filling up the empty pitcher"); teaching is facilitating the students' acquisition of knowledge and tools that he, as the expert, has already procured. Yet the professor still does not view teaching as promoting the student's own conceptual change, the hallmark of Type III conceptions.

Those holding Type III conceptions view teaching as finding ways to help students construct or reconstruct their own conceptions of the subject matter for themselves. They do not expect their students to passively accept the constructions of knowledge created by others (Light, Calkins, & Luna, 2005). A professor of history, for example, describes teaching as follows:

> I think of teaching as enabling learning, as trying to create circumstances that encourage students . . . to build on whatever they know already. And to try to define what directions they want to take their own learning in. My goal is to get [students] to think about the learning process as something that they are shaping. . . . I'm always trying to think about that as something to get them to own the learning process.

Figure 2
Change in Conception



Source: Light, Calkins, & Luna (2005).

In this case, the professor exhibits a Type III conception in speaking of students "shaping" and "owning" their own learning and wants them to make sense of knowledge by contextualizing it within their prior experience. This person views teaching as helping students develop their own conceptions, not just acquire what the teacher already knows.

Most of our study participants began the program holding Type I ($n = 9$) or Type II ($n = 13$) conceptions, and only a handful held Type III conceptions ($n = 3$). By the end of the program, most of the participants had changed their conceptions of teaching (see Figure 2). Although five participants holding Type II conceptions and the three participants holding Type III conceptions exhibited no change, the other participants changed to at least one type higher, with two participants even making two categories of change (Light, Calkins, & Luna, 2005).

Quantitative Component

To provide triangulation, we asked 31 participants over 3 years to complete the ATI before and after their program participation (Light, Calkins, Luna, & Drane, in press). This corresponds to Stages E, F, and G of the model in Figure 1.

Based on phenomenographic research (Trigwell & Prosser, 1996), the ATI is a standardized Likert-type scale inventory developed to provide a measure of faculty approach to teaching (Prosser & Trigwell, 1999; Trigwell & Prosser, 2004). It consists of 16 items and is intended to capture variation in two conceptually discrete dimensions by way of two subscales corresponding with the two main orientations described above: information transmission/teacher focused (IT) and conceptual change/student focused (CC). Paired t-test analyses indicated a statistically significant mean reduction on the IT-focused scale of 0.29 points for participants ($t = 2.92$, $df = 30$, $p = 0.01$). Mean CC-focused scores showed a

significant increase of 0.45 points ($t = 3.23$, $df = 30$, $p < .01$). Paired t tests on a control group ($n = 10$) showed a nonsignficant mean reduction on the IT subscale of 0.02 points ($t = .08$, $df = 9$, $p = .94$) and a nonsignificant mean increase of 0.09 points ($t = .67$, $df = 9$, $p = .52$) on the CC subscale.

The ATI and the qualitative interviews offered strong evidence that faculty moved toward promoting conceptual change in their students, conceptualizing and often adopting learner-focused approaches to teaching during the course of the program. Our findings further suggest that a faculty development program that emphasizes the variation between teacher-focused and learner-focused teaching can have a significant impact on a faculty member's development as a learner-focused teacher.

Implications for the Program

One of the primary goals of our program is to promote learner-focused teaching in our faculty participants. The phenomographic approach described above has helped us assess our participants' conceptions of teaching, and to determine the extent to which they have changed their conceptions over the duration of the program. Because we know that most participants start with Type I or Type II conceptions, we have worked to identify areas of the program (especially workshops and project groups) that can be strengthened to more fully expose participants to the variation between teacher-focused teaching and learner-focused teaching (McKenzie, 2002), ultimately to help them develop Type III conceptions. To measure long-term impact of the program, we have also created a new survey instrument to follow up with participants from the first 5 years of the program to assess their current conceptions of teaching.

Using the Phenomenographic Approach in Program Evaluation

Although it can require more planning and analysis than simple performance-based measures, the phenomenographic approach is broadly applicable and does not need to place a burden on teachers or evaluators. It can be used in any program designed to promote learning, within education, work, or other contexts. Phenomenography might be used, for example, to evaluate a new unit in a course, a faculty- or staff-development program, extracurricular programs such as service learning or study-abroad experiences, a job-training program, or a leadership development program. It can be used in conjunction with more traditional approaches so that evaluators gain information about what learners know and insight into how they know it. When time and resources are limited, qualitative data collection (e.g., individual interviews) can be relatively short and focused, and limited to a small sample of people, still allowing evaluators to discover far more about individual experience than would be available in performance-based measures alone.

Although a complete discussion of the phenomenographic method is beyond the scope of this article, we offer a few general guidelines below. Other sources (e.g., Akerlind, 2005; Bowden & Walsh, 2000; Marton, 1988, 1994; Marton & Booth, 1997; Marton & Pong, 2005) provide more detailed discussion of the phenomenographic method.

Phenomenography is appropriate when evaluators seek to move beyond measuring performance to measuring development in understanding or conception: how people think. The phenomenographic approach can be used to examine understanding of teaching and learning themselves, as in the case studies offered here, or of particular concepts (such as

job competence, effective leadership, or disciplinary concepts, such as those in statistics, economics, etc.).

Evaluators may use existing instruments to measure change in conception or approach, or they might develop their own instruments based on qualitative work. For understanding teaching and learning themselves, a number of validated inventories exist. As noted earlier, these include the ATI (Prosser & Trigwell, 1999; Trigwell & Prosser, 2004), the ASSIST (Tait et al., 1997), the RoLI (Meyer, 2000), and the COLI (Purdie & Hattie, 2002). These instruments would be appropriate in a program that seeks to help students and/or teachers develop their approaches to learning and/or teaching. Evaluators may also want to triangulate quantitative data from such instruments by conducting loosely structured interviews with program participants, as described in the case studies above.

Evaluators interested in using phenomenographic approaches should review published phenomenographic studies to better understand the methods used in interviewing and data analysis. Interview questions should seek to understand the participant's meaning, not to judge his or her knowledge against an external standard. The purpose of interviewing is to gain insight into the participants' subjective experience of learning in the context in question. Thus interview questions might probe how participants conceive of a particular area of study or concept, how they think about approaching particular problems, or what sense they make of particular issues or problems (Marton & Booth, 1997). To achieve a genuine investigation of these questions in the interview, researchers should approach the interview as a conversation (Marton, 1994), allowing the interviewee to explore avenues that emerge during the discussion.

In analyzing phenomenographic data, researchers seek to identify various ways of experiencing a phenomenon (e.g., understanding a particular concept) and to discern any internal hierarchy within these. In other words, the researcher should look for cases in which individuals describe their current understanding and levels of understanding they have held previously (Marton & Booth, 1997). Analysis should be done with a willingness to divert from categories initially found in the data so that researchers avoid ignoring data that do not fit this initial structure (Akerlind, 2005).

Naturally, there are certain constraints to using the phenomenographic approach. It is best used when learning programs are designed to produce conceptual change and is probably not well suited for short training sessions meant to convey limited factual information. The approach also presents several potential challenges for evaluators; for instance, evaluators must develop instruments tailored to the concepts involved in the learning program, and the analysis of data derived from qualitative interviews can be time-consuming, as is the development of inventories. However, the richness of the findings—and the potential they create for developing programs that promote deep learning and conceptual development—should compensate for any additional effort educators and program evaluators must invest.

Conclusion

In its 2001 report on educational assessment, the National Academies' Center for Education called for a change in educational assessment, stating that "assessment practices need to move beyond a focus on component skills and discrete bits of knowledge to encompass the more complex aspects of student achievement" (Pellegrino, Chudowsky, & Glaser, 2001, p. 3). Increasingly, K-12 and higher education institutions—and to some extent,

workplaces—have developed interest in measuring more fundamental change in student thinking than what can be revealed through most standardized exams. These "more complex aspects" of achievement might be defined in the same way Carl Rogers (1961) described the notion of *significant learning*:

> learning which is more than an accumulation of facts . . . learning which makes a difference—in the individual's behavior, in the course of action he chooses in the future, in his attitudes, and in his personality. It is a pervasive learning which is not just an accretion of knowledge, but which interpenetrates with every portion of his existence. (p. 280)

As we have argued earlier in this article, if the goal of educational program evaluation is to measure "pervasive learning," to uncover thinking in addition to learner performance, then performance-based measures are insufficient. What is called for is an approach in which the performance being measured is grounded in the learning experiences of the participants. A phenomenographic evaluation will allow program designers to understand the different ways in which learners conceive of and approach learning within the program, and the ways in which learners' conceptions and approaches change during the course of the program.

That said, the phenomenographic approach is not a substitute for basic assessment of learner performance. Educators can hardly be expected to do their jobs without some indication of what learners know. Rather, the phenomenographic approach offers insights that would remain hidden if only traditional assessment methods were used—it helps educators understand not just what their learners know but also how they know it. In other words, the phenomenographic approach taps into "significant learning" (Rogers, 1961) and the ability to perform. Taking a deeper approach to assessment and evaluation—one that incorporates profound changes in thinking that accompany performance changes—not only encourages learning that can help produce innovative thinkers but also promotes teaching practices that can further promote deep learning (Ramsden, 2003).

Traditional measures of learner performance can provide critical information about the content of learners' knowledge. Such measures fall short, however, in elucidating the ways in which learners understand that knowledge, and whether or not they have developed more complex ways of thinking about the material on which they are tested. To be truly accountable for high-quality education requires understanding how, and not just what, learners know. A program evaluation model that enables educators to assess how their interventions help change the way learners think, and not only what they know, will help move us closer to a system of education that produces individuals who are not simply learners but who also have the capacity to become excellent lifelong thinkers.

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