Making Waves:
Demonstrating a CTL's Impact
on Teaching and Learning

Marjorie Keeshan Nadler
Cecilia Shore
Beverley A. P. Taylor
Andrea I. Bakker
Miami University

In the face of increasing calls for assessment of all aspects of the university, centers for teaching and learning (CTLs) have increasingly searched for ways to document the impact of interventions. This article explores prior research about the activities of CTLs and how they have assessed programs and describes how a large-scale curriculum redesign and faculty development project can provide an opportunity to document the impact of a CTL. The use of assessment as both an intervention that improves teaching and learning and a means of documenting program impact is discussed.

In the present era of accountability, Centers for Teaching and Learning (CTLs) are called upon to document their impact on teaching and learning on their campuses. How can we provide evidence that the work we do makes a difference? The nature of the work that we do will set some parameters for how we can best document its effectiveness. Within these parameters, multiple methods can be used to demonstrate the impact of the CTL on teaching and learning. Using a large-scale CTL project as an example, we share the many ways in which a CTL can assess the impact of its work on teaching and learning at a university and discuss how these assessments can become part of the intervention itself. This project consisted of multiple elements and so suggests that by combining multiple smaller-scale interventions and evaluating in a global manner, CTLs may be able to make the impact of their work more visible.

The type of work in which CTLs engage can provide guidelines for appropriate assessments. Hines (2011) reported that the majority of her sample of "established, centralized" CTLs provided events and activities, consultation services, publications and resources, and grant programs. Nearly half also provided mentoring programs. Pchenitchnaia and Cole (2009) recruited a panel of 15 experts from established, well-reputed CTLs at research-extensive universities. The experts considered the following categories to be essential now and also in the future: consultations (for example, with individual faculty and TAs or with departments), organized university-wide orientation programs for TAs and new faculty, university-wide workshops, updated web resources, and service on committees relevant to teaching. Dotson and Bernstein (2010) interviewed 17 directors of institutions that the University of Kansas considered to be peer institutions. The typical activities of 50% or more of those institutions are grants, reimbursement for faculty participation in programs, technology support, and TA services, for instance, a course in college teaching.

In their landmark national survey of faculty development programs, Chism and Szabó (1997) found that programs evaluated different services (for example, events, grants, consultation, publications) at different frequencies and for different purposes. Events were most frequently evaluated (90%), and publications were the least frequently evaluated (45%). User satisfaction was the most typical measure for all services. About 36% of programs attempted to follow up on the impact of consultations on teaching by using student evaluations or observations, but programs assessed the impact of mentoring on teaching less than 20% of the time, and they rarely assessed the impact of publications. Programs rarely assessed the impact of their services on student learning; in fact, "only one respondent answered that such assessment is feasible" (p. 59). Belanger, Belise, and Bernatchez (2011) noted in their review of CTL assessments that "evaluations of the *outcomes* of activities are especially rare" (p. 131).

Given that the majority of services provided by CTLs feature single events or short-term consultative relationships, it is not surprising that Chism and Szabó's (1997) finding that assessment efforts focused on following up on events was replicated as recently as 2009 (Hines, 2009). Hines (2009) reported on assessment methods and outcomes described in interviews with 20 CTLs collected prior to 2007 in an upper Midwestern state. All of the schools obtained satisfaction data on center events. Eight out of 20 schools reported that they obtained data on impacts on teaching; these data all came from events and were generally self-reported. Five out of 20 schools reported that they obtained data on impacts on learning; these data came almost exclusively from events (such as workshops or

brown-bags) and were generally based on teacher perceptions of student learning. Plank, Kalish, Rohdieck, and Harper (2005) demonstrated that a rich understanding of the work that centers do can be attained by a set of relational databases that track people and events and allow, for example, accounting of the time spent by staff members in preparing for an event compared to the attendance at and evaluations of that event.

An extension of the Hines (2009) study to a wider range of 33 centralized teaching-learning centers (Hines, 2011) found an increasing interest in assessing the work of CTLs. CTLs obtained satisfaction data nearly universally for events and activities and at least 75% of the time for consults and mentoring. CTLs obtained impacts on teaching at least 75% of the time for events and activities, consults, mentoring, and grants. These measures predominantly included self-reports, follow-up classroom observations, student ratings, and grant reports. In one of the most extensive efforts to measure the impact on teaching, Belanger et al. (2011) reported finding that about a third of those who participated in use of the CTL services reported a change in learning in terms of how they thought about teaching (for instance, moving from a teacher-centered to a student-centered approach), and 83 to 92% (depending on their level of prior teaching experience) reported changing their teaching behavior as a result of their CTL experiences. Measures of student learning were used by 45% or more of the sample for events, consultations, and grants. CTLs generally measured student learning by means of faculty self-report, grant reports, and teacher evaluations of student performance. However, when large-resource or high-impact programs were at stake, a few centers also employed student self-reports, qualitative assessments of collected student work, pre-post scores for student performance, and/or broader measures of student success, such as retention or GPA.

Although CTLs have substantially increased their efforts to measure impacts on teaching and learning, this is difficult to do. First, as noted by Plank and Kalish (2010), it requires longitudinal evidence, such as follow-up surveys of clients. In addition, assessing impacts on teaching and learning from single or short-term events is difficult because too many other variables besides faculty development programs may be responsible for differences in student learning (Chism & Szabó, 1997). A single event is like throwing a pebble into a pond; at best it may create a small, hard-to-detect ripple (S. R. Hines, personal communication, October 28, 2011). However, CTLs are sometimes involved in large-scale curricular or pedagogical innovations in their institutions. Examples of such initiatives can be found in Lee's edited volume (2012) and also in Allen, Horne, Martin, and Solt (2011). These larger scale interventions,

extended over time and a number of courses, provide an opportunity to see the impact of faculty development initiatives throughout an institution. They are like boulders thrown into the pond that make noticeable and measureable waves (S. R. Hines, personal communication, October 28, 2011). Such large-scale interventions often consist of several components, so that even when multiple small interventions are not part of a single large intervention, they may be conceptually grouped so that the effect of them collectively may be more visible.

In this article, we will describe the effect of one such large-scale initiative at our institution and the unique opportunity that it afforded us to learn about and document the effect of our faculty development interventions. We embedded assessment of teaching and learning from the beginning of the project to find out whether the initiative succeeded. However, at about mid-point we began to realize that the assessment process itself was actually part of the intervention. Faculty benefitted from the feedback we were giving them about their teaching and their students' learning, and the next round of assessment results showed improvement. Similar discoveries were made by Jones, Sagendorf, Morris, Stockburger, and Patterson (2009), who found that assessment instruments could be used to encourage different types of teaching methods. Cook, Wright, and O'Neal (2007) would concur. They note that CTLs are especially well positioned to conduct action research on the effectiveness of interventions, and they are explicit in noting the cyclic "feedback loop" nature of action research. Plank and Kalish (2010) also note that assessing the work of the CTL feeds back to planning, better teamwork, and more reflection. We will describe the initiative at our institution, the methods we used to assess its and, correspondingly, our CTL's effectiveness, the methods used to provide feedback and support to faculty, and its impact on the culture of teaching and learning here.

The Top 25 Project

Miami University, a mid-sized public institution with approximately 15,000 undergraduates on its main campus and 6,000 on its regional campuses, has adopted a "student as scholar" model of teaching and learning that emphasizes developmentally appropriate inquiry-based learning (Hodge, Baxter Magolda, & Haynes, 2009). The university has a longstanding tradition of teaching excellence, with rigorous coursework supported by close faculty-student relationships (Moll, 1985). To maintain a standard of continuous improvement, we undertook new efforts to increase student engagement and inquiry, particularly methods directed

toward students' first year designed to set expectations for their entire university experience. The Top 25 Project represents one of these efforts, and it has been one of the major foci of our CTL over the last five years.

The university president tasked the Office of Liberal Education and our CTL with developing and carrying out the Top 25 Project, a course redesign project intended to significantly increase student engagement in introductory courses and, eventually, to impact the entire university through the spread of inquiry-oriented learning throughout the curriculum. In order to make the greatest impact on university culture, the Top 25 Project targets the courses in the university that enroll the largest number of students (either in many small sections or a few large sections). Twenty-five courses initially were selected for redesign, but that number eventually expanded to 29 courses. About two thirds of these courses align with our general education requirement, and the other third mark part of the core requirements of our business school. Taken together, the Top 25 courses account for over 20% of all undergraduate credit hours and, thus, have the potential to make a significant impact on student learning and culture.

While the Top 25 Project had well-specified goals, it allowed departments considerable flexibility in how they achieved those goals. We asked departments to redesign the pedagogy of these Top 25 courses to emphasize inquiry-based learning and other active-learning techniques, engagement with peer learners, critical thinking, and the use of class time for complex tasks rather than low-level material suitable for mastery outside the classroom. As secondary goals, we hoped that these changes would lead to increased student satisfaction and increased student time spent engaged with the course material. In many cases, redesigning courses toward these ends required that faculty relinquish some control in the classroom, learn to interact with students in new ways, develop assignments that promote inquiry and provide scaffolding as students learn new critical-thinking skills, do a better job of managing learning outside of the classroom, and, in some cases, learn new technologies. All of these challenges require faculty development.
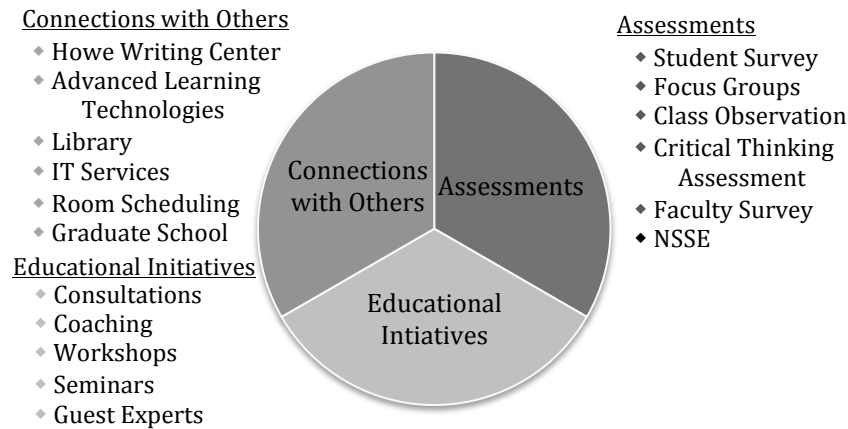
In order to address the need for faculty to learn new skills and grow professionally, we offered a variety of interventions that can be loosely categorized as education, connection to resources, and assessment, as shown in Figure 1. We worked with departmental teams individually as they developed their proposals. This was a two-step process that involved receiving feedback on a pre-proposal and help with developing content assessment plans before submitting their full proposal. The CTL continued to assist the teams as they moved into pilot testing their designs. We of-

Figure 1
Model of Top 25 Program CTL Interventions

CTL Interventions

Connections with Others
- Howe Writing Center
- Advanced Learning
   Technologies
- Library
- IT Services
- Room Scheduling
- Graduate School

Educational Initiatives
- Consultations
- Coaching
- Workshops
- Seminars
- Guest Experts

Assessments
- Student Survey
- Focus Groups
- Class Observation
- Critical Thinking
   Assessment
- Faculty Survey
- NSSE

Connections with Others | Assessments | Educational Intiatives

fered two-day workshops each year with guest experts on course redesign, inquiry-based learning, and assessment as well as time for individual consultations with the guest expert. We offered numerous seminars during the academic year that were open to the entire university community but focused on issues relevant to the Top 25 redesigns, such as engaging large classes in discussion, assessing critical thinking, and grading written assignments efficiently. In the first year of the project, team leaders participated in an inquiry seminar in which they read and discussed some of the literature on inquiry-based learning and attempted to define what inquiry and inquiry-based learning meant in their own discipline. We employed coaching and consulting to help teams refocus their courses.

In addition to these educational interventions, faculty development efforts also included creating connections between departmental teams and university resources. Via the two-day workshops, representatives from the Howe Center for Writing Excellence, the library, and our Advanced Learning Technologies group provided faculty teams with initial consultations. These consultants continued to be available to the teams throughout the process. As necessary, we acted as liaisons with Room Scheduling, IT Services, the Graduate School (regarding TAs), and other university

offices in order to make sure faculty had the resources they needed to be successful. We also made sure that new teams getting started had an opportunity to interact with and learn from previous teams.

Finally, we had a heavy focus on providing formative assessment for the teams during the initial offerings of the redesigned course. These will be described in more detail below. We gradually realized that these assessments were making a significant impact and should be considered part of the faculty development intervention.

To prevent these interventions (educational, connections, and assessment) from overwhelming our CTL, only about six departmental teams began their redesign process each year. Each team received some financial support that was primarily used for summer salary for the faculty team members in the initial planning states of each project. The phase-in process also helped to spread the expense over several fiscal years.

The departments were free to select the pedagogical structures and active-learning techniques that best fit their discipline and that focused on how experts practice the discipline. As a result, the Top 25 Project included a variety of models. Even courses that one might expect to employ similar pedagogical styles, such as introductory lecture courses in the business school, used quite different models. One business course completely inverted the classroom; one maintained lecture, but added breakout sessions for small-group problem solving; yet another introduced sophisticated software that let students practice management decisions in a virtual environment that they then debriefed in class. To illustrate the scope of the project, some examples that represent the diversity of approaches are shown in Table 1. More detailed information about the pedagogical methods used in the Top 25 project can be found in Hodge, Nadler, Shore, and Taylor (2011).

As with many mandated programs, the Top 25 project met with some faculty and student resistance. The university administration expected all departments with courses on the list to redesign those courses and to eventually incorporate those designs into all sections of the course. Some departments were reluctant to become involved, even though the university offered financial support for course development. Leaders in those departments may have felt their courses were already quite good, viewed the project as too much work, and/or felt that maintaining the redesign would be a drain on departmental resources once the funding period was over. It helped, though, that we did not want everyone to begin at once, so that reluctant departments could wait and be encouraged by the positive outcomes in other departments. To encourage reluctant departments, we met with department chairs and key faculty

Table 1
Top 25 Project Redesign Examples

Course	*Redesign Approach*
MKT 291	**Inverted classroom**: Initial content learning was outside the classroom with pre-recorded videos of faculty and experts, PowerPoints, reading, and quizzes so that in-class time could be spent analyzing cases, working in teams on marketing simulations, and working on major projects such as corporate audits or marketing plans.
CHM 144/145	**Developed inquiry based labs**: The CHM 144/145 team redesigned the labs so that students engaged in inquiry-based labs that allowed students to learn about the nature of science, sometimes ask their own questions, and get a realistic experience of the way professionals practice science.
THE 191	**Total redesign**: The team took what had been a standard large class lecture-based approach to theater history and turned it into a theater appreciation experience for students. There is a large master class coordinated by one faculty member in which faculty rotate in for their areas of expertise. The master class is linked to smaller breakout sections led by graduate assistants where students experience each aspect of theater being presented (e.g., lighting, makeup, set design). This culminates in teams of 6 writing, producing, and performing their own 10-minute theater piece.
PSY 111	**Use of undergraduate teaching associates in coordination with course revision**: The PSY 111 team refocused large lecture classes on how psychologists use evidence to examine human behavior and mental processes. These lectures were linked with students meeting a 4th day each week in a small breakout section led by trained, advanced undergraduate students.
COM 135	**Buffet approach**: The team refocused the public speaking class on inquiry and student engagement. After agreeing to core learning outcomes and central assignment areas, the team created a range of options for specific assignments and activities and shared them on a central website for instructors. The COM 135 team created computer modules to complement the approach, and faculty were given freedom to select options from the central site as well as to create new ones and share them.

MBI 131	**Small groups within large lecture**: The Community Health Perspectives team divided the class into part lecture and part teamwork days. Students were divided into groups of about 8 to discuss application of course material to societal issues, upload summaries to the course website to share with the class, and research projects to present based on their own questions from course material.
MGT 291	**Adopted simulation software:** The Management course adopted a software product called Virtual Leader. Outside of class, students work on simulations in which they have to deal with different situations a manager might encounter. In-class discussions debrief those simulations.
ENG 111/112	**Move to laptop classrooms:** College composition and literature courses have moved to laptop classrooms that allow the emphasis of the course to expand to digital media for both evaluation and production, have embraced a core set of inquiry projects, and focus on students doing more writing and group work during class time.

members to brainstorm possible designs for their course and provided discipline-specific educational opportunities, such as funding for attendance at pedagogical conferences or a visiting consultant.

Even in departments in which the design team was enthusiastic about the project, we encountered some resistance from individual faculty members. Often these were faculty who had always lectured and saw no reason to change. We encouraged them to try out just a few changes initially to see what effect it had on student learning and often this won them over. In a small number of cases in which a faculty member was near retirement, we consulted with department chairs and decided it was acceptable for that section not to change.

Some faculty, especially untenured and part-time, resisted not because they did not want to do something new, but rather because they feared their course evaluations would go down due to student resistance to the new approaches, and they would be penalized as a result. Thus, it was vital that the entire upper administration supported the Top 25 project and that they said so publicly and often. We worked with chairs and deans to make sure they understood that teaching evaluations were likely to go down initially, but were also likely to rebound, and we reassured faculty

that we "had their back." We also made it clear that faculty would not be identified as individuals in any of the assessment results that we reported to the administration.

In many courses, students resisted the new approaches that called for them to take on more work outside of class and to wrestle with critical thinking in new ways. Student expectations had been shaped by the reported experiences of prior students, so they were initially unprepared for the new course expectations. Because many students had not developed the necessary skills in independent critical reading required by the new approaches, scaffolding needed to be built into course designs. Course evaluations did drop initially for most classes. However, once faculty became more comfortable with the new teaching styles and students became acclimated to the new work expectations, the course evaluations ultimately rebounded to prior levels. Whether dealing with students, individual faculty, or departments, it was important for our CTL staff to remain flexible, respectful, and compassionate, yet make it clear that this was a presidential directive that was not going to go away.

Assessment Methods for Impact on Teaching and Learning in Top 25 Courses

We built multiple assessment methods into the project to inform us whether the project interventions were improving teaching and learning. Each course was involved in some type of assessment every semester, and the faculty members received feedback from these assessments. We describe below each of our assessment pieces along with the kinds of information we gathered and returned to faculty. In the short term, our assessments have functioned as formative assessment and had a significant impact on course designs; in other words, they acted as another form of intervention that led to greater improvements. In the long term, some of them have functioned as summative assessments and have allowed us to see the impact of this major faculty development effort.

Classroom Observations

We utilized classroom observations early in the course revision process. A Top 25 staff member paid a visit to each of the redesigned classes and discussed the results of that observation with the team. In cases where there were many sections of the course or significantly different activities on different class days (for instance, lecture versus breakout sections), staff members observed multiple sections and/or multiple days. In

many ways these were no different than other observations for faculty improvement, but we focused specifically on how the course pedagogy reflected the engaged-learning and inquiry-based approach and on where greater student engagement or additional options for inquiry could be employed. For example, was it clear that there was a mechanism in place to ensure that students came to class ready to participate in discussion or other activities? Was the teacher presenting challenging questions and encouraging students to respond to each other's comments and questions? Were students being challenged to explore alternative interpretations or solutions? Top 25 staff followed a common classroom observation protocol, which is available on the CTL Top 25 website (http://www.units.muohio. edu/celt/engaged_learning/top25/assessment.php). The reports of these observations served as purely formative feedback for each course team. Top 25 staff members shared these reports orally with the instructor and other team members; staff members did not maintain written records of the class observations in order to reassure faculty that they would not be used for evaluation purposes.

Focus Groups

We conducted hour-long focus groups with students, usually in the second semester of offering the revised course, and again about a year later. We invited randomly selected students from the revised sections of each course to participate in one of two or three focus groups for each course. Top 25 program staff members used a common protocol (available on the CTL Top 25 website) to lead focus groups. Staff members asked students to identify the activities they engaged in for the course and to provide feedback about how helpful each activity was in terms of their learning. The questions focused on engagement with other students, use of inquiry based learning, how challenging the course was, how much work the course required out of the classroom, and students' perceived expectations for critical thinking. We also collected student definitions of what they thought critical thinking was within the framework of the course. We summarized the results in a brief written report without student or instructor names and shared these reports with each team as formative feedback. In a few cases in which a significant problem became apparent during the focus group, Top 25 staff members held immediate conversations with the team leader.

Student Surveys

Top 25 staff conducted a survey of students in each of the Top 25

courses at the end of the semester. An end-of-the semester survey examined student reports of the importance of different types of activities to their learning, the frequency of course activities such as the amount of engagement with other students during class time, the emphasis on student development of knowledge and critical thinking, and their satisfaction with the course. Some of the items were taken from the National Survey of Student Engagement (NSSE) with permission (www. nsse.iub.edu). A complete copy of the student survey can be found in Appendix A. We conducted this survey at least once a year for each Top 25 course for a three- to four-year period. We administered the survey to both redesigned and traditional sections of the course. In some cases we were able to do this before the redesign began, and for others it was done during the piloting phase, in which only some sections were using the new model. We compared the results for the redesigned sections to those for the traditional sections in order to examine the impact of the new approaches. Faculty teams received reports that compared their current semester's redesigned course with traditional sections of their course and with all redesigned courses combined (that is, courses other than their own). Faculty also received longitudinal data tables that enabled them to see changes in their survey results from year to year. Some teams found this data sufficiently useful that they asked to have their classes surveyed more frequently than we had planned.

The results from the Top 25 student survey suggest that the faculty members' emphasis on inquiry-guided learning is affecting students' experiences in the classroom. For example, students in the redesigned courses were significantly more likely than students in the traditional sections to work on a paper or project that required integrating ideas or information from various sources, to work on assignments that required them to combine ideas from the course to build understanding on their own, and to support their ideas and beliefs with data or evidence (see Table 2 for the detailed statistical results of the student survey analyses). Feedback from students also indicated that students' engagement with peer learners in the redesigned Top 25 courses differed from the experiences of students in the traditional courses. Students in the redesigned courses reported working more frequently with other students on projects during class time, asking questions in class or contributing to class discussions, and discussing ideas from their readings or from the class with others outside of the class. Similarly, students in the redesigned courses reported spending less time in class on low-level tasks like memorization and more time preparing outside of class than did students in the traditional courses.

The fact that the student surveys were administered regularly allowed us to track some interesting trends in critical thinking in redesigned versus traditional courses. Early analyses of students' self-reports of their critical thinking in the Top 25 courses, using a five-item critical thinking scale, indicated a significant difference between students in the redesigned courses and the traditional courses. However, the emphasis on critical thinking in the traditional sections has increased steadily since the first year of the project, to the point that there is no longer a significant difference between the traditional and redesigned sections of the courses in the most recent data (see Table 2). These results suggest that the Top 25 Project may be having an indirect impact on course sections at the university that are not yet a part of the project. The initial increased emphasis in critical thinking that was, at first, only visible in redesigned Top 25 courses is now appearing in Top 25 course sections even before they have begun their redesign, suggesting that the desired culture change in the institution is occurring. Thus, to return to our metaphor of pebble-sized versus boulder-sized interventions, our results show not only that the boulder-sized combination of education, connection to resources and assessment had an impact on the redesigned sections themselves, but also that it rippled out to other course sections.

Faculty Surveys

We received feedback on the project from the faculty on the redesign teams on an ongoing basis. We felt it was also important, however, to hear from the faculty who were teaching the courses but had not been involved in the redesign. Thus, four years into the project we surveyed all faculty teaching redesigned courses about their experiences with the course. The survey focused on the Top 25 project objectives such as engaging students in their learning, using inquiry-based learning approaches, moving lower-level learning outside of class, and enhancing critical thinking. We also asked faculty about their perceptions of student preparation for class time and student learning as well as their own satisfaction with teaching a Top 25 course and the level of work the redesigned approach called for from faculty. If the faculty member also had taught a traditional section of the course, we asked him or her to compare students' performance and their own experiences using the two approaches. A complete copy of this survey is available in Appendix B. Because about 50% of the survey respondents indicated that they had little or no involvement with the redesign teams (the groups with whom we worked directly), we were able to learn about the indirect and ripple effects of our faculty development work.

Table 2
Top 25 Student Survey Results

Item	Traditional (N = 2,398) M (SD)	Redesigned (N = 5,099) M (SD)	t value	p value
Worked on a paper or project that required integrating ideas or information from various sources.	2.35 (1.02)	2.93 (0.86)	-25.18	< .001
Worked on assignments that required you to combine ideas from the course to build understanding on your own.	2.74 (0.87)	2.96 (0.79)	-10.52	< .001
Supported your ideas and beliefs with data or evidence.	2.81 (0.95)	3.08 (0.81)	-12.24	< .001
Worked with other students on projects during class time.	1.98 (0.99)	3.00 (0.94)	-42.30	< .001
Asked questions in this class or contributed to class discussion.	2.36 (0.94)	2.53 (0.90)	-7.21	< .001
Discussed ideas from your readings or from this class with others outside of class.	2.15 (0.91)	2.36 (0.93)	-9.26	< .001
Memorizing facts, ideas, or methods from this course and readings so you can repeat them in pretty much the same form.	2.71 (0.96)	2.52 (0.91)	7.30	< .001
Time spent preparing for class.	3.10 (0.86)	3.46 (0.92)	-15.91	< .001
Five- item critical thinking scale (early data)	2.59 (0.75)	2.84 (0.62)	-3.23	.001
Five- item critical thinking scale (recent data)	2.94 (0.69)	2.90 (0.64)	1.63	*ns*

Faculty teaching Top 25 courses reported that their teaching was consistent with the goals of the project. They reported that their course emphasized a variety of inquiry-guided learning activities. For example, 96% of faculty reported that their course emphasized applying theories or concepts to practical problems or new situations. When asked how often they encourage students to ask questions or contribute to class discussions, 96% of Top 25 faculty members reported that they encouraged their students to do so "often" or "very often." In addition, 72% of the Top 25 faculty members reported that they "often" or "very often" required students to work together on projects during class time. When asked about the extent to which their course emphasized memorizing facts, ideas or methods, 57% of faculty in the Top 25 faculty survey reported that their course emphasized memorization "not at all" or "very little."

The survey also provided an opportunity to examine faculty members' reactions to the changes that they were enacting in their courses. The majority of faculty members reported that they were comfortable teaching the course (90%) and found it enjoyable to teach (90%). Most faculty members (83%) reported that the workload of the redesigned course, compared to the traditional course, had increased "somewhat" or "a great deal." The survey results also suggest that the Top 25 Project has changed the way that faculty members teach not only their Top 25 courses, but other courses as well. When asked whether the Top 25 redesign influenced the way they taught their other courses, 82% of faculty reported that the redesign project influenced their other courses "some" or "a lot."

The Top 25 Faculty Survey also provided insight into faculty members' perceptions of student learning and effort. When asked how students' learning in the redesigned Top 25 course compared with their learning in the traditional courses, 77% of faculty reported that students' learning had increased "somewhat" or "a great deal." In addition, 70% of faculty reported that students' critical thinking in the redesigned course had increased "somewhat" or "a great deal" in comparison to students in the traditional course.

Direct Assessments

We also carried out direct assessments of student critical thinking. We collected a random sample of student work from the redesigned sections of courses. A team of multidisciplinary faculty trained to assess critical thinking, the Assessment Fellows, utilized a rubric to assess the level of student critical thinking illustrated in those samples. Quite often, the Assessment Fellows employed the Miami University adaptation of the

Washington State Critical Thinking Rubric or a Scientific Inquiry Critical Thinking Rubric developed by Beverley Taylor (both are available at the CTL Top 25 website). Sometimes, the course team developed a modified rubric for critical thinking that was more appropriate for their discipline. In a few cases, the content of the students' work was so specialized that knowledge from that discipline was needed to fully evaluate the critical thinking represented, and in those cases a team of faculty from that department or a closely related field completed the critical-thinking assessment. Student work was assessed at least twice for each course, one year apart. We shared the results of the first assessment with the team along with suggestions about revisions to the assignment that might lead to better critical thinking on the part of students. This feedback often led to altered assignments and/or variations in teaching approaches that resulted in improved student scores in the second round of assessment. Some courses have now been through this revision cycle three or four times. Faculty, students, and the Assessment Fellows report that critical thinking has improved. However, because the assignments and rubrics have changed along with the student performance, it is difficult to make direct comparisons of student performance over time.

Course-Specific Measures

All of the above assessments were conducted by Top 25 staff rather than faculty members teaching the courses, and the assessments were common to all of the courses. Each course team also was responsible for assessment measures of content learning by students, such as common exam questions or reviews of student work, and those measures varied widely. Team leaders also provided anecdotal reports of altered student and faculty perceptions and approaches after the revised course approach had been in place two to four years.

Assessment Methods for Impact on Student Experiences Across the Institution

Because the goal of the Top 25 program was culture change throughout the university by focusing on the largest-enrollment courses, the Top 25 staff used not only assessment tools that were designed specifically for the Top 25 Project, but also existing institutional data that included all students, not just those in Top 25 courses. We examined the institution's results from the National Survey of Student Engagement (NSSE) over time, starting in 2003 before the Top 25 Project was launched and running every

other year through 2011. The NSSE data drew on a sample of first-year students and seniors each year in that time frame, and it allowed us to compare the results for Miami University with the entire NSSE sample.

Results from the NSSE suggest that the increase in inquiry-guided learning activities is part of a broader institutional change at Miami University. For example, in 2003, prior to the start of the Top 25 Project, there was no significant difference between first-year students at Miami and first-year students at other participating NSSE institutions in the reported course emphasis on applying theories or concepts to practical problems or in new situations. The reported emphasis on applying theories or concepts to practical problems or new situations increased significantly for Miami first-year students from 2003 to 2011. By 2011, first-year students at Miami reported more course emphasis on applying theories and concepts than did students at other participating NSSE institutions (see Table 3 for the detailed statistical results of the NSSE analyses).[1]

The NSSE results also suggest that Miami University has improved in the extent to which students engage with peer learners. In 2003, Miami first-year students reported lower levels of peer engagement in class than did students at comparison institutions. The level of peer engagement reported by Miami first-year students increased significantly between 2003 and 2011. By 2011, the original pattern of results had reversed: Miami students now reported significantly more peer engagement in class than did students at comparison institutions (see Figure 2).

Finally, the NSSE results indicated a change in the amount of preparation that students do outside of the classroom. Between 2003 and 2011, there was a significant increase in the amount of time that Miami first-year students spent preparing for class (see Table 3). In 2003, only 39.7% of first-year students reported spending 16 or more hours preparing for class each week. By 2011, that number had increased to 50.7% of first-year students.

We cannot claim that the only thing that varied over the time period examined by the NSSE was the Top 25 Project. However, it was the centerpiece of a university effort to focus on engaged learning, and many of the Top 25 interventions were key initiatives during that time period. Using the existing NSSE data in conjunction with the Top 25 assessments provided additional support to some of the findings of the Top 25 assessments. More importantly, using an institution-wide assessment tool such as the NSSE allowed us to detect some of the first potential "waves" of change resulting from the Top 25 Project's impact on the university.

Discussion

Assessing the effectiveness of the CTL is, of course, important for both

Table 3
NSSE Results for Miami First-Year Students and All NSSE First-Year Students, 2003 and 2011

2003 – *Miami vs. NSSE*	*Miami* (N = 440) M (SD)	*All NSSE* (N = 45,991) M (SD)	t *value*	p *value*
Course emphasis on applying theories or concepts to practical problems or in new situations	3.08 (0.86)	3.01 (0.86)	1.70	ns
Peer engagement in class	2.24 (0.77)	2.34 (0.80)	-2.71	<.01
Time spent preparing for class	4.28 (1.56)	4.11 (1.70)	2.21	<.05

2011 – *Miami vs. NSSE*	*Miami* (N = 448) M (SD)	*All NSSE* (N = 185,241) M (SD)	t *value*	p *value*
Course emphasis on applying theories or concepts to practical problems or in new situations	3.23 (0.78)	3.09 (0.85)	3.54	<.001
Peer engagement in class	2.57 (0.85)	2.44 (0.87)	3.24	<.01
Time spent preparing for class	4.66 (1.59)	4.25 (1.66)	5.00	<.001

2003 *Miami vs. 2011 Miami*	*2003 Miami* (N = 440) M (SD)	*2011 Miami* (N = 448) M (SD)	t *value*	p *value*
Course emphasis on applying theories or concepts to practical problems or in new situations	3.08 (0.86)	3.23 (0.78)	-2.63	<.01
Peer engagement in class	2.24 (0.77)	2.57 (0.85)	-6.08	<.001
Time spent preparing for class	4.28 (1.56)	4.66 (1.59)	-3.39	<.001

Figure 2
**Percentage of First-Year Students
Who Worked With Other Students on Projects
During Class "Very Often" or "Often" During the Current School Year**
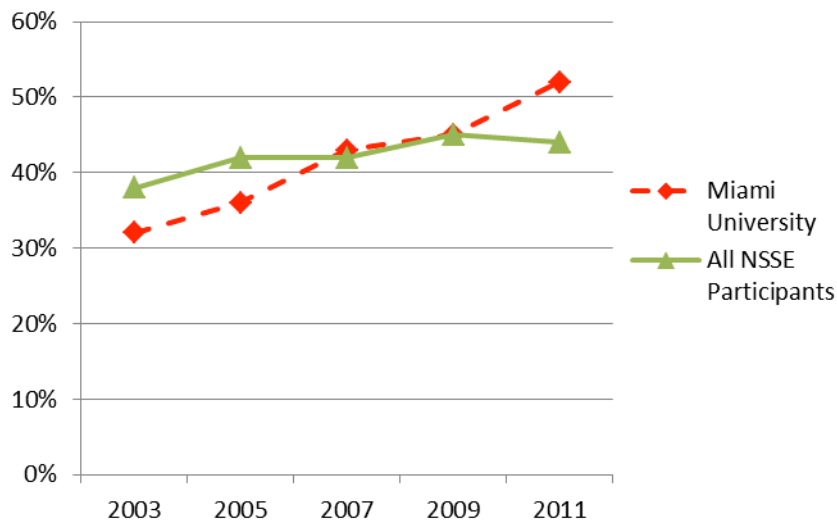
accountability and improvement. Equally important, however, is that, by doing so, the center provides a model for faculty of scholarly and reflective teaching practice. Generally, CTLs encourage faculty to set learning goals, search the literature for effective means of helping students reach those goals, assess student learning and reflect for improvement. CTL leaders should model scholarly teaching by following scholarly practices themselves.

Our experience indicates that not all assessment efforts are equally scalable. Looking for the impact of a single workshop on student learning is like looking for a needle in a haystack. In some cases it might, in fact, be life-changing for someone. In other cases, it may just be one more little nudge toward a change the faculty member was thinking of making anyway. To use a concept from strategic communication, the effectiveness of communication is not necessarily related to the number of messages; what matters is the impact the messages make. Counting up the number

of consultations, workshops, or interventions we offer will not tell us if those interventions have resulted in changes in learning or teaching. We have a much better chance of seeing the impact of our work when we have many different convergent influences that are regularly viewed through the same lens so that we can compare changes across time and across comparable redesigned and traditional sections.

As with any large-scale initiative of this type, our faculty development intervention was complex. It included many elements, such as educational seminars on inquiry learning, workshops, connections to intensive support from different offices for developing a proposal that would be appropriate for the discipline and the staffing model of the department, and ongoing dialogue with other course teams about what was or wasn't working. Similarly, the assessments were numerous, encompassing a variety of quantitative and qualitative methods, and included continuous formative and summative assessment feedback. Rather than try to assess the impact of any single intervention, we sought to assess the impact of the collective interventions (assessments included) over time.

All of this work encompassed significant time in an ongoing relationship between the Center and the departmental teams. It often took 3-4 years for the instructors and the students to become comfortable with the new model. For example, one of the courses in our first cohort had focused primarily on facts and technical skills, and the faculty members did not see critical thinking as important to the course. Two of our staff worked with members of that team to help them see that they could help students develop critical thinking skills as they practiced their technical skills by designing assignments that asked students to go beyond organizing data to analysis and drawing conclusions. Over multiple semesters, the faculty developed scaffolded assignments that we critiqued, each time urging them to go a little further. Each time the Assessment Fellows assessed the students' work for the course, they saw improvement, which encouraged the faculty members to keep trying to improve both the assignments and their support. This was a three-year process involving frequent contact between the two CTL staff members and the faculty team, but those faculty members are now among our most vocal supporters of the value of assessment in course design. Analogous results can be seen in results from faculty learning communities, where the development of a long-term relationship among participants also appears to be important (Cox, 2004; O'Meara, 2007).

Our experience resonates powerfully with the "lessons learned" by Jones et al. (2009). Two of their key lessons were that teaching cannot be boiled down to a recipe and that effective course design is critical. They

recommend that CTLs know and take advantage of institutional context, practice what they espouse, get faculty involved in the process, seek outside assistance, and be flexible and willing to learn. The ability of our course teams to redesign their own courses, with strong support from a number of offices, was critical to our success. In addition, the leadership team had to be transparent and flexible.

We found that multiple assessments of teaching and student learning provided evidence for the effectiveness of the Top 25 initiative overall. As in most field experiments, we cannot pinpoint any one piece of this complex package of interventions that was the "magic bullet," but we believe that the act of assessment itself played a role in bringing about culture change. Feeding the results of faculty members' behavior back to them creates a feedback loop that has a powerful potential for changing that behavior (Goetz, 2011). In that way, assessment was both a means and an end.

Other CTLs can focus on outcomes related to student learning and teaching as well. This can be done as part of a larger scale initiative, but it also can be done by grouping multiple smaller-scale interventions and evaluating in a global manner. The relational database used by Plank et al. (2005) allows the tracking of the topics of consultations with individual clients, showing the evolution of the relationship with that client. Belanger et al. (2011) report an overall assessment of impact on faculty learning and teaching practices based on a collection of CTL services rather than a large scale initiative; this kind of approach can be extended to consider student learning as well. A greater emphasis on assessment can be an additional intervention tool for CTLs, and it can also serve as feedback for the CTL itself to examine the waves of influence from the larger scale boulder of a group of CTL actions.

Footnotes

[1]For the sake of brevity, only the statistical results for first-year students are presented. For all NSSE results reported here, the pattern of results was identical for seniors.

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Marjorie Keeshan Nadler *is a Professor of Communication and was team leader for the COM 135 class in the first round of the Top 25 Program. She is the current Director of the Top 25 Program, and is a Faculty Associate for Miami's Center for the Enhancement of Learning, Teaching, and University Assessment.* **Cecilia Shore** *is Professor of Psychology and Director of the Center for the Enhancement of Learning, Teaching, and University Assessment. Her recent work focuses on teaching and mentoring, e.g., inquiry-based learning in undergraduate education, educating undergraduates in psychology, and mentoring graduate students for faculty roles. She received the Associated Student Government Outstanding Teacher Award in 1990, and the College of Arts & Science Distinguished Educator Award in 2000.* **Beverley A. P. Taylor** *is Professor of Physics at Miami University. In 1999 she was elected a Fellow of the American Physical Society in recognition of her contributions to the field of physics education and has also received a Distinguished Service Citation from the American Association of Physics Teachers. As a Faculty Associate in the Center for the Enhancement of Learning, Teaching, and University Assessment, she has led the Top 25 Project and provided assessment assistance to other faculty. Her most recent scholarly work is focused on teaching and assessing critical thinking skills and on investigation of issues related to the success of females in science.* **Andrea I. Bakker** *is the Assistant Director of Institutional Research at Miami University. She has served as an assessment consultant on the Top 25 administrative team and also sat on the committee that reviewed Top 25 proposals.*

Appendix A
Top 25 Student Survey

For each of the following items, indicate how important the item is in helping you learn in college. *[Not important (1), Somewhat important (2), Important (3), Very important (4)]*

1. Engaging in activities that encourage me to "become my own teacher."

2. Spending most of class time listening to the instructor lecture.

3. Engaging in course activities that were designed for me to discover course concepts and ideas for myself.

4. Developing and researching my own questions about the course material.

5. Engaging in course activities that helped me learn how to discover new ideas for myself.

6. Having the instructor tell me everything I need to know in this class.

7. Working on assignments that gave me an opportunity to discover new ideas without being taught them specifically.

For each of the following items, indicate how often you have done each of the following activities in your section of this class. *[Never (1), Sometimes (2), Often (3), Very often (4)]*

8. Asked questions in this class or contributed to class discussion.*

9. Worked on a paper or project that required integrating ideas or information from various sources.*

10. Worked with other students on projects during class time.*

11. Discussed ideas from your readings or from this class with others outside of class.*

12. Put together ideas or concepts from different courses when completing assignments or during class discussions.*

13. Worked on assignments that required you to combine ideas from the course to build understanding on your own.

14. Worked on course assignments that expected you to explain your reasoning.

15. Supported your ideas and beliefs with data or evidence.

16. Engaged in course activities that helped you to learn to think in new ways.

17. Tried to see how different facts and ideas fit together.

18. Came to this class without completing readings or assignments.*

19. Worked harder than you thought you would to meet the instructor's standards or expectations for this class.*

To what extent has your work in this course emphasized the following mental activities? *[Very little (1), Some (2), Quite a bit (3), Very much (4)]*

1. Memorizing facts, ideas, or methods from this course and readings so you can repeat them in pretty much the same form.*

2. Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components.*

3. Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships.*

4. Making judgments about the value of information, arguments, or methods such as examining how others gathered and interpreted data and assessing the soundness of their conclusions.*

5. Applying theories or concepts to practical problems or in new situations.*

6. Thinking critically and analytically.*

Mark the box that best represents the quality of your relationships with people in this class.

7. Other students in this course. *[Unfriendly, unsupportive, sense of alienation (1) to Friendly, supportive, sense of belonging (7)]*

8. Faculty member(s) teaching this class. *[Unavailable, unhelpful, unsympathetic (1) to Available, helpful, sympathetic (7)]*

9. About how many hours do you spend in a typical 7-day week preparing for this class (e.g., studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)? Do not include time spent in class. *[0 hours per week (1), More than 0 but less than 2 hours per week (2), 2 or more hours but less than 4 hours per week (3), 4 or more hours but less than 6 hours per week (4), 6 or more hours per week (5)]*

10. Overall, how satisfied are you with this course? [*Very dissatisfied (1), Dissatisfied (2), Neither satisfied nor dissatisfied (3), Satisfied (4), Very satisfied (5)]*

11. If you could start over again, would you enroll for this course again? *[Definitely no (1), Probably no (2), Probably yes (3), Definitely yes (4)]*

Note. This item is from the National Survey of Student Engagement (www.nsse.iub.edu).

Appendix B
Top 25 Faculty Perceptions Survey

Indicate how often you have designed activities or assignments for use in your Top 25 classes that included: *[Never (1), Sometimes (2), Often (3), Very often (4)]*

1. Encouraging students to ask questions or contribute to class discussions.*

2. Asking students to work on a paper or project that required integrating ideas or information from various sources.*

3. Requiring students to work together on projects during class time.*

4. Asking students to discuss ideas from the readings or from the class with others outside of class.*

5. Asking students to put together ideas or concepts from different courses when completing assignments or during class discussions.*

6. How often do you think students come to class without completing readings or assignments? *[Never (1), Sometimes (2), Often (3), Very often (4)]**

To what extent has the work in your course emphasized the following mental activities? *[Very little (1), Some (2), Quite a bit (3), Very much (4)]*

7. Memorizing facts, ideas or methods from the course and readings so that they can be repeated in pretty much the same form.*

8. Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components.*

9. Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships.*

10. Making judgments about the value of information, arguments, or methods such as examining how others gathered and interpreted data and assessing the soundness of their conclusions?*

11. Applying theories or concepts to practical problems or in new situations.*

12. Thinking critically and analytically.*

13. How many hours do you think students spent in a typical 7-day week preparing for your class (e.g., studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)? *[More than 0 but less than 2 hours per week (1), 2 or more hours but less than 4 hours per week (2), 4 or more hours but less than 6 hours per week (3), 6 or more hours per week (4)]**

14. How much were you involved in the initial redesign of your Top 25 course? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

15. How much would you like to have been involved in the initial redesign of your Top 25 course? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

16. To what extent has the spirit of the original redesigned course been sustained in subsequent offerings of the course? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

17. Has the Top 25 redesign influenced the way you teach your other courses? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

18. How comfortable are you teaching the redesigned course? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

19. How enjoyable is it to you to teach the redesigned course? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

20. How much work is it for you to teach the redesigned course? *[Not at all (1), Very little (2), Some (3), A lot (4)]*

If you have taught a traditional version as well as the redesigned version, please respond to the following questions. If you have not taught the traditional version of the course, then please skip to question 28.

21. Compared to the traditional course, student learning in the redesigned course has*: [Decreased (1), Not changed (2), Increased somewhat (3), Increased a great deal (4)].*

22. Compared to the traditional course, student critical thinking in the redesigned course has: *[Decreased (1), Not changed (2), Increased somewhat (3), Increased a great deal (4)].*

23. Compared to the traditional course, student engagement with class material in the redesigned course has: *[Decreased (1), not changed (2), increased somewhat (3), increased a great deal (4)].*

24. Compared to the traditional course, student attitudes toward the redesigned course have: *[Decreased (1), Not changed (2), Increased somewhat (3), Increased a great deal (4)].*

25. Compared to the traditional course, how would you rate the workload (for you) of the redesigned course? *[Decreased (1), Not changed (2), Increased somewhat (3), Increased a great deal (4)].*

26. Compared to the traditional course, how would you rate the enjoyment of teaching the redesigned course? *[Decreased (1), Not changed (2), Increased somewhat (3), Increased a great deal (4)].*

27. Compared to the traditional course, how would you rate your comfort in teaching the redesigned course? *[Decreased (1), Not changed (2), Increased somewhat (3), Increased a great deal (4)].*

28. What are the best and/or most positive things to come out of the Top 25 project for your course?

29. What are the biggest issues and/or problems associated with the Top 25 project for your course?

30. What are the biggest challenges you face in sustaining the Top 25 redesign for your course, and how are you addressing these?

31. Are there any other comments you would like to make about your experiences designing and teaching Top 25 courses?

32. Which campus(es) are you teaching the redesigned course on (Check all that apply)? *[Oxford (1), Middletown (2), Hamilton (3), VOA (4)]*

33. Your faculty level: *[Part-Time (1), Full-Time Tenured (2), Full-Time Tenure Track (3), Full-Time Non-Tenure Track (4)]*

34. How many years have you taught at Miami University?

35. How long have you been teaching the Top 25 revised class? *[Haven't taught the revised Top 25 class (1), 1 semester (2), 2 semesters (3), 3 semesters (4), 4 semesters (5), 5 or more semesters (6)]*

36. Your gender: *[Male (1), Female (2)]*

Note. This item is from (or adapted from) the Faculty Survey of Student Engagement (www.fsse.iub.edu).