Successful College Teaching

PROBLEM-SOLVING STRATEGIES OF DISTINGUISHED PROFESSORS

CHAPTER SIX: A Problem-Solving Theory of Teaching

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Second Edition

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Problem-Solving Strategies of Distinguished Professors

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About the Authors

Dr. Jamie DeWaters, Dr. Sharon Baiocco, and Dr. James Ragonnet share an interest in the professional development of college educators. Their goals: to empower teaching faculty and to improve the institutional bottom line of colleges and universities.

The authors' mantra -- *"Excellent teachers are an institution's most valuable asset"* -- rests on approximately 80 years of combined professional experience in the areas of award-winning teaching, administrative excellence, authoritative and timely scholarship, and corporate and military training. In a nutshell, these experienced partners have done their homework researching which practices and strategies will produce the quality teachers an institution needs to maintain its advantage in today's competitive market. Here's a glimpse of who they are:

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Foreword

This is a book about change in higher education. Specifically, it is about whether professors can view sweeping changes in higher education as opportunities rather than as problems. In sum, professors, depending on their viewpoint, will be either the victims or the agents of change in higher education.

Viewing change as an opportunity rather than a problem is a key theme throughout history. Arnold Toynbee, the British historian, spoke of cultures and individuals responding at critical moments to difficult challenges. Creative visions and a new consciousness flow only from those who can recognize problems as opportunities, then can respond powerfully. This book is an invitation to professors to become agents of educational change.

There is an ancient tale about a man plowing his field. When his plow encounters an obstacle, he digs down to see what it is. He discovers a large ring that is attached to the trapdoor of a dark cave. He opens the trapdoor and enters the cave. Inside the cave is a treasure chest filled with jewels. And so it is with us in academe. After years of plowing the same field, our plow gets stuck. We can ignore this opportunity and keep plowing. Or we can dig into the problem and potentially discover a treasure.

In the darkest places we often find our greatest rewards. Unless we stop the plow, dig down deep enough to find the ring and open the cave, we will never realize our full potential. The jewels are there waiting. The opportunity is now.

James L. Ragonnet

Introduction

A decade has passed since we first began research for our book*, Successful College Teaching: Problem-Solving Strategies of Distinguished Professors* (Allyn and Bacon, 1998) in which we argued that *faculty leadership* was the key to improving college teaching and enhancing higher education. We argued for the importance of a research-based theory of teaching in order to equip academic leaders with a new faculty development system linked to teaching performance. We argued that a reward system for faculty had to include incentives for their development as teacher-scholars. Subsequently, the Collegiate Development Network that we proposed in the first edition was funded by a national A T & T Teaching and Learning grant we were awarded in 1998. During that grant-funded year we developed and administered a pilot online mentoring program like the one we proposed in the book at three colleges along the East Coast. This became the prototype for our most recent initiative, the Collegiate Development Network Inc., founded in 2001 (see www.cdnhighered.com)

In 1995, dramatic forces for change were converging on colleges and universities. Among these were (1) a wider and more diverse student body, (2) technological innovations with an extraordinary power to enhance learning and instruction, (3) unstable economic conditions that affected the budgets of public universities and students' ability to pay increasingly higher tuition, and (4) demands by

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government, business, and the public for standards and ways to measure post-secondary education. We wrote then that “we believe that this system will change because of a confluence of current, social, economic, and political conditions that are creating the most serious re-evaluation of the role of higher education in society since the 1940 *Statement* [*of Principles on Academic Freedom and Tenure*]” (Baiocco & DeWaters, 1998, p. xii).

Indeed, we believe our predictions were accurate. Trends in student enrollments continue to support our statements about student diversity. Advances in computer technology have wrought quantum changes in both learning environments and instructional tools. The federal government has more than hinted that it plans to use financial aid as a lever to make both public and private colleges and universities more accountable to students and funding sources. State governments are also demanding more accountability, and accrediting agencies' now are calling for “outcomes assessments” backed by punitive actions. Economic pressures have worsened on many post-secondary schools, as states flirt with insolvency in the aftermath of 9/11. One result is that adjuncts/contingent and “term contract” faculty make up an increasingly larger percentage of the college teacher workforce. In addition, “for profit” institutions -- offering relatively cheap, convenient and appealing “cherry picked” programs -- are taking an ever increasing share of the tuition market.

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Faculty Development: Then and Now

In our 1994 survey of faculty development programs at AAUP campuses, our respondents reported that the vast majority of institutions in our study (71%) funded *at least three* of the following activities: travel, research, consultant-led workshops, faculty-led workshops, development personnel/mentors, and equipment/office space/supplies.

However, only 14% of the respondents said that their institutions allotted office space for faculty development, and fewer than half had someone assigned to coordinate development programs--more often an administrator, not a faculty member. On the vast majority of campuses (83%), there were no formal evaluations of faculty development offerings (Baiocco & DeWaters, 1995). We wrote then that these findings revealed a lack of institutional commitment.

One of our most disturbing findings, however, was the poor preparation of faculty in the area of computer technology. The American university system was among the first to embrace computer networks for communication, yet fewer than half of the respondents in our study said that their colleges and universities were far enough along on the information superhighway. Only 47% of their

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institutions provided a campus computer network, though more (66%) reported that faculty had access to an external computer network (if they had their own computers). A subsequent survey of presidents of independent colleges found that 74% of the responding institutions provided faculty with access to campus computer networks, and 92% provided access to connections with the Internet (Fennell, 1997).

Our 1994 study identified faculty leaders' perceptions of future priorities for faculty development. Travel funding continued to be the first priority, reflecting, we think, the faculty's preference for discipline-specific development programs. However, we contended that funding support for faculty travel to conferences, the most common development support, would prove too expensive to survive in an era of budget cuts. In addition, highlighting a nationwide reawakening of interest in the faculty teaching role, faculty leaders in our study cited mentoring for teaching effectiveness, and assistance in using technology and developing materials as the next highest priorities. Training in the use of computer technology was both a significant current need and a future priority, according to respondents. Respondents expressed little or no awareness of a recent educational thrust toward viewing the faculty as "reflective practitioners" who use the classroom as an experimental laboratory for research on teaching and learning (Schön, 1987). A mere 1.5% said faculty teaching effectiveness programs were available to faculty teaching at the graduate level. The drive to publish continued to

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be alive and well on the campuses of our respondents, for they also cited mentoring in research, publication, and grant writing as priorities for future faculty development (Baiocco & DeWaters, 1995, p. 39).

We concluded that higher education institutions had to offer additional and radically different faculty development programs in order to acquaint faculty with dramatic changes in student attitudes and population, in learning techniques, and in the disciplines themselves. We asserted that higher education faculty needed major retraining and ongoing support in learning theory, cultural sensitivity, teaching effectiveness, multimedia technology, evaluation and assessment, field supervision, and classroom research. Moreover, that support required administrative backing, a key predictor of program success.

Our indictment of the existing system concluded, “No longer can colleges and universities be satisfied with periodic offerings of in-service training peripheral to the instructional process” (p. 40).

In the last decade faculty, against great odds, have made significant gains in promoting the scholarship of teaching. The number of Teaching and Learning Centers (TLCs) has skyrocketed and spread from the elite research institutions to many mid-size universities and undergraduate colleges. Professional

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organizations with active listserves such as the Professional and Organizational Development in Higher Education (POD), and the Society for Teaching and Learning in Higher Education (STHLE) etc. now link communities of scholars of teaching across the nation and the world, and research in teaching and learning at the higher education level has blossomed. Conferences on teaching abound, and teaching assistants at many schools now enjoy more than token support for their professional development. The institutions, in our view, that best demonstrate their commitment to quality teaching and learning are those that enthusiastically fund and support the worthy goals and on-going programs of their respective TLC's.

Our argument for faculty taking a leading role in improving college teaching, as presented in Chapters 1 through 3 in the 1998 edition, has gained widespread acceptance and requires no repetition here. Thus this second edition, an abridgement of the 1998 bestselling book, focuses on the research findings reported in the earlier edition. Our study and the resultant theory of teaching excellence is still relevant. This abridged version replaces the last chapter with a new conclusion outlining the "new wave" in faculty development. Our goal here is to provide teachers and scholars with a "best-practices" approach based on our 1998 research study.

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A Problem-Solving Theory of Teaching

We have said that teaching excellence involves character, knowledge, actions, and outcomes. In previous chapters we presented case study narratives of observations and interviews with award-winning professors. Also, we analyzed their "character" from the perspective of a set of acquired behaviors, emotional intelligence, which are "mapped on" to genetic personality dispositions. Then we investigated their beliefs and knowledge about pedagogy, planning, and methods. Finally, we showed how distinguished college teachers apply their problem-solving skills to resolve issues with individual students and groups.

Thus far, we have clarified two elements of our model of teaching excellence: (1) the professors' character (who they are) and (2) the professor's knowledge (what they know and believe). However, our model of teaching excellence involves a key third element -- a theory--, which lies at the core of our book. We submit that teaching excellence flows from a professor's astute and artful ability to

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solve problems. Simply put, excellent teachers are excellent problem-solvers. Competent teachers are competent problem-solvers. And poor teachers are poor problem-solvers. Ultimately, theories have useful predictive features, applications, and implications. These predictive elements will be the focus of the final chapters. In this chapter, we will draw upon our observations, interviews, and experience to support the problem-solving theory within our model of excellent teaching.

The "Aha!" Experience: Mucking Around in the Data

Theories take the form of statements of truths about something. They are developed by gathering facts, making hypotheses, experimenting, and drawing conclusions. Most of us are trained in the scientific method of inquiry that consists of these orderly and logical steps. However, without creative intuition, researchers who employ only the scientific method would never make a serious discovery. In this section we will describe our own "Aha!" experience--the intuitive discovery of our hypothesis that the actions of excellent teachers are indeed problem-solving, what Robert Gagné called the highest order of cognition (1975), and what Gardner described as intelligence (1993, p. 7).

At the beginning of our research, our goal was to discover "markers" of excellence among professors recognized for their distinguished teaching. Although we gathered a wealth of data, we lacked an adequate and logical system to organize and explain it. Having a hunch as to what we would find

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regarding the importance of problem-solving, we immersed ourselves in the research. Frankly, we expected along the way a flash of intuition that would allow us to tie together our findings.

Early on in our examination of the data, we each began to see glimpses of the theory we were seeking. Baiocco's education was in problem-solving theory of composing processes and the arts, whereas DeWaters background was in statistics, behavior analysis and the preparation of teachers. Like the serendipitous combination of chocolate and peanut butter which inspired Reese's Peanut Butter Cups, these two ways of looking at the essence of excellent teaching suddenly merged into the model we are proposing. Baiocco approached the investigation of excellence in teaching from a cognitive perspective, looking at the way teachers *think*, whereas DeWaters, coming from a behaviorist angle, focused on what teachers *do*.

We chose the term *radar* to describe the distinguished professor's intuitive and astute ability to monitor and observe. We noted that this active *radar* allowed professors to detect and respond to the most subtle cues within the dynamic, instructional environment. The more distinguished professors whom we observed, the more confirmation we gained for our *radar* concept. Our experiences told us that teachers at every level -- from pre-kindergarten to graduate school -- routinely used a sort of intuitive *radar* to observe, plan, act and evaluate the teaching situation. Most importantly, we concluded

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that distinguished teachers made sound decisions based on two key factors: first, what their experience taught them, and second, what they picked up on their *radar screens*.

Closely observing the performance of distinguished professors, we discovered that teaching excellence flows from the gifted teacher's ability to solve problems creatively and effectively. Simply put, our theory posits that the common denominator among all excellent teachers is their artful ability to solve problems. Once properly considered, one can also see that expert problem-solving skills is the distinguishing feature, the common denominator, among all great presidents, all great CEO's, all great generals, all great plumbers, all great carpenters, all great parents, etc. Essentially, excellent performers are excellent problem-solvers.

Let us now return to our original research question: "What *distinguishes* teachers of excellence?" After careful observation and consideration, we conclude the following: *Teachers of excellence are distinguished by their expert proficiency in solving problems effectively and creatively*. As we continued our research and applied various problem-solving and communication theories, we expanded and refined our model of teaching excellence.

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The Eclectic Field of Problem Solving

Currently, the field of problem solving is vast and eclectic. However, a more unified theory of problem solving is emerging as the result of interdisciplinary conferences and collaboration between experts in intersecting fields such as mathematics, philosophy, rhetoric and communications, cognitive psychology, education, creative studies, artificial intelligence, and psycholinguistics.

Focusing on the literature on teaching as problem-solving, Schön (1983) viewed "professional action" as problem-solving involving the processes of framing or naming the problem, taking action, and responding to the consequences of the actions. Sherman, et al. (1987) looked at the cognitive components in terms of strategies to attack a teaching problem and called for a theory of teaching excellence. Ramsden (1992) supported the notion that teaching is a problem-solving activity and pointed towards a reconceptualization of teaching centering on student learning problems. Menges and Rando (1996) produced a problem-solving model of the process of seeking and using feedback to improve teaching and learning which includes four phases of a cycle: (1) seeing and gathering, (2) interpreting and valuing, (3) planning and building, and (4) doing and checking; and they presented a taxonomy of instructional problems. (p.241)

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Like our initial analogy of the blind man and the elephant, researchers in problem-solving all touch on different aspects of how the mind works. Most of the research supports the concept that problems have certain characteristics: givens, goals, and obstacles. They further agree that problem solving is a complex set of processes that are recursive. Unlike machines, however, human beings are capable of going outside the problem to find "novel" solutions.

Teaching as Cognitive Processing

When it comes to theory development, we believe in The Principle of Occam's Razor: namely, that simple and elegant is preferable to complex and flashy. Even though we believe that the brain functions like an airport terminal -- with many activities occurring simultaneously while the main "business" of the terminal is directed and monitored from the control tower -- we aimed to develop a theory comprehensive enough to explain our findings and simple enough to be "user-friendly." After considering many existing theories of problem solving, we eliminated (a) those with unfamiliar terms, (b) those with empirical data derived from non-educational settings, and (c) those fraught with complexity. One model involving a cognitive process theory of writing (Hayes & Flower, 1980; Flower & Hayes, 1981) attracted our attention because of an appealing reference to "flexibility and creativity," -- two salient traits displayed by distinguished professors in our study. What these researchers said about flexibility and creativity in writing, we applied to teaching.

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Our theory suggests that teaching excellence flows from one's ability (partially innate, partially learned) to identify, analyze and solve a wide range of problems. Equipped with a *radar-like* system to scan and interpret the learning environment, distinguished teachers characteristically make wise decisions aimed at turning their students into effective, independent learners. Sherman et al. (1987) described this radar in terms of metacognition.

Standing in front of a class, gifted teachers send and receive signals. Based upon what they pick up on the radar screens, gifted teachers interpret these signals, then respond appropriately. The ever-changing environment (including students, the physical space, etc.) demands flexibility and creativity, especially in today's challenging and diverse classroom. This dynamic system is not fixed or linear. Like a radarscope, the teacher is tracking multiple, and sometime contradictory signals. Some signals appear in isolation and others in clusters. Signals are emitted and received in differing speeds, intensities and directions. In a busy and dynamic classroom environment, signals can easily be misinterpreted. For example, as Professor N. was leading a class discussion, students began firing questions at him from all directions. In a moment of insight, he described how he could see the questions (representing the students' varying levels of comprehension) "stacked" like aircraft in a holding pattern, one above the other in developmental order. His *radar* told him that reorganization of the questions was essential to the students' comprehension. While others may have misinterpreted the questions as being random, Professor N. was able to make sense of them. Essentially, expert

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professors and expert airport flight-controllers operate in a similar fashion: they both rely heavily on their radar to manage effectively their respective hectic and fluid work environments. In the remainder of this chapter, we will expand upon this concept of teaching as detecting, interpreting and reacting to student signals. We will frame this discussion by analyzing excellent instruction in terms of a problem-solving model.

The Theory in Action

Problem-solving theorists disagree about how to classify the major problem-solving processes. For our purposes, we have chosen to describe three processes -- (a) assessment and identification, (b) planning and implementation and (c) evaluation. We openly acknowledge that these categories are artificial since "process" itself inherently suggests something ongoing and continuous.

Problem Identification and Assessment

During the first process, namely problem identification and assessment, problem-solvers detect in the environment something that needs to be changed in order to reach a certain goal. In the instructional environment, for example, this problem might be a student's negative attitude or a complicated textbook. Typically, problem-solvers will try to "get a handle" on the problem by attempting to find and

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examine causes for the problem and then divide the problem into parts, a behavior that problem-solving theorists call "problem analysis."

Planning and Implementation

In the next process, namely planning and implementing, the problem-solver evolves a solution. For example, an excellent teacher's plan to find a new textbook might begin with ordering examination copies from publishers. During this process, the teacher might seek recommendations from colleagues and show prospective texts to selected students. These are examples of how problem-solvers use divergent thinking, and then convergent thinking as they assess the merits of a particular solution. In problem-solving lingo, these activities would be called strategies or "sub-goals."
Somewhere during this search for solutions, problem-solvers may decide to "give it a rest," and leave the problem for a time. This deliberate postponement of decision-making or choice of a solution is what problem-solving researchers call "incubation."

Creative studies research shows that such time off task is often essential to the choice of a good solution. An incubation period gives our professor, for example the time to reconsider course objectives or even go outside the traditional avenues to find a good textbook. During this "down time," one professor we know, for example, discovered online information sources, downloaded

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them, and had them compiled into a class reader. Another decided to write his own textbook. A simple decision like selecting a new textbook -- seemingly a routine matter-- once properly considered creates a golden opportunity for a teacher to have an intuitive flash that may solve a long-standing problem.

Once a likely solution is found, problem-solvers begin to act. One professor might decide to adopt a new text when the course is next offered. Another professor might begin to collect readings or "play" with the notion of writing his own text. To be sure, when they all begin using a new text, they are likely to be tentative, conducting a classroom test of how successfully the new text meets their instructional goals of clarity and emphasis.

Evaluation

The final problem-solving process, evaluation, closely resembles the assessment feature of initial problem identification. When our instructor tests the viability of her new text during her course, she will seek to verify and evaluate whether her solution, the chosen textbook, was effective. Thus, one can see that teaching excellence requires an experimental mindset.

Throughout the “test run” with the new textbook, an excellent teacher will be monitoring whether

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students are learning better. The new text has been the "intervention" in a classroom experiment. If the class learns no better than it did previously, the professor may revert to her former textbook or, concluding that other variables influenced the outcome of her experiment, decide to give her current text a longer trial period.

This ability to step back and take a holistic view of the instructional environment, including one's own teaching performance, is a kind of metacognitive assessment that our case study professors reported during our interviews. They told us that they were always asking themselves, "How's this going?" and "Is this working?" If their self-questioning yielded negative feedback, they readily shifted gears.
Our case study professors, rather than blame their students for the learning problems, held themselves responsible for making improvements. They ask themselves, "What am I doing that I need to change?" Wise professors, understanding that teaching experiments often fail, take calculated risks to effect better learning. When their instructional experiments "flop," they turn inward and learn from their mistakes.

Here is where the optimism that we noted in our outstanding teachers is crucial. Rather than becoming depressed by poor outcomes, distinguished teachers are spurred to keep trying. Problem-solving theorists would say that they have overcome "set rigidity," that is, they have not become fixated on the problem to the extent that they cannot see alternative solutions.

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Now let us see the theory in action by taking a look at how these problem-solving processes are reflected in two problem scenarios. In Chapters 4 and 5 we provided a catalog of instructional problems and illustrated how award-winning professors addressed individual learning problems and problems with groups of students. The Problem-Solving Matrix (**Table 6-1**) below is a useful framework for organizing our analyses, though we do not claim that it is comprehensive.

Table 6-1

Instructional Problem-Solving Matrix

	Identification & Assessment	Planning & Implementation	Evaluation
Individual Problems			
Group Problems			
Content Problems			
Environment Problems			
Instructor Problems			

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The problem-solving analyses in this chapter will highlight instructional problems related to content material and instructional environments.

Scenario 1: An Environmental Problem

Let's put Professor H.'s teaching under our microscope. An experienced professor of biology who has taught a course in gross anatomy for several years, he is becoming increasingly dissatisfied with his initial solution to a logistical problem. Professor H.'s laboratories do not have the requisite television equipment to enable groups of students to view close-ups of dissections. Initially, he decides to have students stand on lab stools in the back rows so they can see the procedure, but this solution proves unsatisfactory. His colleague in physics suggests that he look for interactive computer software to simulate the dissections, and, finding none, they decide to create one themselves--a daunting task, but one which absorbs them over a period of years. Here's another clear case of necessity being the mother of invention.

During the first years of teaching the course, H. also has observed how students respond to their first encounters with cadavers, and decides, after consulting his colleague in religious studies, that he would like to promote a respectful and appreciative attitude among his students towards the bodies.

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He gets the idea to initiate a new routine: the "blessing" of the bodies at the beginning of each semester. What we have witnessed here is the manner in which Professor H. continues to refine and improve the way in which he teaches a single course.

Scenario 2: A Content Problem

In another illustration, Dr. E., an English professor, has successfully used students' reading response journals as a springboard to writing in her communications course for first-year students. She notices that students usually choose topics related directly to their own experience (personal narratives) or else write about the short stories or news articles they are reading for class discussion. She believes that the notion of "community" might be an excellent way to move her traditional 18-year-old students away from their egocentric stage of development toward the social involvement of a young adult. Drawing upon what she knows about novice writers needing to move further from using themselves or their own experience as topics, she designs an assignment that will force the students to focus on the outside worlds of the campus and the larger community.

She wants to help students overcome their initial shyness and begin to make acquaintances in the classroom "community," so she decides to pair up residents and commuters and ask them to collaborate on an observation of a campus site and report to the class for a prospective paper. The

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students eagerly choose sites, and, curious to see how the "experiment" is going, Dr. E. directs each pair to report to the class during the next meeting and to turn in a jointly authored informal report. She hopes that the experience of co-authoring will be new for the students and will give them a taste of "real world" writing.

All but two students complete the assignment--an excellent success rate--and several pairs also report having benefited from collaborating in their writing. This leads Dr. E. to the question of how she will award grades to co-authored papers. Perhaps this seems contrary to what we have found about excellent teachers with respect to clarity. One would think that grading policy should be decided upon before the assignment is given. In this case, because this assignment is an experiment, she decides to negotiate the grading policies with the students. The real test of the assignment's success, she believes, will be whether any students choose to develop the assignment into a quality paper and submit it for a grade.

When the students' folders are submitted, 25% of the students have written about their venture into their new campus community, but only one pair of writers has submitted their joint paper for a grade. The average grade on the six papers is B. Dr. E. assesses her new assignment as meeting her goals, but still needing refinement (an illustration of monitoring).

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In each of these scenarios, we have observed how excellent teachers use a set of processes to meet instructional goals. The first scenario demonstrates the development and improvement of an existing course by creating new strategies to improve the class setting. The second narrative describes how a professor created a new assignment within an "old" course plan.

As we have said in other chapters, outstanding college teachers are excellent planners. When they sense problems or opportunities for learning, they are experts at setting objectives, inventing new solutions, creating new plans, employing new methods, evaluating the results, and making refinements.

Phase One: Problem Identification & Assessment

Scenario One, Phase One: Dr. H. identified the instructional problem as an environmental interference. Students could not see the dissections.

Scenario Two, Phase One: Dr. E. was unhappy with the fact that students usually limited their choices for writing to personal narratives.

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Dr. H.'s problem analysis most likely began with a sense of a logistical problem. There were simply too many students and too few cadavers to enable students to view the dissections clearly. The "givens" of his problem were the number of cadavers--they are very expensive--and the numbers of students in his lab sections. One solution--television equipment--was not available to him due to its expense. Yet Professor H. knew that the value of the lab experience was in the tactile and visual learning--the psychomotor dimension--that occurred during the dissections. How would he solve this logistical problem?

Dr. E.'s problem analysis most likely began with her awareness of the limitations of the personal narratives that students usually submitted as their first papers in this first-year English course. She could assign topics like many of her peers, but she had higher a objective of making students responsible for their writing topics to assure that they were both interested and committed to their writing. Her decision to provide the "community" writing stimulus came out of the reading she had been doing in higher education, as well as the value she placed on collaboration.

Phase Two: Planning & Implementation

Scenario One, Phase Two: Professor H. considers the alternatives, and decides to allow students to stand on stools to observe dissections.

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Scenario Two, Phase Two: Dr. E. designs a "community" writing assignment and pairs students to visit campus sites.

Dr. H. and Dr. E.'s actions here are deceptively simple. Because excellent teachers are efficient, they manage more than one goal simultaneously. This concept of multiple goal processing explains how excellent teachers can successfully "conduct" groups and individuals simultaneously. For example, Dr. H. was in the process of solving one instructional problem, the logistics of viewing dissections, at the same time as he was becoming aware of another problem, an irreverent attitude by students towards the cadavers.

Dr. E.'s "community" assignment incorporated several layers of goals and objectives, although she only articulated the superficial goal of extending their concept of community (a cognitive objective). For example, pairing residence students and commuters was a strategy designed to build friendships among first-year students (an affective objective) and the site observations were an extension of that. However, she never informed students of her over-riding goal, to move students away from an egocentric writing style to an expository one, because at that point, it was too abstract for them.
In general, we have found that teachers frequently have far-reaching goals which go beyond the immediate objectives. Gradually, as the criteria for success are met, the students gain insight and are

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ready to understand the more sophisticated goal. Thus, teachers frequently must present what are interpreted as stringent guidelines for the students to follow in attempt to guide them toward an understanding of the larger picture. For example, professors find themselves repeating certain foundation information again and again in order to form the basis for a conceptual framework.

Phase Three: Evaluation

Scenario One, Phase Three: Dr. H. is concerned that the "solution" he first arrives at is dangerous. He talks to a colleague, who suggests that they develop an interactive computer simulation of dissections, an anatomy almanac that students can preview prior to the dissection.

Scenario Two, Phase Three: Dr. E. assesses the assignment as successful because students eagerly present reports in class (affective objective) and an increased percentage of the class submits papers developed from the observation, rather than solely from their personal experience (cognitive objective).

In both of these scenarios, we see that the professor evaluated the effect of the strategy (solution) they had developed. Dr. H. was dissatisfied with the only solution he and the class could find at the

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time, and thus began his search for a long-term solution. Meanwhile, he "lived" uncomfortably with the temporary solution. Dr. E. decided that the community assignment has been modestly successful and was worthy of continuing, but she would refine it further the next time. Thus we see that the problem-solving processes have come full circle: from assessment to assessment, and then the cycle begins again.

Teaching and Learning as Discourse

We soon discovered a significant shortcoming of the problem-solving theory of composing processes as a model for explaining teaching behavior: its scope is too narrow. It was developed to explain one kind of communication problem--writing. We have said that instruction is not a single act of communication, but an ongoing discourse in which teachers and students use a variety of language options, not simply writing. In fact, learning and instruction mostly involve spoken communication and non-verbal communication, with writing reserved for the more formal aspects of the teacher/student relationship.

To fill this gap in the cognitive process model of writing, we have incorporated into our theoretical framework some additional concepts derived from a psycholinguistic theory of discourse (Clark &

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Clark, 1977; MacWhinney, 1983), because they allow us to explain the more complex and ongoing natures of the communications between students and teachers.

During a semester, students in effect “carry on a conversation” with the professor as they interpret his or her “points,” and generate “responses” in the form of papers, contributions to class discussions, and answers on tests. Teaching and learning are cooperative acts, just as our distinguished teachers so eloquently described them as a “shared responsibility” in their philosophies of teaching in Chapter 3.

In order to begin the discourse, the professor must establish the students’ baseline level of comprehension. The emphasis our participants placed on preliminary status assessment -- identifying the entering knowledge and skills of students -- shows that they are aware of how crucial that pre-assessment is to successful instruction. And, since students’ responses are almost always presented in some linguistic form for evaluation--either speech or writing--the outstanding teacher is also remarkably sensitive to the fact that prerequisite terms and behaviors are essential to the understanding of certain concepts and skills. Consequently, they continually seek to give students the language and terminology they will need to learn a particular subject.

This analysis of the social contexts for discourse are salient if we apply them to instructional failures as well as successes. Within the “instructional dialogue” which occurs between teachers and students,

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outstanding teachers know there are many opportunities for communication errors: sometimes students' incorrectly anticipate what is expected in the course; sometimes teachers' intentions are misunderstood; and other times, conventions of academe, such as the time allotted for a student to learn a particular skill or concept, interfere with instruction.

An important fact to remember is that people only solve the problems that they find. Professors who fail to recognize anything more than superficial problems in their classes and who assume that their lecturing automatically implies their students are learning will never become excellent teachers unless they are taught to "see" differently.

In our study, we found that one of the ways in which distinguished teachers differed from other teachers was their ability to identify a vast array of learning problems. Like the musician who has learned to "hear" the subtleties of sound, or the artist who can distinguish between 100 shades of green, the excellent teacher is expert at finding and analyzing a wider variety of instructional problems, perhaps, even, a different kind of problem. Our data clearly showed that novice teachers identified a more basic level of problems than did our excellent, experienced teachers. For example, they were concerned about lecturing in an interesting way, or selecting course readings, often viewing elements in the instructional environment as "the problem," unlike our expert teachers, who focused their attention instead on the behaviors of individuals and groups as "the problem."

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Our findings suggest that there may be a hierarchy of instructional problems, and that faculty see the classroom environment differently, depending on their level of experience. Beginning teachers' instructional problem solving may be hampered by their inability to accurately "locate" the learning problems. Their need to survive in the academy dictates that they focus on aspects of the instructional environment that have become second nature to experienced professors, who are intimately familiar with their fields, instructional materials, presentation techniques, and evaluation process.

Putting the Theory to Use

In this chapter, we traced the genealogy of our problem-solving theory of teaching from cognitive science, education research, and discourse theory, and we suggested that the distinguished professors we observed appeared to possess a superior ability to scan and interpret the learning environment. From our case study analyses, we presented and illustrated three problem-solving processes (a) problem assessment and identification (b) planning and implementation, and (c) evaluation. Then, in our "Instructional Problem-Solving Matrix" (See **Table 6-1**), we showed how these processes might be applied across the domain of instructional problems, which we viewed as having five strands:

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individual learning problems, problem of groups of students, content problems, instructional environment problems, and instructor problems. We also suggested that the distinguished teaching professors we observed understood the cooperative nature of learning and made fine distinctions about students' learning problems.

In the next chapter, we will show how our problem-solving approach might be used to assist new professors with their teaching. We will discuss the lack of preparation of graduate students for college teaching, contrast the concerns of teaching assistants and experienced faculty, and finally present an array of solutions to common problems proposed by new professors.

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