Appendix A: An Example of a Qualitative Proposal

No single proposal can adequately represent the diversity of qualitative research designs and ways of communicating these. If space permitted, I would include two or three proposals here, to emphasize that there is no one right way to structure either a qualitative study or a proposal. Because I can present only one, I've chosen Martha Regan-Smith's proposal for her dissertation, a study of exemplary medical school teachers. Not only does it give a clear, straightforward explanation and justification for the proposed study, but it raises many of the key issues that most qualitative proposals will have to address. In my commentary, I try to identify and clarify the connections between these issues and my model of research design, and to present alternative ways of handling these issues. The proposal appears here just as Regan-Smith submitted it, with only a few additions (marked by brackets) or corrections of typos or punctuation for greater clarity; the appendices and references have been omitted.

The most serious danger in presenting an exemplary proposal such as this is that you might use it as a *template* for your own proposal, borrowing its structure and language and simply "filling in the blanks" with your own study. This is a sure recipe for disaster. Your proposal needs to fit the study that you are proposing, and an argument that works well for one study may totally fail to justify a different study. Construct your proposal around your *own* design, not someone else's.

HOW BASIC SCIENCE TEACHERS HELP MEDICAL STUDENTS LEARN: THE STUDENTS' PERSPECTIVE

Dissertation Proposal

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Abstract

Medical school consists of 2 years of basic science and 2 years of clinical training. The sciences taught in the first 2 years include Anatomy, Biochemistry, Physiology, Pathology, Microbiology, and Pharmacology. As a result of the biomedical information expansion which has occurred in the last 80 years with no increase in the time available to teach this information, the teaching of basic science has become content heavy. In addition, the teaching has become increasingly rapid paced as most schools over the past 20 years have decreased the number of hours spent in laboratories and demonstrations while increasing reliance on lecturing as the way to teach. Medical student performance on the basic science examinations used for licensure has decreased, and, as a result, medical school faculty feel medical student learning of basic science is less than desired.

As a member of medical school faculties for 18 years, I want to improve medical student learning of basic science by improving the teaching of basic science in medical school. No qualitative studies of basic science teaching in medical school exist. What works for student learning and how it works is not known. In order to understand how teachers can help medical students learn basic science, I propose to do a qualitative study of four exceptional basic science teachers to answer the following research questions: How do these basic science teachers help medical students learn? What do these teachers do to help students learn? How and why do these techniques help students learn? What motivates the teachers to do what they do? Is what students feel teachers do to help them learn what teachers intend? How do student understandings of what helps them learn differ from teacher understandings?

Each of the four teachers studied teaches a different basic science at a typical private medical school in the northeastern United States. The school has a traditional curriculum in which the 2 years of basic science are taught predominantly using the lecture format. Each teacher is a winner of the student-selected Best Teacher Award, and each teacher uses the lecture format for his teaching.

Participant observation of the teachers' lectures and teacher and student interviews are the primary data sources. Classes, in addition, are audiotaped for transcription and videotaped. Videotapes are analyzed as well as used as prompts for dialogue when shown to teachers or students. Interviews are tape-recorded, transcribed, and coded. Analytic memos are written and coded for each class observation and interview. Matrices are constructed to identify themes and to check evolving concepts. Both teacher and student collaboration is obtained by getting their opinions of my analysis and conclusions. Each teacher's teaching is analyzed separately followed by comparative analysis of all four teachers' teaching. Generated theory will be compared to existing theory, which is primarily based in other educational settings or on personal experience. The goal is to identify teaching techniques and behaviors that help students learn and to gain understanding of how and why these techniques help students learn. This knowledge about practice in context can be taught to teachers in faculty development workshops designed to teach teachers how to improve their teaching. By teaching teachers how to better help students learn, it is hoped that improved student learning will result.

This abstract is a concise summary, not just of the components of the research design, but of the connections between these—the *argument* of the proposal. Standards and requirements for abstracts vary, but conveying the argument of your proposal should be a primary goal.

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Introduction

Since the Flexner Report in 1910, the 4-year medical school curriculum has comprised 2 years of teaching the sciences basic to medicine followed by 2 years of training in the clinical disciplines. The basic sciences include Anatomy, Microbiology, Biochemistry, Pharmacology, Pathology, and Physiology, and the clinical disciplines include Surgery, Medicine, Pediatrics, Psychiatry, and Obstetrics/Gynecology. Because of the information explosion in biomedical science during the past 80 years, the basic science curriculum has become "overstuffed" (Eichna, 1980). Usually three to four sciences are taught simultaneously, using predominantly the lecture format. As a result, students are in class 25-33 hours per week throughout the first 2 years of medical school. This, combined with the student perception of ineffective teaching (Awbrey, 1985; Eichna, 1980; Jonas, 1978; Konner, 1987), has led to student disillusionment with science (Eichna, 1980) and student cynicism about the educational process (Petersdorf, 1987). In addition, the national failure rate on the basic science portion of the National Board of Medical Examiners examinations has risen over the past 6 years (NBME letter to Deans, Appendix A) without a demonstrable decrease in student undergraduate grade point averages or admission examination scores.

In an effort to improve the teaching of basic science in medical school, I want to study what teachers of basic science actually do to help medical students learn. I propose to conduct a qualitative study of four exceptional basic science teachers' teaching, from the students' perspective, to answer the question, "How do these teachers help medical students learn?" The goal is to identify teaching techniques

and behaviors that help students learn, which can then be taught to teachers in faculty development workshops designed to teach teachers how to improve their teaching and hence better assist student learning.

In this Introduction, Martha sets the stage for what follows by presenting the practical problem that motivates the study and the historical context of this problem and briefly stating the nature of the proposed study. Details of the context, research questions, and methods are left for later. Different studies will require different amounts of information in order to adequately accomplish this task of orienting the reader to the study itself and to what will follow in the proposal.

Context

To increase medical student enthusiasm for and learning of basic science, several scholars have called for critical examination of the teaching of basic sciences (Beaty, 1990; Bishop, 1984; Neame, 1984). A small number of schools, such as McMaster and Harvard, have been able to replace lectures with small-group tutorials during which students participate in problem-based learning by independently solving paper patient cases (Neufeld & Barrows, 1974; Schmidt, 1983). Most medical schools, however, because of financial and faculty constraints, must continue to rely on lectures as a major method of teaching basic sciences. Therefore investigation of how the lecture method can be effective in assisting student learning is worthwhile.

This paragraph justifies studying the lecture method of teaching basic science. It works well here but could just as easily have been part of the Introduction.

Existing Literature on Basic Science Teaching in Medical School

Studies of science teaching in secondary or undergraduate schools do not necessarily apply to the medical school setting. The teaching of science through the use of lectures in medical school is unlike the teaching of science in any other educational setting. The rapid pace of medical school and the vast quantity of material needed to be learned by students with varying science backgrounds make the teaching of science and the learning by the students unique. Effective teaching through the use of lectures in nonmedical school educational settings

has been well-described and studied (Eble, 1976; Hyman, 1974; Katona, 1940; McKeachie, 1969), but whether the teaching techniques recommended are appropriate in the medical school setting or whether other techniques are helpful is unknown. Qualitative study asking students what works for their learning is needed.

The medical education and health professions education literature on lecturing is limited. Some prescriptive works on how to give effective lectures (Bughman, 1973; Miller, 1962) are based on implicit theory derived from personal experience as students and as faculty (Cook, 1989). Others have been written by educators working in the medical school arena (Jason, 1982), but these are based on educational theory derived from educational settings other than medical school. Schwenk and Whitman (1987) prescribe effective lecturing techniques related to existing educational theory and relate these techniques to communication theory and negotiation theory inherent in effective doctor/patient relationships.

Quantitative studies of lecturing in medical school, usually utilizing student ratings of lecturing techniques, depend on the researchers' prior understanding and assumptions about what helps students learn. Because no qualitative studies of medical student learning of basic science exist, this understanding is based on theory derived from study of or experience with nonmedical school settings. The few quantitative studies in the literature looking at basic science teaching in medical school (Mendez, 1984; Naftulin, 1973; Russell, 1984; Ware, 1975) are limited in scope and contribute little to the research question, "How do basic science teachers help medical students learn?"

Naftulin (1973), looking at teaching delivered in a "seductive charismatic manner," showed that students could give high ratings of such teaching; however, the audience's perception of learning was not included in the study. In response, Ware (1975) concluded that "seductive, charismatic lecturers" assist student learning by showing that students attending lectures with high seduction (characterized by enthusiasm, humor, friendliness, expressiveness, charisma, personality) and low content have similar examination scores as students attending low seduction, high content lectures. How these teacher characteristics contribute to student learning of content was not addressed. Mendez (1984) surveyed year I and II medical students for the factors contributing to lecture attendance and found that students attend lectures that they perceive to have clearly defined objectives and that cover material tested on the final examination. How the

objectives help student learning and which lecture techniques help learning were not investigated. Russell (1984) looked at medical student retention of basic material immediately after and 15 days following lectures with varying amounts of content and found that increasing information density of lectures reduced retention of the basic information. The reasons for this effect were not a part of the study.

Slotnick (1975) and Irby (1976), using quantitative methods, demonstrated that teaching criteria presumed by the researchers to be important for student learning were in fact important to students for their learning. Slotnick (1975) showed that faculty-student rapport, student work required outside of class, pace of class, overall workload, understandability of lecture material, lecturing activities (e.g., summary of material, concise explanation, organization of material in a logical way), student ability to organize material, and professor knowledge of students' knowledge level are interrelated rather than univariate factors in effective teaching. How these factors affect student learning and why was not a part of the study. Irby (1976) showed that teachers could improve their teaching when given immediate feedback about student ratings of their teaching. The rating variables were derived from education literature, and whether the list of teaching techniques rated by the students included all the techniques helpful for student learning could not be determined from the study.

No one has asked medical students what teachers do to help them learn. Existing research has asked students to rate particular teaching techniques or to state whether a technique works or not. These studies depend on the researchers' understanding of what works for student learning. What works to help students learn science in other educational settings may not work in medical school. Quite possibly basic science teachers in medical school have happened upon or developed teaching techniques that are unique to medical school or are unintentionally assisting learning in ways they do not appreciate. Qualitative study is needed to generate a theory of effective nonclinical teaching in medical school.

This section of the proposal argues that we know very little about how basic science teachers in medical school help their students to learn. This point is important in justifying a qualitative study of this phenomenon. As a result, however, the proposal says little about what will be the focus of the Context sections of most proposals: existing theory about, and research on, the phenomenon studied. Martha Regan-Smith briefly reviews several theories about what constitutes effective teaching in medical school lectures, but her main point is that these studies address neither *how* such teaching methods work nor the students' perspective. If your study is of a topic for which there exists a substantial literature of theory and research, your Context section will need to address this literature, as well as your own experience (which Regan-Smith discusses in the next section) and pilot research (which she deals with both in the next section and later, under Preliminary Findings).

Personal Interest

I am a physician, an internist, and rheumatologist. I was a chemistry major in college, and, prior to this study, I had not participated in a science class since I was a medical student 21 years ago. I have taught how to diagnose adult disease in clinical medicine for 18 years. Approximately 6 years ago I realized I was also trying to teach both critical thinking skills and the communication skills needed to enable others to understand the reasoning behind a diagnosis. I also realized that I did not know much about critical thinking or communication, let alone how to effectively teach these skills. In 1987 I entered the [Harvard Graduate School of Education] master's program to learn about these skills and how they can be taught. I felt these skills should be a part of a physician's education, and I quickly learned that effective learning of these skills necessitated teaching of these skills throughout medical school, not just in clinical medicine courses.

In 1988, for a course on perspectives of teaching, I was required to study a teacher, classroom, or school. I chose to study a teacher. As the Assistant Dean for Clinical Education, whose responsibility is to oversee all clinical teaching, I anticipated I could more easily gain entry into a teacher's classroom if I chose to study a basic science teacher rather than a clinical teacher. In addition, I chose to study a winner of the student-awarded Best Teacher Award. I reasoned that I could learn more about teaching from a winner of such an accolade than a nonwinner, and that a winner would be more likely (i.e., have more confidence) to allow my presence in his classroom than a nonwinner.

I expected the teacher to be skillful; however, I was awed by the extent of his skill as a teacher. Equally surprising was how articulate the students were at describing how he helped them learn. Although I appreciated how he helped me learn in the classroom, I needed student

input to appreciate all the aspects of what he did and why it worked for them. Curiosity about how other teachers help medical students learn basic science, and my desire to improve medical education, led to my application in 1988 to the doctoral program, with plans to pursue study of how basic science teachers help students learn. By finding out, from the students' perspective, what works to help students learn, I want to discover how teachers can help their students learn and why. Two more teachers have been studied as part of methods courses: the most recent was written up as my qualifying paper entitled, "Relevance in Teaching." Each teacher has exemplified all the teaching characteristics that I identified as helping students learn; however, each teacher has best exemplified a different teaching characteristic. The information gleaned from these teacher studies can be used in faculty development workshops designed to teach teachers how to better help their students learn.

In this section, Regan-Smith describes how the study originated, presenting her personal purposes and how these connect to the practical and theoretical purposes described in the Introduction. She also describes her own background as the "research instrument" of the study. In doing all this, she also begins to build her justification for the selection of exemplary teachers as the focus of the study, and for using students as a major source of data.

Proposed Research

Research Goals

I want to learn what teachers do to help students learn. The teaching techniques gleaned from teachers in practice, which I identify as helping students learn, will be useful for other teachers to improve their teaching. Quantitative researchers define the problems of practice in their own terms, not the terms of the practitioners, and tend to generate knowledge that is not useful to the practitioner (Bolster, 1983). Quantitative research often does not cause change in practice, whereas qualitative research, which strives to understand the meaning of action to the participants, can offer improvement of arguments for practice and hence can have greater effect on practice (Fenstermacher, 1986). Knowledge generated by quantitative educational research is often not useful to practitioners, who are swayed more by practical arguments, experience, and faith (Buchmann, 1984). To improve

practice, educational research needs to emphasize the context within which the activities studied occur and the meanings of activities studied for the participants. Qualitative research methods meet these needs (Abrahamson, 1984).

The unique teaching/learning situation in the first 2 years of medical school merits a qualitative research design that (a) takes into account the contextual elements that make medical education different from other science education settings and (b) allows for inductive hypothesis generation. What works for basic science lectures is unknown. What helps medical students learn may well be different than what works for students of science in other settings. There is a need for students to define and explain what works. Understanding how particular methods work will require understanding of the context. Using qualitative research methods to study teachers and their students in basic science lecture-format classrooms, I intend to learn from the students and their teachers how basic science teachers help students learn.

For my dissertation, I propose to study four basic science teachers. Recognizing that students can be valid, reliable, and useful evaluators of teaching (Costin, 1971; Irby, 1977; Palchik, 1988; Rippey, 1975), I decided to continue to study student-selected Best Teacher Award winners. I will analyze each teacher's teaching individually and then comparatively analyze the data collected from all four teacher studies. The theory generated about basic science teaching will be compared to existing effective teaching theory generated from other educational settings.

In this section, Regan-Smith reviews the main question and purposes of the study and uses these to justify a qualitative study. In the process, she brings in two additional pieces of the conceptual context that relate particularly to methods: the relatively greater impact of qualitative research on practice and the validity of student ratings of teaching. This discussion could just as easily have been included in the Context section.

Research Questions

The research questions to be answered are: How do these basic science teachers help their students learn? What do these teachers do to help students learn? How and why do these techniques help students learn? What motivates teachers to do what they do? Is what students feel teachers do to help them learn what teachers intend? How do

student understandings of what helps them learn differ from teacher understandings?

In this section, Regan-Smith expands on the single main question she stated in the Introduction, specifying the range of questions and subquestions that she will address. In many proposals, more explanation or justification of the questions would be desirable, but because of the clear rationale that Regan-Smith provides for these questions in previous sections, it seems unnecessary here. For clarity, it is often better to number your research questions, and to indicate which of these are subquestions of particular main questions.

Research Site

I chose to study teachers at a private northeastern medical school where I have been on the faculty for 10 years (I was a winner of the Best Teacher Award for clinical teaching in 1987), and I have been the Assistant Dean for Clinical Education for 4 years. The school is a typical private medical school of slightly less than average student body size. It has a traditional curriculum with 2 years of basic science followed by 2 years of clinical experience.

The students are 50% to 65% males and 35% to 50% females and come from over 50 different public and private schools throughout the United States. Passage of the National Board of Medical Examiners examinations is not required for promotion or graduation; however, most students take the examinations to obtain licensure to practice. The school's matriculating students' admission grade point averages and admission examination scores are near or slightly above the national mean. During the past 5 years, the school's students' failure rate on the basic science portion of the National Board of Medical Examiners examinations has been at or near the national failure rate and has risen as the national failure rate has. The only differentiating features of this school from other U.S. medical schools are its rural location and its close, friendly faculty/student rapport.

I have professional relationships of considerable mutual respect with the teachers I have chosen to study. All have worked with me as colleagues on Dean's Advisory, Curriculum, and/or Student Performance Committees. We see each other as education advocates in an environment that does not reward education program development or teaching achievement. The four teachers chosen from the Best Teacher list to be studied each teach at least 20 hours of different basic science

discipline courses (Appendix B) and primarily use the lecture format. The basic science teacher winners that will not be studied either teach the same discipline as another studied teacher or teach using a non-lecture method (see Appendix B).

Three teacher observations and interviews have been completed. The teacher remaining to be studied is to be included because he has passion for his subject, which is a recognized dimension of effective teaching (Eble, 1976). Students participating in my previous studies of medical school basic science teaching have recommended study of this professor, who teaches Pathology, because they perceive him as best exemplifying love of subject, which they feel is very important for their learning.

In this section, Regan-Smith accomplishes two purposes. First, she describes the setting of her proposed study (supporting the generalizability of her results) and the kind of study she plans to do and further justifies her choice of teachers. Second, she explains some aspects of her research relationship with the teachers she will be studying. The proposal would have been stronger if she had said more about this and about her relationship with the students.

Methods of Data Collection

Qualitative research methods were selected for this study both because I did not know a priori what I would find and because I wanted to generate data rich in detail and embedded in context. Classroom participant observation, student interviews, and teacher interviews are the primary sources [methods] of data collection. In addition, course outlines, syllabi, quizzes, examinations and examination results, paper cases, slides, and other handouts are collected as data. Student evaluations of the course and of the teacher's teaching are also used if available.

For all case studies I attend all possible scheduled lectures given by the teacher throughout a 4-month course. This will be no less than two thirds of the teacher's teaching. Two to four lectures are audiotaped to record exactly what was said by the teacher and students in the classroom and later transcribed. As discussed below, I videotape teachers teaching and interview both students and teachers. I take fieldnotes while in class, unless I am videotaping, and write analytic memos and contact summaries (Miles & Huberman, 1984) following each class as well as each interview.

These two paragraphs provide an overview of the Methods section as a whole, and explain the sampling strategy for her observations. The sampling of students is dealt with later, under Student Interviews.

Videotaping

Videotaping, which I first used with the third teacher I observed, produces a rich source of data about what is going on in the classroom. It allows me to see things I could not see otherwise. I will have the opportunity to review classroom action and observe and isolate individual parts of what is going on. Several of the videotapes will also be used to facilitate the teacher discussing his own teaching in depth. By showing the teacher the tapes of his teaching, I can ask about individual components of his teaching in context. In addition, the tapes will be used to stimulate student dialogue. They will be shown to students to facilitate their explaining the effect of what the teacher does in the classroom to help their learning. Since videotaping was not used to study all four teachers, a comparative analysis cannot be done including all teachers.

Note that videotaping serves two different purposes in this study: ensuring the descriptive validity of her observations, and stimulating recall and reflection as a component of some of the interviews with teachers and students. Videotaping only two of the four teachers would be a serious flaw if the primary purpose of this study were to compare the teachers, but it is not; the primary goal is to obtain an in-depth understanding of each of the four teachers, and it would be pointless to forgo the advantages of videotaping the last two teachers simply to maintain a superficial consistency of method. In a proposal that will be reviewed by readers not familiar with qualitative research, such a decision might need more explicit justification.

Student Interviews

The student interviews begin with an open-ended question such as "What stands out for you?" or "What did you notice?" Subsequent questions are conversational in an attempt to get the interviewee to discuss further something he/she mentioned in an answer. For the first several interviews, the only other preconceived question is "What does the teacher do that helps you learn?" As I observe more classes, questions arise for which I need answers in order to confirm my observation conclusions and to understand what is going on in the

classroom, and these are added. Eventually a set of questions (Appendix C) emerge from the evolving data; I ask these questions of all remaining interviewees in addition to the two original set questions.

Out of a class of 84 students, 10 to 20 formal student interviews, lasting 20-45 minutes each, are conducted for each teacher study. As many of the student interviews as time will allow are done after the final examination to minimize student fear that what they say will affect their grade. The interviews occur in my office and are audiotaped and later transcribed. Each interview is preceded by my stating that I am studying what teachers do in the classroom to help students learn, and all interviews are kept anonymous. Analytic memos and contact summary sheets discussing setting, student attitude and demeanor, and content are written for each interview.

The students I interview are selected to contribute student opinion and characteristics that seem important to the context of the study. In the three concluded studies and planned for the fourth study, I seek samples of the student population guided by my emerging theory using theoretical sampling (Strauss, 1987). I do not attempt to get an empirically "representative" sample. As I learn about and make sense of the events in the classroom and its meaning to the participants, I look for negative data as well as positive data for my emerging theory. I determine how many interviews I will do by doing interviews until I find that I am discovering nothing new. I purposely interview students known to be outspoken and critical to be sure I hear negative comments, as well as students known to be outsiders (loners—not a member of one of the cliques in the class) to be sure to get different opinions rather than just "the party line." By asking interviewees to tell me who in the class has opinions about the class and the teacher different from their own, I find out which students are likely to provide contrasting perspectives. In addition, I try to interview students who do not regularly attend class in an effort to understand what informs their decisions to attend or not to attend class.

In this section, Regan-Smith presents and justifies both her sampling strategy for the student interviews and how she will conduct them. Again, the lack of uniformity of interview questions for all students would be a flaw if the purpose of the study were to compare student responses, but it is not. The number of student interviews could have received more explicit justification, but most readers would feel that this is a more than adequate number. Further justification for her sampling decisions are provided in her discussion of validity, and these decisions are supported by her preliminary results.

Teacher Interviews

For all four studies, the teacher is interviewed formally three to six times, and all interviews are audiotaped and transcribed. The interviews occur throughout the course as well as after the course if appropriate. In general, the interview questions are about issues about which I become curious as an observer in class or as the result of student input. I pursue issues raised by the teacher and ask preconceived questions only if the teacher does not spontaneously address an issue of interest to me.

Formal teacher interviews last at least 30-55 minutes. For two of the teachers, I will use a class videotape as "text for dialogue" about the teacher's teaching for at least one interview. This yields more specific information about the teacher's play-by-play reasoning and strategy than interviews without videotapes, which tend to yield more abstract general teaching strategies and attitudes. Data gathered is analyzed along with the class observations in daily analytic memos and contact sheet summaries.

Because Regan-Smith had already collected much of her data when she wrote this proposal, she has a dilemma with what tense to use. Her decision to use mostly present tense seems to be the best choice; this could be misleading, but she has clearly explained earlier that she has already completed data collection for three of the four teachers. For dissertation proposals, I advise you to be completely candid about how much of your data you have already collected, unless you receive knowledgeable advice to the contrary. For funding proposals, this may be unwise; seek specific advice from those familiar with the particular funding source.

Methods of Analysis

Single Case-Study Analysis

Analysis of collected data is ongoing. Analysis of transcribed interviews and classes is coded during data collection as soon as transcriptions are available. Codes are inductively generated using the "grounded" approach of Glaser (1965) and emerge from the participants' descriptions of the teacher's teaching. In addition, coding is done using codes from a "start list" (Miles & Huberman, 1984) generated from previous studies. All interviews and classroom transcripts are reread specifically for codes that emerge from later interviews. As patterns or themes are identified, dimensionalization (Strauss & Corbin, 1990) is carried out accompanied by recoding for the developed dimensions or properties of a given theme.

Matrices are constructed from the data and are used to identify patterns, comparisons, trends, and paradoxes. Further questions and possible routes of inquiry are devised to answer the questions that emerge from matrices. Periodic review of all the collected data, as well as all the analytic memos, followed by summary construction and formulation of yet to be answered questions is done every 2 or 3 weeks throughout the study. In addition, I meet weekly with an education colleague, knowledgeable about qualitative research and the research site, to summarize the status of the research and to discuss emerging themes, concepts, and explanations.

In the final phase of data analysis, each interview is reread with the objective of writing individual short interview summaries. These summaries allow me to see threads that run through interviews and thereby maintain the context for the quotes that are lifted out of the interviews and used as examples in writing up the research. Using Microsoft Word (Apple, 1988), I then cut and paste quotes from all the interviews, creating new separate documents for each code that had emerged from analysis of the interviews. This compilation of quotes for each code is used to appreciate trends, contrasts, and similarities. Matrices are constructed to check the validity of themes that emerge. Finally, the data are reviewed to pair up student perspectives with teacher perspectives of the same phenomenon to compare and contrast perspectives, as well as to look at whether what the teacher intends is, in fact, what the students perceive as happening.

Validation of data is achieved by triangulation (Denzin, 1970) of methods by comparing student perspectives, teacher perspectives, and participant observer perspectives of events in the classroom. Theoretical validation is achieved by regular presentation and discussion of emerging conclusions with medical school colleagues familiar with the setting, students, and teachers. Further validation is achieved by discussing my analyses and conclusions with the teacher and with students.

Cross-Case Analysis

Once I develop an understanding about how the fourth teacher helps his students learn, I will begin cross-case analysis. The first step will be construction of a conceptual framework (Miles & Huberman,

1984) containing the dominant themes of how these four teachers help students learn. Each theme will be dimensionalized (Strauss & Corbin, 1990) or broken into factors and graphically displayed, illustrating the relationships between them.

Patterns and themes will be sought by construction of cross-case displays and matrices. Plausible explanations and metaphors will emerge as the variables are related, split, and factored (Miles & Huberman, 1984). The goal will be to build a logical chain of evidence (Scriven, 1974) and to construct a theoretically and conceptually coherent theory by checking for rival explanations and looking for negative evidence. In order to check for theory validation, informants will be asked for feedback on generated theory after data collection is completed.

Regan-Smith's description of her analysis strategies is detailed and comprehensive but rather abstract and boilerplate, and it doesn't give a good sense of the actual methods and categories she'll use. This weakness is compensated for by her discussion of Preliminary Findings, below, which provides detailed, concrete examples of the *content* of her analysis. The discussion of evidence, rival explanations, and feedback also paves the way for the next section, on validity.

Validity Issues

1. *Teacher selection*: After the fourth teacher study, I will have studied the award winners from four different discipline courses who use the lecture method (Appendix B). I will stop at four teachers, unless another important teaching characteristic is identified that I have not already found. Because the study school has no features that make it different from other U.S. medical schools with a traditional curriculum of 2 years of basic science and 2 years of clinical experience, I find no reason to study teachers elsewhere. Most teachers of basic science in most schools are male, so I found no validity threat to my study by the teachers being male.

This is really an argument for the *generalizability* of her results, not their validity.

2. *Student selection:* Did I interview enough students? Did I bias the data by who I interviewed? I intentionally try to interview students who have different perspectives and opinions of the teacher's teaching. I interview students who are: (a) known to be outspokenly critical of teaching, (b) from all quartiles of the class, (c) from a variety of career choices, (d) whom I know and whom I barely know, (e) who are referred to me by classmates as feeling different about the class and teacher, (f) who participate in the typical camaraderie of the class and who do not, and (g) who attend most every class and who attend only a few. In essence, I try to seek out students who do not feel the teacher helps them learn as well as those who do. Thereby I try to get both negative and positive student input. I stop interviewing when I begin to hear the same things repeated and no new information.

This paragraph deals with some plausible threats to the validity of her results. The sampling strategy described here is an example of purposeful sampling; the decision on when to stop interviewing is based on what Strauss (1987) calls *theoretical saturation.*

3. *How do I know what students say is true and not just what I want to hear* (i.e., that the teacher helped them learn when he did not)? To make students comfortable being honest with me, I assure the students anonymity and interview them in a location distant from the classroom. As often as possible, I postpone student interviews until after student grades have been awarded. I also attempt to interview students who are scheduled to finish their third and fourth years at another medical school, thereby eliminating any power I may have as Dean for Clinical Education over them. In the three completed studies, students have not held back from criticizing the teachers nor sharing with me their negative feelings and opinions of the teachers' teaching. I use my presence in the classroom as a learner trying to understand new subjects (e.g., the molecular biology of viruses) to substantiate whether a teacher truly helps students learn. If the teacher helps me learn and the students say he helps them and they pass the course, I believe them. I ask students to give examples of all teaching characteristics they claim help them learn, and then I substantiate student examples by being present in class. Collaboration with students (both those included in the study and those who were not) by discussing my observations and my conclusions also helps increase my confidence in the validity of my work.

This paragraph addresses her relationship with the students, which has ethical as well as validity implications, and argues that her relationship to them as Dean is not a validity threat to her conclusions.

Someone who didn't know Regan-Smith and her reputation among these students might not find this argument completely convincing, but I'm not sure what else she could say. The most persuasive point, for me, is that the students she has interviewed *have* been critical of their teachers.

4. *How do I know what the teacher says he does is true?* I substantiate all teacher claims by participant observation and through student interviews. Teacher beliefs and stated reasons for behavior are accepted as true unless I encounter discrepant evidence.

Here, Regan-Smith basically relies on triangulation to deal with the validity threat of self-report bias in the teacher interviews. She could also have used the argument she made in discussing the student interviews: that, having already studied three of the teachers, she *knows* that the observations and student interviews corroborate the teachers' reports.

This section as a whole is organized by particular validity threats—how she might be wrong. In discussing these threats, Martha draws on information previously presented in the Methods section but reorganizes this information so it's clear how the data obtained through these methods will help her to deal with these threats.

Ethical Issues

Could my research harm the students or teachers? The teachers risk my finding out that they are not as good at teaching as their award would merit. Even though I do not oversee the basic science part of the curriculum, my administrative colleagues do; and I am a member of the Curriculum Committee. To minimize this fear of risk, each teacher is assured that no one other than specified study school education colleagues with whom I discuss results and conclusions (and my thesis readers) will know of the results of my research unless the teacher gives me permission to do otherwise. I cannot eliminate this risk for the teachers.

No harm from teachers can come to the students who participate because the students' identities are kept secret. I cannot eliminate the risk that I, as the Dean who writes the student's letter of recommendation for residency after graduation, will form opinions about them as a result of my interview. Those students concerned about such a risk can easily avoid participation. I am aware of no one refusing to participate when asked, hence I do not think student avoidance of participation poses a significant validity threat to my research.

This section could be placed either before or after Validity. One point that could have been made explicitly here is that these teachers, as award winners, have less to fear from examination of their teaching than most teachers. Regan-Smith could also have dealt more convincingly with the ethical issue of risk to the students. Ultimately, her argument depends on her own integrity. The point at the end, about validity, belongs in the previous section.

Preliminary Findings

To date, preliminary analysis of the data has enabled me to identify a number of teaching characteristics that help students learn: clarity, relevance, knowledge of students' understanding, teaching to different learning styles, and passion for the subject. Each of the three teachers studied so far has been found to best exemplify different teaching characteristics, even though the characteristics were found in all the other teachers' teaching. In other words, the characteristics identified that help medical students learn basic science are practiced by all the teachers studied but each teacher is a "master" at one or two different characteristics.

The first teacher teaches heart physiology, anatomy, and clinical disease to Year II students as a part of the Scientific Basis of Medicine course. The students felt that his lecture style was "like a conversation" with them; the students felt he understood what they knew and what they did not. In addition, this teacher addressed multiple student learning styles by presenting the course material (e.g., coronary artery disease) in seven different ways (i.e. lecture, reading assignments with clear stated objectives, computer interactive patient cases, student participation in demonstrations, small group discussions, problem solving of paper cases, and student presentations of current articles to small groups).

The second teacher teaches the virology section of the Microbiology course in Year I. The students and the teacher felt that the most important feature of his teaching was clarity. The students perceived him to achieve clarity by (a) limiting the material needed to learn, (b) explicitly defining the material the students need and do not need to know, (c) specifying the meaning of his words, (d) presenting concepts moving from the simple to the complex in a logical progression, (e) including stories about patients, epidemiological problems, or medical history to explain concepts, (f) asking the class questions critical to understanding the concepts, and (g) repetition of key con-

cepts and facts. He checks on his clarity by giving weekly quizzes and spending extra time in class to explain any quiz questions missed by a significant number of students. The quizzes promote clarity for the students because they additionally give the students feedback on what they know and do not know as well as force them to learn the material weekly and keep up with learning the material rather than cramming for the final examination.

The third teacher teaches pharmacology and best exemplifies the use of relevance in teaching. He uses relevance in his classroom teaching by structuring each lecture around either a presentation of a patient case of his own or a patient case volunteered by a student. In addition, each week he provides students with paper case problems to solve individually, thereby letting students simulate practice as physicians. Relevance is also achieved by having students teach students how to solve the case problems. The ensuing class discussion allows students (and the teacher) to learn and discuss student understanding of the pharmacologic principles. The use of the Socratic method by this teacher as cases are discussed in class gives the students opportunity to privately reflect on their own similar experiences with patients. Relevance is also achieved by students privately conversing during class, relating to a neighbor what they are learning in class to cases they have seen, and sharing the experience with the classmate.

Previously studied teachers were not aware of all they did in the classroom to help students learn. Often a teacher is unable to fully appreciate how he helps students learn without my feedback. From the fourth teacher, I expect to learn how a teacher's passion for or love of subject helps students learn. I have heard the fourth teacher speak and he is mesmerizing. His charismatic style of presentation captures the audience's attention and, I suppose, it helps them remember what he says. He may also contribute to their learning by motivating them to learn on their own.

I expect the comparative analysis to reveal that the dimensions of each of the individual teachers' teaching characteristics overlap (e.g., anecdotes used to achieve clarity also achieve relevance). Ongoing analysis of my first three case studies reveals that students feel that student-involved teaching, such as students teaching students, is particularly useful for their learning because it achieves clarity, relevance, and a form of student/teacher conversation, and it addresses student learning styles.

This discussion of preliminary findings serves several purposes. First, it supports Martha's argument that the methods she proposes are workable and will allow her to generate interesting and valid answers to her questions. Second, it fleshes out her rather abstract and general discussion of data analysis, clarifying how she is coding her data and integrating themes within each case, and suggesting issues that the cross-case analysis will focus on.

> In summary, by using qualitative research methods to study basic science teachers who primarily use the lecture format to teach, I intend to find how these teachers help medical students learn. The theory generated will be compared to existing theory on effective teaching using lectures in other educational settings. This theory will be used to develop faculty workshops to teach teachers how to teach. The ultimate goal of improved basic science teaching in medical school is to improve medical student enthusiasm for, and learning of, the sciences basic to medicine.

This final paragraph sums up the study by briefly reviewing, in the reverse order from their presentation in the proposal, four components of the design: the methods, the research question, the theoretical context, and the purposes of the study. In doing this, it clearly shows the connections between these components and links the proposed research to the purposes with which the proposal began. However, this is pretty terse for a conclusions section; most proposals will need to say more to summarize the proposal and present the implications of the study.