Faculty Perspectives on Peer Review

By Kathleen M. Quinlan

The quality of teaching in higher education has been the subject of much concern in recent years.[1] Efforts are being launched by campuses and professional societies to find ways in which teaching can be better recognized and supported within a social system where formal and informal rewards have favored research accomplishments.[2]

A key strategy in this attempt to improve the status of teaching in higher education has been to regard instructional activities as examples of, or analogous to, scholarly research, which is highly valued within academia. Through Ernest Boyer's reconceptualization of faculty work, *Scholarship Reconsidered*, the notion of the "scholarship of teaching" has attracted much attention among administrators, policy makers, and higher education researchers.[3]

Lee Shulman has articulated some of the key aspects of that scholarship metaphor, asserting that we need to make teaching "community property." He argues that in order for teaching to share a privileged status, it must be connected to the disciplines that define scholars' communities, documented richly and publicly before that community of peers, and subjected to the same sort of scholarly critique and evaluation accorded to research.[4] This thinking has provided one rationale for recent campus policies mandating that teaching be peer-reviewed.[5]

Yet we know little about what actually constitutes the "scholarship" of teaching and how those scholarly aspects can best be documented or judged. Much of the research on (and practice of) college and university teaching improvement and evaluation has

Kathleen M. Quinlan *is a doctoral candidate in the School of Education at Stanford University. This paper draws on her work as a research assistant with the American Association for Higher Education's project on peer review of teaching (Lee S. Shulman, principal investigator). After completing her degree she will serve as a lecturer at the Australian National University.*

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focused on overarching, non-discipline-specific teaching techniques such as enthusiasm, organization, and clarity, while neglecting instructors' knowledge of the subject matter[6] and their ability to translate key concepts in their field into terms that students understand. However, faculty members' understanding of and representations of their subject matter form precisely the dimension that lies closest to the heart of scholarship.

Research suggests that faculty in different disciplines value different phases of their teaching or different forms of evidence as indicative of scholarly prowess.[7]

The ways in which different groups of faculty are used to thinking about the world influence the ways in which they view teaching and learning. In addition, the nature of the knowledge that those groups have constructed within a particular field affects the substance of the teaching and the ways in which teachers teach. Since the work patterns, world views, and processes for thinking, knowledge acquisition, and validation differ among the disciplines,[8] the scholarship of teaching must also necessarily be defined differently in different disciplines.

An important empirical question to guide initial steps in the implementation of programs of peer evaluation of teaching is, "What do the evaluators (the faculty in particular disciplines) *value*?" In other words, as faculty write and talk about their teaching, what aspects of teaching do they value most? What disciplinary differences emerge in these valued (scholarly) aspects of teaching and in the types of evidence that are preferred for supporting judgments about scholarly dimensions of teaching? This study seeks to explore these questions. The following assumptions guide the analysis:

1) Some aspects of teaching can be considered scholarship, and the evaluation and improvement of those aspects can be treated analogously to research.
2) Those scholarly aspects are directly connected to the discipline represented by the scholar-teacher.
3) Those scholar-teachers are in the best position to define the scholarly aspects of teaching in their field.

Two faculty members in each department were asked to complete three exercises in peer review.

Method

This study is part of a national peer review project coordinated by the American Association for Higher Education's Teaching Initiative. Thirty-six departments in 12 universities (six research, six comprehensive), representing at least two disciplines in each of the following clusters—humanities, sciences, and professional (or applied) fields—are involved in the project. Two faculty members (tenured in almost all cases) in each department were asked to complete exercises on the peer review of teaching by:

1) choosing three artifacts of their own teaching (such as a syllabus, a videotape of classroom teaching, and examples of student work).
2) writing self-reflective statements on each one, which comment on the work sample.
3) exchanging the exercise with a colleague.

Although all participants received the same set of instructions and prompts to guide their work on each of the exercises, the guiding questions granted the scholar-teachers freedom in what teaching artifacts they selected and how they focused their commentaries.

After preparing these exercises, all participants attended a workshop in which they shared their artifacts and writing with their peers at other participating universities during semi-structured discussions.

I drew on two main sources of data for this study: (1) the content of the written exercises (the artifacts and the commentaries) completed by faculty participants, and (2) observations of discipline-specific groups of faculty participants discussing the exercises.

In order to maximize the disciplinary differences observed, I compared and contrasted the materials and responses of faculty in a humanities discipline (history) with those of a science discipline (chemistry). Fourteen historians, representing eight different universities, participated in the discussions. Eight of these faculty contributed partial or full sets of written exercises for analysis in

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this study. Twelve chemists, representing six universities, participated. Eight chemists also contributed some or all of the written exercises. For three of the universities, both the chemistry and history departments were represented.

Findings: History

Intellectual Standards: Doing History

Since the larger project promotes discipline-specific considerations of teaching standards, the faculty frequently focus on the importance of giving students a sense of what it is like to "do history" through the courses that they offer. The group sees history as resting on the reading, interpretation, critique, and writing of arguments. Many express the need for students to manipulate larger ideas and themes.

This group of historians thinks of their courses as scholarly arguments that can be evaluated as one would review a colleague's other scholarly research. For example, one can compare the process of evaluating a colleague's course to evaluating a history book by "looking at the underlying assumptions [of the course], the conceptualization of [my colleague's] course, asking, 'What does it contribute to students' (readers') knowledge of the subject?'"

Mission: Caretakers of Liberal Education

These historians share a belief in the value of their disciplinary modes of thinking for all students, majors as well as nonmajors. One senior professor cites a recent statement issued by his department: "We reaffirm our commitment to the value of the study of history of civilization as a means of enhancing the broad goals of a liberal education."

This commitment to providing a liberal education for all of the university's students also shapes the major challenge that many of these teacher-scholars face: trying to meet the needs of a variety of students with a range of backgrounds and abilities. One participant writes:

The assumption of a need to tailor goals to different students leads to debates about legitimate course goals.

> Because I value the participation of all these kinds of students. . . I have resisted the temptation to make my life easier by targeting a particular audience. . . As a result, the goals of the course as I teach it reflect its hybrid characteristics. . . . My varied students are not equally positioned to attain all of these goals. Some of my beloved engineers struggle to get much beyond goal (2). The brightest of the history majors want to spend all their time on goals (4) and (5).

In a written review of a colleague's course, another professor also notes the equity issues that arise when students with various academic backgrounds are invited into the same course:

> In order not to discourage students from taking a course that we feel would be a wonderful learning experience for them, we often do not require prerequisites. But do we put students who have not taken the basic U.S. history courses, etc. at a disadvantage with those students who have? Is it really fair to advertise a course in that way—even for the best of intentions—if a knowledge of the period in which someone lived would be very valuable in both the discussions and the exams for the course?

The assumption of a need to tailor goals to different students leads faculty to debates about legitimate course goals for majors vs. non-majors and the possibility of sequencing their courses so that, for example, the easier skill of recognizing and criticizing historical arguments would precede courses that involve writing historical theses. While sequencing and building on the knowledge and skills developed in earlier courses is taken for granted by their colleagues in chemistry, many of these historians are reluctant, because prerequisites would exclude many students, including their "beloved engineers," who may be able to learn a lot from the course.

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Students and Their Role

The historians' interest in variations among the individuals they educate in their classes also manifests itself in their conversation about assessing student learning. Early in a discussion, the group seemed uncomfortable with the idea of using standardized assessments of student learning as a measure of faculty teaching performance. Instead they view each individual student (and therefore each individual interaction with them) as unique, multidimensional, and valuable. This perception is associated with a desire to personalize their assessments of students.

The historians also acknowledge that students come with "vastly different agendas" and are there to "learn different things," touching on the question of whether student learning should be assessed against the instructor's goals, against the student's goals for the course, or against the student's individual progress and development over the course.

The multidimensionality of their students is also regarded as significant to the educational process. Says one, "I focus on student characteristics because I regard a mix of traditional and non-traditional, male and female, and differing ages, ethnic, racial and class backgrounds an important element in the success of this course." Others mention differing future career plans and origins in different parts of the world. The various experiences and perspectives that students bring to and share with the class are seen as important contributions to the curriculum and process of the courses.

The Learning Process

Seven of the faculty expressed in written comments a need to personally and emotionally engage students with the material of their courses. One professor writes, "I believe that biography is an important approach to the study of history, because it brings flesh and life to an otherwise [lifeless] series of treaties and wars." He elaborates, suggesting that humanizing history promotes retention of the material:

> I really believe students will remember

For another historian, emotion is a key factor in a view of learning as a transformative process.

> Washington, Jefferson, Confucius, Jyang Kai-shek, Ho Chi-minh more fully and longer, if . . . students have fleshed them out with autobiographical and biographical details. To see Mao sitting around in his underwear and picking out cooties from his body, or Jefferson puttering around in a workshop on one more invention or labor saving device for his home, etc. really does bring life to the individuals we are discussing with our students.

Another scholar/teacher writes about the personalization of his course as a mirror that allows students to examine their own lives and rethink the worlds in which they live.

> [the course serves as]. . . a means of clarifying [students'] own values through analyzing events in the past. The argument here is that history is not primarily, a study of events of the past for their own sake, but a method of inquiry, thought, and evaluation which is of use in understanding the present in general and of one's own life in particular. . . I also encourage the students to see the connection of great civilizations of the world to the diversity of students around them on campus and in [this city]. . . I also try to get them to see how idiosyncratic and strange is the world they have experienced up till now. I try to get them to see that [this university], and [this city], and the U.S.A. are, in world perspective, quite unusual places and institutions. To some degree I try to get them to step outside themselves and see events from other perspectives.

For another historian, emotion is a key factor in a view of learning as a transformative process:

> I also take much satisfaction in the revelatory nature of much of this material to students. Even those who think they have a good understanding of

Almost all of the participants emphasize problem solving as a main objective of their courses.

> the region, its racial heritage, etc., often express dismay and discomfort in reading these intimate accounts. . .[that] leave students with a far more sophisticated sense of the complexity and diversity of [the history of this region], and the importance of the human variables always at play in shaping it.

These comments illustrate the importance these historians place on conveying the vitality of their fields to their students by engaging students personally in the material they are studying. This view seems to rest on an overriding interest in the "humanness" of their students, as well a view of learning as a process of individual change fostered through dialectical processes that allow students to "try on" different points of view.

Findings: Chemistry

Intellectual Standards: Doing Science

Just as the historians want their students to learn to "think like historians," the chemists believe that it is important for their students to "think like scientists." Almost all of the participants emphasize problem solving as a main objective of their courses.

> My overall philosophy in teaching this course is to consider it one in problem solving. Most of the engineers will forget the chemistry presented; many of the biologists will also, although they will ultimately be exposed to considerable chemistry. But every student in engineering and the physical sciences will survive by the ability to think critically, reason abstractly, and solve problems.

Others focus on having students understand what models and laws are, their differences, and their significance in science:

> The object of this historical discussion is to emphasize that scientific models are just that—

Members of the group spoke of needing to model and instill the "excitement of discovery."

> models. They are to be used and not necessarily believed. This is very disturbing to many students who want to think of science as an academic field which is embedded in irrefutable facts. To emphasize this concept, I point out that some of the greatest thinkers in the world have been completely wrong in their ideas about science. . . . General Chemistry lays the basic foundation for further studies in chemistry, including organic chemistry. There are many topics that students must understand from general chemistry before proceeding to organic chemistry. These topics are reaction kinetics, thermodynamics, all aspects of chemical bonding, and acid-base concepts among many others. I emphasize that just because reactions involve organic compounds rather than inorganic compounds, the basic laws of chemical reactivity do not change.

According to these faculty, chemists and chemistry students should also cultivate the abilities to translate between English and mathematical notation, to draw chemical structures, and to communicate results effectively.

"Thinking like a scientist," though, also seems to mean "feeling like a scientist." Members of the group speak of needing to model and instill the "excitement of discovery," and also to develop in students an appreciation for the "beauty" of the interconnections between concepts, experiments, and general models. Furthermore, involving students in realistic projects that do not have a defined outcome means that student experiments often fail, but:

> (I)t appears that the learning opportunities are enhanced by this approach because of the struggle that students go through as they think about the problems and the exposure to how a scientist feels when things don't work. For the students that struggle through the problems and reach the point

> ***Achieving a wide variance in student scores is apparently important and a sign of rigor.***

> where they can get the experiment to actually work, there is an additional feeling of satisfaction that comes with realizing the results of hard work.

While the historians want students to develop the habits of mind of historians, these chemists want their students to develop the habits of mind and the emotions of scientists.

Preparing Future Scientists

While the historians see themselves as liberal educators whose job it is to teach both majors and non-majors the chemists speak and write almost exclusively about science majors and, in particular, chemistry majors. Subject matter in chemistry is hierarchically structured and sequenced, in contrast to history courses, which are not. Few non-science majors enroll in upper level courses in chemistry, and it is not surprising that chemistry faculty do not think very much about non-science majors. But it is notable that many of the faculty who write about and discuss introductory and other lower division courses do not refer in their comments to the teaching of the non-science majors. Their descriptions of the importance of "thinking like a scientist" focus on only those students who will literally become scientists, while the historians frequently assert that learning to "think like a historian" is important for all undergraduates. These contrasting views of their mission are closely linked with what each disciplinary group sees as its major challenges.

Student Learning and Student Evaluation

In their writing and discussion of the exercise on student learning, the chemists frequently comment on how to *evaluate* their students' learning. All members of the group was asked to describe their assignments or exams and student achievement on those tests, and other members of the group were asked questions about the type and number of students in the class and the range of student scores. Discussion of the grading of student work reveals a strong shared assumption among most of the scientists that students' abilities fall on a single normal or bell-shaped distribution. One professor writes:

Chemists more frequently discuss the problem of motivating students than do historians.

> The final was hand-graded, with generous credit being given for delineating key points of logic and knowledge, even in the face of numerical errors . . . This final averaged 262 out of 400 points. I consider an average of 65% to be ideal. Scores for the 469 students in the course ranged from 395 to 45! (Incidentally, total scores in the course ranged from 866 to 277 out of a possible 900, with the average being 606.) With a 65% average I am satisfied that the average student learned considerable chemistry and at the same time improved his or her problem-solving skills. This class performed about as well as the usual.

Another professor, teaching a small honors class, echoes this attitude, saying that his final exam had a class average of 70 percent and that he was "happy with that" and that it "met my expectations." Assignments that deviate from traditional in-class finals, such as group projects and presentations, take-home exams that students can collaborate on, or the opportunity to correct exam questions later at home for half-credit, are justified by the fact that the distribution of student scores still correlates with score distributions on in-class finals. Even across this range of different examination methods, achieving a wide variance in student scores is apparently important and a sign of rigor.

The emphasis on the 65 to 70 percent average score within a normal distribution means necessarily that many students will fail the class and be excluded from moving to the next course in the sequence. Grading "on a curve," therefore, serves as an efficient sorting device to ensure that only the top group of students will make it through a chemistry major and on to graduate school. This approach is generally accepted, despite protests by a couple of these scholar-teachers against an attitude of "weeding out," saying "it is easy to flunk students, but that attitude [of weeding out] is the problem — our obligation is to educate, not to flunk."

In addition to those protesters, two other scholars-teachers from another university question the validity of the standard eval-

> ***Cheating is also a concern among chemistry faculty. Many issue warnings against it.***

uation practices. One points out that some of his best graduate students have not been those with the best GPA or GRE scores. He has seen some of his "C" students turn out to be terrific researchers. From this evidence, he concludes that there is "something else which is important which our exams are missing to predict skill at research." He has become committed to having students work in small groups doing advanced open-ended projects that "require all different kinds of skills to come into play in the cooperation." Those two individuals, more than the other members of the group from other departments, talk about the variety of skills that they need to assess and not simply a single set that is more easily measured by traditional individualized, and competitive exams and problem sets.

The biggest challenge chemistry faculty seem to face, given the emphases in their discussion, is how to accurately measure and sort students on their potential to become successful scientists.

Students and Their Roles

Chemists more frequently discuss the problem of motivating students than do historians. Some of the instructors attribute low scores on exams to student unwillingness to "work hard." In describing his score distribution on a final exam, one chemist points out with frustration that there is a "good correlation between doing the problem sets and attending problem sessions and doing well on the exam, as usual."

One response to this problem is to advise students on how to study. All of the chemistry syllabi contain some study tips. For example:

> In working problems, wherever possible get a complete set-up before you do any arithmetic. First, give a set-up in symbols and in numbers. Suppose you had the problem, what is the change in pressure when 1.750 moles of hydrogen is changed from 25.00 degrees C, 40,000 cc to 100 degrees C, 22,000 cc. Do it this way. . .[he shows an example of set-

In both disciplines, professors are concerned with overcoming the stereotypes about their field.

> ting up the problem]. . .Now do the arithmetic. This procedure fits a pocket calculator. If there is to be cancellation, you will see it. It is much easier to locate errors. Where problems appear on examinations, the setup is your way of proving that you understood the approach even when you did not produce the correct numerical result. This leads to large partial credit. <u>PLEASE TAKE THIS SERIOUSLY.</u>

One group of these faculty, whom I call the "real world problems" advocates, argues for asking students to work cooperatively to solve open-ended, real world problems that draw on scientific inquiry and analytical skills. Students "get fired up about it," says one, and another asserts, "Open ended questions or projects can really stimulate creativity and effort on the part of students that you would never have dreamed of." The testimony offered from this "real world problems" group shows respect for the good work that students do in their classes and suggests that it is the responsibility of instructors to provide assignments and support that excite and challenge students to do their best work. The "lecture, homework, and test" group, on the other hand, places greater responsibility for students' lack of thoughtfulness on the students themselves, saying that students simply "aren't willing to work hard enough" to be successful in chemistry.

Cheating is also a concern among several of the chemistry faculty. They talked about it in the group discussions, and half of the syllabi analyzed offer warnings about the severity of punishments for cheating. This attention to student integrity stands in contrast to their colleagues in history. Only one out of the eight history syllabi notes the consequences of cheating, and the issue was not addressed in the group discussions I observed. Given the value placed on the rigorous and competitive evaluation of students among these chemists, it is logical that they should also focus their attention on students who try to earn unfair advantages in the careful grading systems they have constructed. It is also possible, given such a competitive grading environment, that there

Peer review is based on a set of faculty values that prevail in the disciplinary cultures.

actually are more instances of cheating occurring in the chemistry courses than in the history courses.

Discussion

In both disciplines, professors are concerned with overcoming the bad stereotypes about their field that students may have picked up in their earlier schooling. In history, the faculty perceive themselves as needing to overcome student perceptions of history as a boring series of events and facts. The chemistry faculty speak of going beyond "cookbook" experiments and memorization of rules, without an understanding of how to apply them. Both groups of faculty seem to agree on the need to promote an overall critical thoughtfulness about, engagement with, and ability to understand and apply the themes or principles of the material they are studying.

There is also strong evidence among the chemists, and some evidence among the historians, of a desire to cultivate productive study habits among their students. While the chemists stress completion of homework sets, historians emphasize actively reading the assigned material before coming to class or discussions. Chemistry faculty provide hints on how to tackle problems; historians give tips on writing papers. In each of these fields, faculty seem to believe that developing particular kinds of self-discipline are critical aspects of studying their discipline.

Although faculty in each of the groups want their students to learn what it is like to experience the disciplinary perspective, the faculty appear to have different perceptions of their responsibility for educating students. The historians appear to have a strong commitment to the liberal education of *all* students. The chemists are committed primarily to teaching scientific skills and knowledge to *science majors*.

Furthermore, listening to both chemists and historians talk about their students, one comes away with quite different images. From the historians' descriptions of their students and the challenges they face as teachers, one envisions a classroom full of indi-

Cross-discipline conversations may be valuable for members of tenure and promotion committees.

vidual people, each with their own unique contributions, perspectives, sets of experiences, and goals. They reveal an appreciation for and excitement about the uniqueness of each class and what the instructor can learn from the interactions of particular groups of students. Reading the exercises and listening to the conversations of the chemists, one is left with the impression of a homogeneous student body, unused to rigorous study, and in need of faculty vigilance to guard against cheating. Students compete for scores on predetermined course material. Students' unique individual needs, goals, and interests are not addressed in their discussions or writing.

Differences within each group are also apparent. For example, I described earlier the differing viewpoints between what I call the "real world problems" chemistry group and the "lecture, homework, test" chemistry group. These two groups seem to hold different conceptions of students, faculty responsibilities, and the skills which are valuable in science. Those conceptions affect how these faculty carry out their teaching and what they look for in reviewing a colleague's work. Similarly, in history, while there is consensus around the importance of having students "do history," actually carrying out the evaluation of teaching based on this idea of "doing history" may turn out to be more difficult.

Implications for Peer Reviewers

Peer review is based on a set of faculty values—the values that prevail in the departmental, disciplinary, and academic cultures. My analyses of chemistry and history faculty indicate patterns both within and between disciplines. These patterns indicate concerns that must be addressed in implementing peer review of teaching.

Scholars within a particular field are able to have a unique kind of conversation about teaching, about "a pedagogy of substance—rooted in the subject matter itself as well as in a connection with the lives and culture of the [students]"[9]—that cross-disciplinary colleagues cannot easily have. These exchanges allow colleagues to seek assistance on common problems and offer substantive evaluations of teaching, just as disciplinary colleagues provide the most substantive feedback on research endeavors. While tenure and promotion folders now contain letters from external peers in the same field commenting on the candidate's research, similar letters can be solicited and submitted to document the candidate's teaching accomplishments.

Providing occasions in which scholar-teachers can openly examine their values and assumptions about teaching may also lead to strong agreement on particular issues (such as class size limits, for example) on which they can mobilize politically in accomplishing their common goals.[10]

Value clashes that may emerge within disciplines and within departments may prove to be problematic in the peer review of teaching. Reaching a common set of values on what constitutes "scholarly teaching" and how to evaluate it should not mean silencing or shortchanging the most radical teachers. A reduction in the variety of teaching approaches used in a given department or discipline should be guarded against.

While disciplinary peers can have a specialized conversation on a "pedagogy of substance," cross-disciplinary conversation can help faculty gain a better appreciation for the values held in different disciplines. Creating situations in which teachers from different disciplines can compare and contrast their practices and values may help faculty take a fresh look at the assumptions they hold about university education and how to teach their subject matter to their students.

Such experiences may be particularly valuable for members of tenure and promotion committees, who must review the increasingly scholarly documentation about teaching supplied by candidates and their disciplinary peers.

Better understandings of the core similarities and differences between fields may also be critical for the success of integrated interdisciplinary scholarly endeavors, as Margaret Eisenhart and Hilda Borko[11] found when they began collaborating across disciplinary boundaries (psychology and anthropology). They believe that interdisciplinary studies are more than just analyses that add together questions and findings from two different disciplines. These studies integrate the two in a meaningful way. They discovered that the first step in achieving those shared understandings that make up collaborative interdisciplinary research and teaching programs was to "[clarify] the major themes that each discipline brings to the study" in order to construct a conceptual model which integrates the two. Thus, gaining better understandings of the core values of one's own and others' disciplines may also facilitate increased communication, smoother collaborations, and richer cross-fertilization between scholars with differing disciplinary backgrounds.

Implications for Campus Teaching Improvement

This study calls attention to the potency of the disciplinary contexts within which faculty teach and carry out their scholarly work and therefore supports the emerging trend to encourage peer review and departmentally based instructional improvements. Understanding the currently existing sets of shared assumptions and values within a community is an important first step in serving as a consultant. Those outside leaders must successfully balance an appreciation for and understanding of the cultural contexts in which they are working, with their goal of changing the practices within that context.

A successful intervention may depend on reformers critically reflecting both on their own value stance, vis-à-vis those of the groups of scholars they work with, and the perspectives or biases they bring from their own disciplinary backgrounds.

Implications for Future Research

As faculty development and evaluation practices in higher education move toward department and discipline-based interventions, research on teaching in higher education needs to help inform and assess these shifts in practice by gaining better understandings of concepts like the "scholarship of teaching"[12] and the ways in which teaching and evaluation practices are shaped by the disciplinary and departmental contexts in which they take place. To pursue this line of research, scholars of teaching in higher education may find fruitful parallels in research on primary and secondary school studies of the significance of subject-specific aspects of teaching[13] as well as the significance of the social contexts of teachers' work.[14] ■

Endnotes

1 Bok, 1992; Boyer, 1990; Langenberg, 1992; Marchese, 1990; Shelton and DeZure, 1993; Wagener, 1991; Zemsky, 1992.

2 Diamond, 1993; Edgerton, 1992.

3 Boyer, 1990.

4 Shulman, 1993, p. 6-7

5 American Association for Higher Education, 1994.

6 Dunkin and Barnes, 1986; Feldman, 1976; and Seldin, 1980 in Donald, 1985; Donald, 1985; Miller 1987.

7 Becher, 1981; Becher, 1984; Donald, 1986; Donald, 1990; Donald, 1992.

[8] Becher, 1981; Becher, 1984; Donald, 1986; Donald, 1990; Donald 1992.

[9] Shulman, 1989.

[10] Cochran-Smith and Lytle, 1992.

[11] Eisenhart and Borko, 1993.

[12] Boyer, 1990.

[13] Shulman, 1986; Shulman, 1987; Shulman and Quinlan, in press.

[14] McLaughlin and Talbert, 1993

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