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THE SUBJECT MATTER PREPARATION OF TEACHERS[1]

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> If anything is to be regarded as a specific preparation for teaching, priority must be given to a thorough grounding in something to teach. (Peters, 1977, p. 151).

That subject matter is an essential component of teacher knowledge is neither a new nor a controversial assertion. After all, if teaching entails helping others learn, then understanding what is to be taught is a central requirement of teaching. The myriad tasks of teaching, such as selecting worthwhile learning activities, giving helpful explanations, asking productive questions, and evaluating students' learning, all depend on the teacher's understanding of what it is that students are to learn. As Buchmann (1984) points out,

> It would be odd to expect a teacher to plan a lesson on, for instance, writing reports in science and to evaluate related student assignments, if that teacher is ignorant about writing and about science, and does not understand what student progress in writing science reports might mean. (p. 32)

Although subject matter knowledge is widely acknowledged as a central component of what teachers need to know, research on teacher education has not, in the main, focused on the development of teachers' subject matter knowledge. Researchers specifically interested in how teachers develop and change have focused on other aspects of teaching and learning to teach: for example, changes in teachers' role conceptions, their beliefs about their work; their knowledge of students, curriculum, or of teaching strategies. Yet to ignore the development of teachers' subject matter knowledge seems to belie its importance in teaching and in learning to teach.

The focus of this paper is the subject matter preparation of teachers: what subject matter preparation entails, where and when it occurs, and with what outcomes. Since research on teachers' learning of subject matter is a relatively new domain of inquiry in teacher education, the literature is scant. The purpose of this paper, therefore, is to offer a framework that can contribute to future research in this area. To lay a foundation for the argument, the first section of

Sources and Outcomes of Teachers' Subject Matter Learning

Where Does "Subject Matter Preparation" Take Place?

Critics of teacher education tend to overlook the fact that prospective teachers take most of their courses not in much-maligned colleges of education but in liberal arts departments. The professional training they receive in colleges of education is also not centrally concerned with their subject matter knowledge. Elementary teachers take half or more of their courses in the liberal arts; recent policy initiatives--in states such as New Jersey, California, Illinois, Texas, and Virginia--have drastically curtailed or have eliminated the education courses that intending teachers can take. Secondary teachers have, for many years, taken as few as four or five teacher preparation courses in addition to student teaching. Yet, few critics or researchers concerned with teachers' ability to help their pupils learn subject matter knowledge have shown a broad philosophical interest in the liberal arts component of teacher education (see, for example, Bigelow, 1971).

While secondary teachers usually major in a discipline, elementary teachers take a range of survey and introductory courses in a variety of disciplines: history, English, sociology, biology, psychology, and art. What students actually learn about subject matter from their college and university liberal arts courses is both an open and a critical question. This paper, therefore, examines what is learned in university courses.

Yet, to limit the exploration of prospective teachers' subject matter preparation to their university education would be to miss the point. Teachers usually spend 13 years in school prior to entering college. During this period, they take English, mathematics, science, and social studies. What is the contribution of this precollegiate experience to teachers' subject matter understanding? A central premise of this paper is that teachers' understandings are shaped significantly through their experiences both in and outside of school and that a major portion of teachers' subject matter learning occurs prior to college. Consequently, this exploration of the

Outcomes of Subject Matter Learning

What is learned through studying a subject, whether at the elementary, secondary, or college level? On one hand, this may seem an obvious question. Math classes teach students to add and subtract fractions, factor equations, construct deductive proofs, and solve story problems; social studies classes provide them with information about our nation's past, cultures different from their own, and world geography. In English, students learn to write the five-paragraph essay, to construct grammatical sentences, and to spell and punctuate correctly; in science they learn about electricity, gravity, and about the ecosystem. An abundance of evidence belies these easy assumptions about what students learn from subject matter study.

On the other hand, what is learned from studying a subject entails much more than what can be inferred from examining course syllabi or curriculum goals and objectives. Paradoxically, while students seem to learn less of the substance of the subject matter--the facts, concepts, procedures, information, and skills--than we often assume, they also learn more than the substance. Seldom the focus of research on student learning, these other outcomes contribute to students' ideas about the nature of the subject, their dispositions toward the subject, and their assumptions about the teaching and learning of the subject. Three dimensions of what students learn from subject matter study--substantive knowledge of the subject, knowledge about the subject, and dispositions toward the subject--are discussed below.