

Making Subject Matter Part of the Equation: The Intersection of Policy and Content

An Occasional Paper

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INTRODUCTION

Imagine a school district that has recently implemented a court-ordered desegregation plan. Two high schools that have served primarily white, middle-class college-bound students suddenly find themselves serving a much more diverse group of students, including significant numbers of English-language learners and students from working class homes. Now imagine some of the curricular consequences: departments enroll more students in business math courses and remedial English courses, while the white, middle-class students continue to take Algebra and geometry, Shakespeare and honors English. Realizing the inherent inequity of this situation and wanting to ensure that all students will be adequately prepared to enter college, the district mandates the elimination of all non-college preparatory classes (courses that would not count towards college admissions requirements), just as the state passes a policy requiring all students to take and pass algebra. The district assumes that the policy will be accepted and applied similarly across the academic departments of the various high schools of the district. But is it?

The English department at one high school rather quickly moves to eliminate non-college bound courses and tries to ensure that all students encounter similar texts and writing assignments. The math department at the same high school, however, resists the policy. Forced to eliminate courses such as business math, they redesign the curriculum to create several new levels of Algebra courses taught at a much slower pace and continue to enact a placement exam for all incoming students. Across town, another math department embraces the policy and quickly moves to prepare all students to succeed in Algebra.

The story is not hard to imagine, since it is true (Stodolsky & Grossman, 2000; McLaughlin & Talbert, 2001). But how do we make sense of the consequences of this well-intentioned set of policies? Why does the English department embrace the policy while one math department resists? Why does one math department resist, while the other moves quickly to implement not just the letter but the spirit of the policy?

Writing and research on educational policy, and the making of policy itself, tend to approach teaching as a generic practice in which teachers engage, regardless of the subjects they teach or the level of schooling at which they work. Frameworks for understanding policy design, implementation, and impact have developed accordingly, illuminating many aspects of the complex challenges facing instructional reform. But these lines of work have yet to take full account of a central fact of life in teaching: that the practice of teaching is largely situated within particular subject matters. As an increasingly robust line of scholarship on teaching and teacher learning attests, the subject matters a great deal in how teachers think about learning, schooling, and their work (Ball & Cohen, 1999; Siskin & Little, 1995; Stodolsky, 1988; Grossman & Stodolsky, 1994, 1995). Subject matter represents the crucible in which instructional reforms are enacted, as well as the direct target of many curricular reforms. However, as Price and Ball state succinctly, “policy research has failed to probe how ‘the subject matters’ in reforms and their enactments” (1997, p. 639).

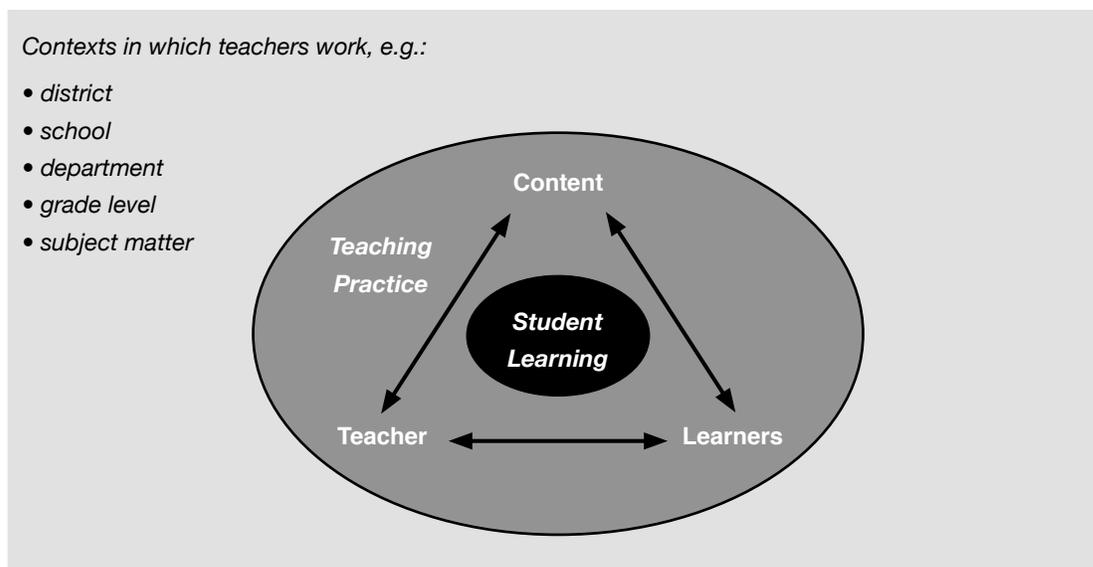
Given the centrality of subject matter to teaching, *the design, implementation, and effects of policy related to teaching are unlikely to be understood – by analysts and policymakers alike – unless they explicitly examine the interaction of subject matter with these policies.* In this article, we offer a way of anticipating where and how subject matter considerations can enter into the discourse about policies that seek improvement

in teaching and learning. To accomplish this goal, we first examine conceptually the connections between instructional improvement policies and school subjects, treated as a crucial context in which such policies are enacted. We then explore three categories of educational policy characterized by their intended focus on school subjects, and demonstrate for each how subject matter contexts are likely to interact with policy. We close with reflections about the puzzles and possibilities this analysis raises for the practice of policy research.

TEACHING, SUBJECT MATTER, & POLICY: A FRAMEWORK FOR ANALYSIS

Because our focus is on policies meant to influence the quality of classroom teaching, we first outline a framework for the analysis of teaching and note how subject matter and policy might be located within this framework. From our perspective, the practice of teaching involves the interaction of teachers and students around particular content, as schematically suggested in Figure 1; these interactions provide opportunities for both student and teacher learning (Ball & Cohen, 1999; Hawkins, 1974)¹. The practice of teaching includes not only the actual classroom encounters between teachers and students, but also the activities that precede and follow. Teaching practice includes planning for classroom interactions, designing tasks and activities in which students will engage, considering the content from a pedagogical perspective, as well as assessing student learning and reflecting on classroom interactions and activities.

Figure 1. An Interactional View of Teaching Practice



The practice of teaching is embedded within various contexts in which teachers work, from the specific classroom, school department (when relevant), and school, up to the district, state, and federal jurisdictions in which schools are located (McLaughlin & Talbert, 2001). Less visible yet pervasive among contexts that frame teaching practice is the subject matter being taught (Stodolsky, 1988; Grossman & Stodolsky, 1994, 1995). The subject matter context resides at several levels—within the parent discipline

(e.g., mathematics, foreign languages, history), within the traditions of the school subject, and within the assumptions about knowledge and learning that typify each subject-matter “culture”. Teachers encounter this context as they develop their disciplinary knowledge, come to know and understand the subject they are teaching, and interact with colleagues with similar teaching assignments.

Subject Matter and Teaching

Research on teaching and teacher preparation has moved from a generic view of teaching to one that takes the important context variable of school subject matter into account. A growing body of research shows that teaching and classroom instruction vary in many ways depending on the subject being taught (e.g., Stodolsky, 1988). Similarly, teachers’ beliefs about teaching and learning, and their priorities for their students, are informed by the specific subjects they teach. In short, how teachers conceive of their practice and how they carry it out is deeply rooted in subject matter (Grossman & Stodolsky, 1994, 1995; Siskin & Little, 1995; Stodolsky, 1988). Especially at the secondary level, subject matter helps define teachers’ work and identities; at both elementary and secondary levels, subject matter contexts mediate how teachers teach.

Specifically, subject matter enters teachers’ work through the content being taught and the teachers’ and students’ beliefs about, and experiences with, that content (Protherough, 1989; Barnes, Barnes, & Clarke, 1984; Stodolsky, Salk, & Glaessner, 1991). At the elementary level, teachers can vary their instructional practices according to which subject they are teaching. Stodolsky (1988), for example, documented differences in math and social studies instruction carried out by the same fifth-grade teachers. Whole-class instruction with seatwork tended to dominate in math, while small-group work appeared in social studies. Elementary teachers are often prepared more adequately in the language arts than in math and science, and may also have had different experiences with these subjects themselves, which may affect how they approach these subjects in the classroom (Price & Ball, 1997).

At the high school level, subject matter is often intertwined with membership in a department, and collegiality and professional culture are often tied to departments (McLaughlin & Talbert, 2001; Siskin, 1994; Siskin & Little, 1995). Teachers of different subjects have been found to hold differing conceptions of the nature of their school subjects and to hold different beliefs about teaching and learning. For example, English teachers tend to value autonomy in terms of curriculum—they want the prerogative of choosing materials and texts for their students; English teachers also believe in personalizing instruction. In contrast, many math teachers concern themselves with topical coverage of the curriculum and emphasize the sequential nature of their field; math teachers often coordinate instruction with colleagues and do not strive for curricular autonomy. Fields also vary in the extent to which there is consensus among teachers regarding goals and teaching practices (e.g., Grossman & Stodolsky, 1995).

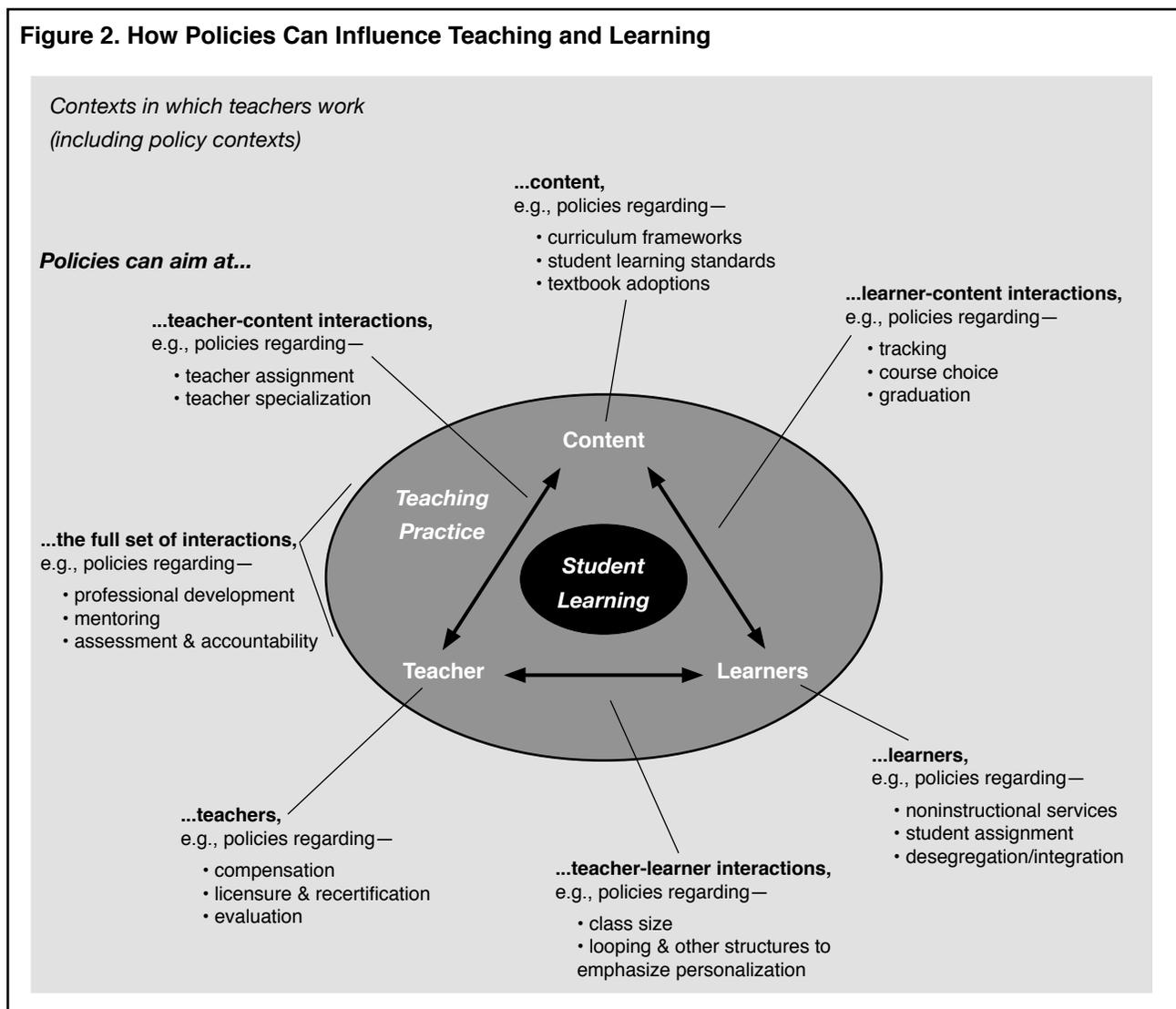
Compounding the differences that stem from the content itself and the cultures that grow up around it, school subjects may also require different resources for effective instruction. Science instruction with a laboratory component may use disposable materials that need to be regularly replaced while texts read in English have a longer useful life. The arts and physical education require special facilities, from darkrooms for arts to weight rooms for PE, while a standard classroom may suffice for English, math, social studies, and foreign language instruction.

Policy and Teaching

How can policy influence teaching practice, given our view of teaching as the interaction of teacher, students, and subject matter? How can policies attempt to enter this shifting triangle in order to influence practice? Treated as purposeful courses of action undertaken by leaders and others in the educational system, various policies from the local, state, or federal level guide, support, or direct activity within classrooms, across settings and time (Knapp, 1997). Given a diverse set of policy tools—among them, broad signals, resources, requirements, sanctions, information flows, and the allocation of authority—policymakers have many ways, in principle, of influencing classroom life.

Most policies related to teaching address one or more of the points of the instructional triangle, as noted schematically in Figure 2. For example, policies that focus on the teacher might set requirements for teacher preparation or licensing. Policies that set pay scales and other matters of compensation and benefits also focus on teachers, as do policies for teacher evaluation established by a school, school district, or state. All of these policies are intended, in one way or another, to address the issue of the quality of the teacher and, consequently, the teacher’s work.

Figure 2. How Policies Can Influence Teaching and Learning



Other policies focus more directly on learners, the second point of the instructional triangle. Policies can direct special non-instructional services such as nutritional support or family counseling for mental health issues to students and their families. Other policies, such as those describing appropriate behavior in school, are directed at students with the goal of supporting instruction by minimizing disruptions. Other policies regarding students result in guidelines used in grouping students for instruction. Some school or district policies, for example, might prescribe (or proscribe) instructional arrangements for students who are not yet proficient in English, or, more broadly, set guidelines regarding school composition by race, ethnicity, or social class, as in desegregation policies. All of these policies can affect both an individual pupil, by determining the parameters within which he or she will be assigned for instruction, and groups of students by shaping the collective context in which they learn.

The third point in the instructional triangle—the content of instruction—is also the target of many policymakers' actions. Witness the broad standards for student learning developed by districts and states over the past decade, along with more specific curriculum frameworks that specify goals of instruction in the various school subjects and grade levels served by the school system. Curriculum materials, as well, such as the textbooks that schools are permitted to adopt, and even the process of textbook adoption itself, can often be the result of policy actions. Policy may even specify certain topics in the instructional program, as in mandates to include units on career education, smoking and health, AIDS education, or conflict resolution.

While these sets of policies focus mainly on one of the points of the instructional triangle, other policies focus more on the lines of the triangle—the relationship between students and content, for example, or the ways teachers and students interact. Consider, for example, policy initiatives that offer incentives for math teachers to teach in high-poverty, low-achieving schools: here, the policy aims at the relationship between teacher and students by seeking to provide a particular group of students with more skilled teachers. Class-size guidelines are another example of policy aimed at this line of the triangle, since such policies are presumed to affect the interactions between students and teacher, by making it possible for teachers to focus more individual attention on students.

Other policies focus more on the relationship between students and content, for example, by addressing graduation, tracking, or the differentiation of instruction. Graduation policies, in the most basic sense, direct students to engage with particular bodies of content and demonstrate mastery of that content. Policies might even specify how mastery should be demonstrated, beyond passing grades on the course or state exams, as in settings that require portfolios or exhibits of student work, which can shape the way students interact with content over time. District, school, or department-level policymakers might dictate whether students in different tracks study the same material or not—do all freshmen read *Romeo and Juliet*, or only students in the honors tracks? Such efforts to differentiate curriculum would affect students' opportunities to encounter particular content, and could also affect instruction, if teachers modified their teaching of particular content in response to the homogeneity or heterogeneity of the class.

A final set of teaching-related policies are best understood as an attempt to influence the whole character of interaction among teachers, learners, and content, in other words, all aspects of the triangle at once. Professional development policies frequently aspire to this (Knapp, 2004), though they may also have the more limited goal of introducing new content or guiding how teachers interact with content.

Assessment systems and accompanying accountability requirements, as well, can also be understood as a way policymakers seek to affect the relationship among students, teachers, and the content of instruction. If pupils must pass certain tests or if assessments lead to important consequences for teachers and schools, teachers will presumably focus their attention on the content covered by these assessments, which, in turn, affects students' experiences with that content (Madaus & Clarke, 2001). In such instances of "teaching to the test" all aspects of the instructional triangle are likely to be affected. Similarly, more complex policy initiatives that subsume curricular change, professional development, and new assessments aim at all aspects of the instructional triangle, as in various experiments with "systemic reform" over the past decade and a half, some focused on particular subjects like math and science, others more broadly framed (Smith & O'Day, 1991; Fuhrman, 2001).

In sum, policy can affect teaching directly by influencing one or more of the key components of educational practice—the teacher, the students, or the content—or the relationships among them.² Because there are multiple levels and sources from which policies can arise, teachers and other educational actors often become policy brokers (Schwille et al., 1983). The full effect of policies on teaching, then, resides in the complex story of implementation, reflecting a host of conditions and forces across settings and levels of the intergovernmental system. Though many things mediate the implementation and ultimate influence of policy on practice, one of the most powerful mediating factors is arguably the subject matter context in which the policy and teachers are situated.

THREE WAYS THAT POLICIES APPROACH SUBJECT MATTER

To understand *how* subject matter mediates policy implementation and influence, one must distinguish at least three different relationships that policymakers try to establish between the policy and subject matter. The first, which we term "subject-neutral" policies, treat subjects as the same or equal, or simply ignore subject matter considerations altogether. The second, "subject-specific" policies, explicitly seek to support or improve the teaching of a particular subject area without regard for others, while the third, "subject-differentiating" policies explicitly treat two or more subject areas differently. Yet, as we will demonstrate, *regardless of policy intentions, the subject matter contexts and the differences among them act as a filter, potentially changing policy intent, implementation, and impact.* The mechanisms of filtering may differ somewhat by policy type.

"Subject-Neutral" Policies: Treat Subject Matters Equally or Ignore Them Altogether

The most common educational policies are not explicitly concerned with subject matter. They are put in place either to treat all educational actors and units (e.g., schools, subjects) uniformly or else are conceived with no thought to their subject matter implications. Many forces in the educational system push policymakers and policymaking in this direction.

Forms and sources of subject-neutral policies. Because policies often emerge as ways to resolve the demands of competing interests—representing a compromise or a reasonable way to settle conflicts (Malen & Knapp, 1997)—policies may be framed so as to anticipate and forestall any potential conflicts among teachers responsible for different areas of the curriculum. Such subject-neutral policies tend to

reflect norms of fairness and equitable treatment as well as legal constraints such as teacher contracts established through collective bargaining procedures. Besides political and legal considerations, the complexity of policy action may push policies toward a subject-neutral form: a course of action that applies to variable settings and does so over time is greatly simplified, both cognitively and logistically, if all units are treated the same. Ignoring subject matter is thus a natural way of simplifying the policymakers' task. So, in trying to imagine how to improve teaching and learning through a school district or state system, leaders are likely to assume that all teachers face essentially the same task and work within similar contexts.

The attractiveness of subject-neutral policy may also reflect the backgrounds of educational policymakers. Both lay leaders, such as school board members or legislators, and professionals in district or state offices are more likely to be interested in "the big picture" of schooling than in the intricacies of subject-specific curriculum and instruction. What is more, they are unlikely to have been selected for their policymaking roles on the basis of subject-matter expertise. Consequently, when "curricular wars" bubble up—for example, concerning best approaches to reading or mathematics instruction (Loveless, 2001)—policymakers are likely to navigate these controversial waters without extensive knowledge of the limits or promise of phonics-based reading approaches or the merits of "a balanced literacy program." Indeed, the whole issue of subject matter as a context to consider in policymaking may not be visible to many who create policy.

The same can be said of those who analyze educational policy. Very often trained in the politics, economics, or sociology of education and educational systems, such individuals employ disciplinary lenses that do not highlight those features of instruction or its context that reflect the nature of the subjects being taught. So it is not surprising that analyses of subject-neutral policies would tend to disregard, or simply not be able to recognize, the ways that subject matter contexts alter the story of policy implementation or effect.

Differences across subject-matter contexts as a filter for subject-"neutral" policy. While many policies may be designed without explicit attention to subject matter, they are generally implemented in the context of specific subject matters. The example with which we began this paper typifies a supposedly subject-neutral policy that played out differently by subject matter—while the policy to eliminate courses that did not meet college admissions requirements largely succeeded in English, it was only partially implemented in math. This one instance signals a process that is likely to be pervasive: thus, as they are implemented across the curriculum, it is hard for these policies to remain "neutral."

To be sure, some policies are likely to have a relatively uniform effect, regardless of subject matter. Policy initiatives that support extra nutrition, mental health, or integrated support services, for example, are unlikely to be affected by subject matter as a context. Presumably, better services of this sort will support students' ability to learn in general. More frequently, however, policies intended to have similar effects across the curriculum may play out differently in various school subjects.

Such differential effects seem especially likely when the policies aim at the relation between teacher and students. Class-size policies are a case in point. While there are some variations depending upon student population or curricular purpose (e.g., special education classes generally have student-teacher ratios smaller than the typical general education classroom), such policies generally do not distinguish among academic subjects, instead stipulating a maximum number of students for whom any teacher

would be responsible. The impact of class size depends on various things, among them, the way in which teachers organize instruction and plan specific activities for their students.

While some of the variation among teachers reflects individual teachers' preferences, there are also systematic differences in teaching across subject matters that would connect to issues of class size. For example, as the National Council of Teachers of English has argued for years, English teachers face the specific challenge of responding to student writing with the express purpose of improving writing skills. Despite the calls for teaching writing across the curriculum, English teachers are still held accountable for the writing achievement of their students. Reduced class size for English teachers results in fewer student papers to read, which in turn provides the opportunity for more careful feedback. For this reason, NCTE has challenged policies regarding class size and has called for reduced student loads for English teachers. By contrast, associations representing other subject-matter communities such as mathematics or science have not made class size a central piece of their reform proposals, as it is not viewed as crucial as other teaching conditions, such as access to laboratory facilities in the case of science instruction, or choice of curriculum in mathematics.

Subject-matter contexts can affect how other resources, such as instructional time, are perceived and used, even when they are allocated "equally." To take an obvious example, policies governing the structure of school schedules in high schools are subject-neutral at first glance—creating similar blocks of time for instruction in all subjects. Yet how teachers respond to proposed schedule changes often reflects subject-matter differences. Math and foreign language teachers, for example, generally oppose efforts to create block schedules, arguing the need for more regular, if shorter, periods of time to support repeated practice within their subject matters. Such objections are much rarer among English, science, and arts teachers, who often welcome extended time periods for certain activities like project work or lab-based inquiry activities. Elementary schools, by contrast, approach the scheduling of the instructional day differently, often allocating different amounts of time to particular subject areas (see discussion of subject-differentiating policies below).

In the cases of class size or the allocation of time for instruction, *subject matter contexts filter supposedly subject-neutral policy by giving different meanings to the same thing*, such as the number of people in the room and the 45-minute period or other unit of instructional time. One can imagine similar dynamics at work with regard to other valued resources related to teaching, such as access to mentors or coaching support, though here the filtering effect may be set in motion by the subject-related character of the resource (mentors, for example, may or may not possess expertise in the subjects their mentees teach).

The filtering of subject-neutral policies by subject-matter context extends beyond the availability and use of resources (class size, instructional time, expertise) to include the assignment of students to tracks, programs, or other groupings, and the consequent organization of curriculum. Once again returning to the opening example, subject-matter communities tend to view the sequencing of content differently so they are likely to view policies that group students heterogeneously or homogeneously as more or less problematic. As was true in this example, policies regarding student tracking are often developed generically by schools or districts, but are not implemented uniformly. The different reactions of math and English teachers when asked to eliminate tracking illustrates such effects. De-tracking has met with considerable resistance in subjects such as math and foreign languages where many teachers believe students need to follow a sequence of content mastery before moving on to new topics. In their eyes,

sorting students by prior achievement is necessary for effective teaching and learning. Studies in the U.S. and Britain have documented marked resistance to detracking among math teachers in contrast to the responses of teachers of English and social studies, only some of whom may find detracking problematic (Ball, 1987; Stodolsky & Grossman, 2000). In these instances, *the filtering effects of subject-matter contexts arise from teachers' beliefs as well as institutionalized practices that support their content perspective.*

The same basic pattern of filtering effects occurs in response to broad instructional reform strategies, when these are framed in relatively subject-neutral terms. For example, broad curriculum mandates driven by an equity or social justice agenda—such as a policy strategy urging teachers at all levels to include multicultural content in their teaching and to adopt instructional techniques that are “culturally responsive”—are likely to play out differently, depending on the subject-matter context. Teachers of science may puzzle over what they should be doing differently to be culturally responsive, while social studies teachers may more quickly incorporate multicultural content into their instructional practice. Or, in the self-contained elementary classroom, teachers may quickly adapt their reading lists to feature stories about characters living in different cultural settings, include books by non-white authors, or adapt their writing lessons to reflect on cultural issues, while leaving math teaching untouched.

Subject-Specific Policies: Target a Particular Subject Without Regard to Others

A second type of policy aims at enhancing or supporting teaching of a particular school subject. As any number of literacy initiatives, mathematics and science reforms, and social studies curriculum revisions might attest, policymakers' attention is often drawn to teaching in a particular subject area, to which they direct requirements, resources, and other supports.

Forms and sources of subject-specific policy. These “subject-specific” policies and instructional reform strategies approach the instructional triangle in a variety of ways. They may delineate specific content knowledge and skills to be taught in a given curricular area through curriculum frameworks, texts and other curriculum materials, mandated tests and assessments, or specific course requirements. Adoption of a new mathematics textbook series would constitute a routine example of a subject-specific policy. An initiative linking curricular changes and associated assessments with professional development targeted to the same subject area, as in any number of aligned instructional reforms (e.g., Clune, 2001), would offer a more ambitious and non-routine example. Many such policies address the whole instructional triangle, potentially affecting students and teachers in relation to instructional content. Subject-specific policies may also focus on the connection between teachers and content by mandating the use of certain pedagogical strategies (e.g., use or non-use of calculators and computers in a science program, or a phonics approach in primary grade reading) in connection with teaching course content. Alternatively, some policies in this category go after one element of the triangle such as the presence of qualified teachers, seen in the case of policies designed to increase the supply of mathematics and science teachers, in response to shortages of qualified staff in these areas.

The origins of these policies are easy enough to imagine. Even though the lines of least resistance are usually for policy to be framed without specific regard to subject matter, there are times and circumstances which draw public or professional attention to teaching and learning in a particular subject area. Conditions as disparate as local media coverage of a test score decline in reading to a

national crisis over science preparedness (as in the Sputnik crisis of the late 1950s) or the publication of a new professional association manifesto (e.g., the NCTM's *Curriculum and Evaluation Standards for School Mathematics* in 1989) can generate within a policymaking community concern, hope, and the impetus to action in a particular subject area. But more subtle, less visible forces and conditions may also be at work: the presence on the school board of an engineer who is vocal about the need for more and better science teaching, the securing of a new grant for improving mathematics education, or the annual cycle of textbook adoption (e.g., this year it's time to look at social studies once again). Whatever the catalysts, subject-specific policy is a natural response.

Policy actions of this sort do not necessarily presume any greater knowledge of subject matter on the part of the policymaker—or the policy analyst—than was the case in subject-neutral policies. Rather, while subject-matter experts may be part of the policymaking team, it is just as likely that the policies are framed (or understood) with the assumption that the policy will play out in the same way among all members of the subject-matter community in question. As we will argue below, this is a problematic assumption.

Subject-matter knowledge and beliefs as a filter for subject-specific policies. Here, the filtering effects happen *within* the subject-matter community more than *across* communities, as is the case with subject-neutral policies, and a growing body of research on the implementation of subject-specific policies helps us to understand and anticipate how these policies might play out. In brief, this research suggests that *how teachers and administrators respond to and implement subject-specific policies will vary considerably, depending largely on their own knowledge of and beliefs about the subject in question*. For example, a number of studies on the implementation of math reforms suggests that how teachers implement these reforms depends heavily upon what they already know and believe about mathematics (e.g., Educational Evaluation & Policy Analysis, 1990; Battista, 1994; Council of Chief State School Officers, 2000; Mewborn, 2003).

Literacy is another subject area frequently targeted for subject-specific policies. Washington state, for example, mounted a reading improvement initiative that mandated a new reading assessment to be used in all second-grade classrooms. This policy was designed, in part, to focus schools' and teachers' attention on student achievement in a particular subject area—reading—early enough to ensure appropriate interventions for struggling readers (Buly & Valencia, 2003). However, what teachers learned about their students through these assessments depended, in large part, upon their own knowledge of early reading and their skill in assessing beginning readers (Place, 2000). Teachers who knew more about reading and its assessment were able to learn more from this assessment than were teachers who were less knowledgeable.

Teachers' beliefs about subject matter may lead them to actively resist subject-specific policies. The controversial decision by the Kansas State Board of Education to require the teaching of a creationist view of evolution offers an extreme example of how a subject-specific policy might generate extensive resistance on the part of teachers expected to implement it. Such a policy was not sufficiently powerful to overcome the convictions of many biology teachers in the state who firmly believed that a Darwinian view of evolution was sound science while creationist perspectives were not (Kansas Biology Teacher, 1999) In a less extreme case that has become increasingly common in districts attempting to meet

accountability targets in literacy, teachers required to use a scripted curriculum program such as Open Court to teach reading may resist such programs based on their understanding of what it means to teach a balanced literacy program, as has been in the case in California (California Educator, 2002).

Teachers' beliefs about subject matter and their relationship to it also differ by grade level, and these differences affect their response to subject-specific policy. At the secondary level, where teachers are generally subject specialists—and view themselves this way—teachers are part of a subject subculture whose members often share beliefs and attitudes about teaching and learning in the subject. At the elementary level, teachers are responsible for multiple subject areas and have varying degrees of content and pedagogical knowledge pertinent to the different areas of their curriculum. The differences in their knowledge base conditions their response to new initiatives: the generally richer backgrounds elementary teachers bring to teaching literacy than to mathematics substantially shapes their capacity to understand and enact the practices embedded in state standards-based reform (Ball & Cohen, 1995), as does the fact that more elementary teachers enter teaching with a passion for reading and language arts than for math (Price & Ball, 1997). Teachers with greater knowledge of the subject, not to mention personal interest in it, may implement reforms differently (Educational Evaluation & Policy Studies, 1990; Jennings, 1997).

Compounding matters, teachers' response to subject-specific policies is likely to be affected by what administrators know and believe about subject matter. Administrators at all levels interpret and implement policies in accord with their own understanding of the subject. Their ideas about teaching and learning, both in general and within specific subjects, shape their expectations of teachers and the support systems they construct to help teachers carry out their work (Spillane, 2002; Nelson, 1999). The importance of administrators' grasp of subject matter is nowhere more clearly seen than in the instructional leadership and supervision exercised by principals in elementary schools. For example, without a firm grasp of what NCTM-style mathematics teaching is all about, rooted in their own professional learning in this domain, principals are likely to misadvise teachers or simply fail to offer the guidance that is needed for teachers to establish their practice securely (see Nelson, 1999).

As in the case of subject-neutral policies, what policymakers know and believe about teaching the subject is likely to influence how they design and enact the policy. Given relatively little knowledge of the subject matter in question, policymakers may underestimate either the knowledge required to implement such policies effectively or may not anticipate resistance to policies based on strongly held beliefs about subject matter. The implications for policy analysis are clear: analysts must look at the conception of the subject and how it is to be taught that is embedded within subject-specific policies, and at the ways this conception interacts with teachers' existing knowledge and beliefs. As Cohen and others suggest (see Cohen & Hill, 2001), underestimating the learning demands entailed by subject-specific policies may both undermine reform efforts and lead to misinterpretation of the reasons for reform failure.

Subject-Differentiating Policies: Target Multiple Subjects and Set Priorities Among Them

A third group of educational policies explicitly sets priorities among school subjects. These “subject-differentiating” policies are meant to privilege one or more subjects over others, in effect, telling educators where to invest most and least energy, attention, and resources. While differential investment in subject areas can come about by default (e.g., as a by-product of a subject-specific policy initiative³), there are many instances where policymakers take conscious and visible actions to direct efforts according to the relative importance they assign to subject matters.

Forms and sources of subject-differentiating policies. Policymakers may have different reasons for giving higher priority or more resources to certain subjects over others. In some instances, such policies reflect commonly held beliefs that certain subjects are more basic or foundational, while others are seen as “enrichment” areas. Literacy and mathematics often fall in the foundational category while other subjects, such as art, have struggled against their designation as enrichment subjects. Other subject-differentiating policies arise because policymakers believe society requires individuals with particular knowledge and skills—like Russian language, a common high-school offering in the wake of the Sputnik crisis, or currently, keyboarding and computer languages. Whatever the source of belief, policymakers build the priority order into graduation or promotional requirements, the allocation of time and resources to subjects, and the stakes attached to testing programs.

Graduation requirements, one of the most obvious examples of subject-differentiating policy, establish different numbers of courses in various subject matters, thereby assigning more weight, and ultimately resources, to some subjects than to others. English is important, science less so, at least according to policies requiring four years of high-school English but only two years of science. In contrast to both of these subjects, few states or districts require any years of art or vocational education for graduation. The high school curriculum thus becomes contested terrain, with winners and losers; because students can only enroll in a fixed number of courses, when requirements are raised in one subject, the policy inevitably affects some other subject. With the move towards more academic requirements for high school graduation, for example, fields such as business and vocational education and the arts have been de-emphasized. These policies have narrowed the range of offerings and electives available to students in many high schools (Angus & Mirel, 1999). Such policies may also cause subjects to try to reinvent themselves; vocational education, for example, began to advocate for more explicitly academic versions of vocational courses as increased graduation requirements in core academic areas began to squeeze out vocational offerings (Grossman, Kirst, & Schmidt-Posner, 1986; Little, 1993).

Long before students reach graduation, other policies allocate time among subject matters. Consider the common policy in elementary schools of differentiating the amount of time in the weekly schedule devoted to language arts and math, as compared to social studies, science, arts, and physical education, with the former receiving the lion’s share of instructional minutes, and often the “best” times for learning (e.g., in the first hours of the morning or right after lunch).

Standardized testing programs reinforce the subject priorities set at the elementary school level, and at other levels as well. Many schools test only in the areas of language arts and mathematics, clearly signaling to teachers and students that mastery in these subjects is of primary importance. Student promotion at certain grade levels (e.g., 3, 6, 8) may be contingent upon satisfactory performance on

standardized tests in reading and math, as in Chicago, where students who do not score at their grade level are required to attend summer school in order to close the gap, and, if not successful, are not promoted (Roderick, Nagaoka, Bacon, & Easton, 2000). High-stakes tests of this nature (Madaus, 1988) create additional pressures on teachers and students to spend scarce instructional time in certain areas (often explicitly directed toward test content) over other un-tested subjects. Not surprisingly, as states move towards high-stakes assessment in reading and math at particular grade levels, time allocated for instruction in reading, writing, and math—all assessed subjects—rises, while instructional time allocated to non-assessed subjects, such as social studies, science, and art decreases (e.g., Stecher & Chun, 2001, in Washington state; Taylor, Sheppard, Kinner, & Rosenthal, 2003, in Colorado).

Programs aimed at increasing the supply of teachers in math and science through emergency certification, targeted alternate routes, and other incentives are a different form of subject-differentiating policy. Because marketplace conditions offer more competition for individuals with math and science backgrounds, teacher shortages are more likely to occur in the areas of math and science than in fields such as English or social studies. Such policies implicitly recognize that the labor market for teachers may differ by subject matter and target resources to shortage areas. However, such policies have come under attack for their very differentiation of teachers according to subject matter.

Subject-matter politics and staff capacity as a filter for subject-differentiating policies. By explicitly targeting multiple subject matters, subject-differentiating policies invoke a different kind of filtering effect. At the root of the filtering process are subject-matter differences, as before, but here they are expressed through the interactions among groups of staff who take on responsibilities for teaching each subject matter, as well as among the broader constituencies that have developed behind each subject. Thus, the enactment of a policy that sets or changes priorities among subjects is likely to intensify whatever conflicts exist among subject-matter communities, as policies disproportionately lavish attention and resources on some subjects while ignoring others. Because subject-differentiating policies appear to make some school subjects more valued than others, policymakers may unwittingly activate a struggle among competing interests within schools, the district as a whole, or the community at large. The struggle can be overt and easily visible in secondary schools which are organized into specific departments, as angry voices in a faculty meeting debate the allocation of new resources to laboratory science, while ignoring needs in the English and History departments. But even in elementary schools, where “generalist” staff are implicitly members of more than one subject-matter community, battles are frequently fought over the allocation of valued resources to different subject matters.

One consequence of such struggles may be to set up counter pressures that push the system back to treating all subjects more equally—for example, as would be the case when a coalition favoring the arts in education mobilizes in response to a state’s heavy emphasis on standards and assessments in the “basic” academic areas. Alternatively, such policies may have differential effects on the morale of the subject-matter communities in the school or district, with long-term consequences for the quality of teaching or longevity of staff. Differential attention to subjects can be particularly troubling when changes are made in long-established priorities.

Subject-differentiating policies may also unwittingly encourage out-of-field teaching, or at least exacerbate the unevenness in teaching quality that already exists. When states upped the graduation

requirements in math and science during the 1980's, many schools were caught without sufficient staff capacity to "cover" the additional courses, thereby either setting up an incentive for greater out-of-field teaching or heightening the issues that arise from insufficient qualifications for teaching. In one study of schools' response to state reform activity of the 1980s, barely a third of the high school science teachers responsible for an expanded number of science offerings had majors in science (Porter, Smithson, & Osthoff, 1994). Whatever the policy initiative, school leaders have an enduring temptation to meet changing needs for subject-matter "coverage" with existing staff who are often not qualified for one or more of the class sections to which they are assigned (Ingersoll, 2002).

PUZZLES AND POSSIBILITIES FOR THE STUDY OF POLICY AND TEACHING

The different relationships between policy and subject matter, just described, and the filtering processes they invoke create a new and essential challenge for those who wish to understand the effects of policy on teaching—and indeed for those who design and enact such policies to begin with. Overall, analyses of policy and its effects would do well to pay more explicit attention to these subject-matter dynamics, and we offer here some ways to accomplish that purpose.

Examining Whether and How Subject Matter Enters Policy Conversation

Subject-sensitive policy research begins with an appreciation of the opportunities available to policymakers to take subject matter into consideration. Here, the policy researcher asks: *to what extent and in what ways has subject matter been taken into account in the way policymakers conceive, frame, and enact educational policies, or in how they anticipate the dynamics of policy implementation?*

As analysts seek to answer this question, they will need to take note of the different issues that arise by grade level for educational policymakers. For example, at the elementary level, where teachers' work typically cuts across a number of subject areas, the policy system must resolve tensions over depth versus breadth of subject matter preparation, the assignment of teachers to subject-specific specialist roles rather than general classroom teaching roles, and the cultivation of subject-specific versus generic instructional leadership. At the secondary level, policymakers must decide what role subject departments should play in reform, how much to "track" students and teachers into "advanced" teaching and learning within particular subjects, and how to distribute resources in an equitable way that also respects the differing needs of particular students and of specific subject areas.

With these grade-specific differences in mind, policy researchers can look at particular features of policymaking that afford opportunities for subject matter to enter policy conversations. Three such instances illustrate a range of possibilities: relative investment in different subject areas, mechanisms for building subject-matter expertise into policymaking, and connections with external sources of subject-matter expertise.

Relative investment in different subject areas. Across these and other issues at either level, policymakers encounter—or may try to avoid—thorny questions of differential treatment by subject. For example, should a particular subject such as high school English be organized and taught with

radically different class sizes (e.g., 15 per class) so that the teachers have a reasonable chance of providing students regular feedback on written work, while other subjects requiring less written work, such as mathematics, might have larger class sizes? What implications follow for other subjects? How do policymakers balance competing interests and concerns of different subject matter communities? If policymakers are not asking themselves these questions, analysts at least can document their resolution of these matters, by default or design, and search for explanations in policymakers' beliefs, strategic thinking, or response to contextual conditions.

Mechanisms for paying attention to subject matter. Analysts will also want to inquire into the mechanisms and structures policymakers create to help the policy community focus on and *learn* about curriculum, teaching, and learning within specific subjects. Curriculum coordinators and subject-matter specialists, for example, represent one vehicle districts use to build subject-matter expertise and “learning capacity” into district-level policymaking, but such roles are typically vulnerable to budget cuts or reorganizations and rarely have “line” authority at school or district level, making their role less powerful. As a growing number of districts take their instructional leadership more seriously, they are increasingly locating subject-matter expertise—indeed a vision of “good” teaching in particular subjects—more centrally within the culture and structure of the central office (Hightower, Knapp, Marsh, & McLaughlin, 2002). Leaders in District 2 in New York, for example, who exercised “line management” authority over principals and teachers in schools, had expertise in literacy (Resnick & Glennan, 2002); some superintendents have more visibly assumed the role of “lead teacher and learner” (e.g., Negroni, 2000) and have taken an active role in inspecting and guiding instructional improvement within schools (e.g., Peterson, 1999). Work in mathematics education suggests the need to educate district leadership about mathematics and to build subject-specific expertise among district and school leaders in order to support reform efforts (Nelson, 1999).

At the state level, where policymaking is often not sensitive to subject-matter considerations, a parallel issue invites the analyst's scrutiny. Recent work by Cohen and Hill (2001) on mathematics reform in California suggests the power of having people within state departments of education who can work to ensure the fidelity of the vision of subject-specific reform across the different links of the policy chain. If one of the key ways that state education reform can improve instruction is by providing opportunities for teacher learning that is strongly connected to curriculum, student work, and content, as Cohen & Hill argue, then subject-matter expertise must inform professional development efforts, as well as reforms of assessment and curriculum. The astute policy analyst, then, would try to determine whether the means and channels exist for policymaking in all of these areas to be informed by subject-matter expertise, or conversely whether “subject-neutral” strategies prevailed.

Connections with external sources of subject-matter expertise. For both district and state-level actors (not to mention those at a national level), subject-matter organizations represent a potentially rich external resource that can play a significant role in educating policymakers about distinctive features of a subject and how such features may affect policy needs and provide challenges to policy implementation, such organizations may also need to explore more intentionally how to work with state and district leadership to craft policy and implementation approaches that respect features of a school subject and subject-matter community.

One implication of this line of analysis is the need to identify more carefully how and when issues of subject matter should enter into a policy conversation. By zeroing in on features of the policymaking process that would invite greater consideration of subject-matter, analysts can begin to uncover both current patterns and new possibilities. How much do and can policymakers consider the relative balance of investment in subject areas, and the implications of that balance for effective practice? How do and can policymakers use subject-matter organizations to test out different policy ideas and be forewarned about subject-specific challenges and obstacles? How do and can large districts organize themselves to learn more about subject-matter concerns? Research has begun to illustrate how these kinds of questions can be addressed more explicitly—as in a recent study that identified subject-matter “channels” within districts which enable continuous conversation regarding the subject-specific dimensions of policy actions, in this instance, related to the mentoring and curricular support for beginning language arts teachers (Grossman, Thompson, & Valencia, 2002).

Attending to these kinds of issues often will reveal the absence, as much as the presence, of effective voice for subject-matter concerns in policy deliberation. But bringing that to light will provoke new possibilities—such as a new role for departments and department chairs at the secondary level in communicating both subject-specific concerns and perspectives to policymakers. At the elementary level, this analysis raises questions about how to strengthen subject-specific leadership within schools (e.g., through reading specialists, math specialists, science specialists) who could anticipate potential needs for subject-specific professional development and advocate for resources to meet the need at the appropriate levels.

Demonstrating How Subject Matter Filters Different Kinds of Policies

There is just as much work to do in illuminating the ways in which policies, however framed, are filtered by subject-matter communities, by their members’ knowledge and beliefs, and by the interaction among them. Here, the policy researcher asks: *Is there a subject-matter filter at work and how does it work?* More specifically, does the policy work better in some subjects than others? Does the meaning of a policy differ depending on the subject-matter community? What precisely is filtering the messages, requirements, and resources that comprise the policy—the composition of the subject-matter community, their existing beliefs and knowledge, or the interaction among different subject matter communities?

These questions direct the policy researcher’s attention to various features of the settings in which teachers and others encounter educational policies. In addition to directly investigating teachers’ practice or student learning in different subject areas, researchers can learn much by uncovering how a policy’s enactment, implementation, and effects are mediated by particular features of the subject-matter context. Three possibilities illustrate a range of “ripe” targets for investigation: subject-specific policy tools, communities of instructional practice, subject-specific instructional leadership.

Subject-specific policy tools. Policymakers communicate their intentions and support efforts to realize these intentions through various means, among them specific policy “tools” (e.g., directives, guidelines, or curriculum frameworks that communicate expectations, operational details, offers of assistance). The language and form of these tools “speaks” to teachers and school leaders about the intent of policy, and more specifically what it has to do with their work as teachers of algebra, reading, French, social studies, or whatever. By examining these tools closely for their stated and implicit

assumptions about “good” teaching in a subject area and how to support it, policy researchers can do much to uncover how well the policy takes into account the subject matter context and how this context is likely to respond to it.

Communities of instructional practice. Teachers’ most immediate source of help, comfort, and moral support in managing the challenges of instructional practice is often colleagues with whom they work on a regular basis and with whom they are likely to form “communities of practice”, in the sense that the community members undertake joint work, develop relationships around this work, and evolve a shared language and set of meanings about this work (Wenger, 1998). These communities are likely to be defined, at least in part, by subject matter, especially where subject-defined departments become the locus of the community of practice. Given that these communities vary in strength and openness to new ideas (McLaughlin & Talbert, 2001, at secondary level; Gallucci, 2003, at elementary level), it behooves policy researchers to consider how these communities are likely to interpret policies, whether specific to a subject matter or not. By tapping into the way these communities may redefine policy to “fit” the communities’ conception of good practice in a subject area, researchers can document a powerful set of influences on the ultimate meaning and impact of policy on individual teachers’ teaching practice.

Subject-specific instructional leadership. While communities of practice generally exert informal influences on instructional practice, various individuals are formally invested with an instructional leadership role. Past conceptions of instructional leadership, focused on the principal, tended to emphasize a generic picture of instructional practice (Hallinger & Heck, 1996), but in recent years a growing number of individuals in instructional support roles have exercised more subject-specific forms of instructional leadership (e.g., literacy coaches, mathematics specialists, in-school staff developers). The extent of subject-specific instructional leadership can have a lot to do with how, and how much, teachers incorporate reform ideas into their practice, as has been demonstrated with meaning-oriented teaching in mathematics, reading, and writing in high-poverty elementary schools (Knapp & Associates, 1995). The challenge for policy research is to identify the sources and character of instructional leadership (if any) to which teachers have access.

Reconsidering Policy Research Designs

To answer these kinds of questions, policy researchers will need to reconsider their designs and methods, not to mention conceptualizations of the research problem. To begin with, conceptualizing a policy research problem with subject matter as an explicit context, as we have modeled above, will set the stage for studies that are sensitive to the possible influences of subject-matter context on a range of policy types. But beyond that, researchers will need to consider the implications for sampling designs and strategies of data collection.

Subject-sensitive sampling designs. While policy research now more often looks at policies aimed at a particular subject matter (e.g., Cohen & Hill, 2001; Wilson, 2002; Stein & D’Amico, 2002), taking a subject-matter perspective might argue for more comparative work across subject matters—for example, by intentionally including teachers from different subject-matter communities in study designs (e.g., aimed at subject-neutral policies) or by contrasting policy initiatives in different subject areas (e.g., in studies of subject-specific policies). Such designs would permit policy analysts to explore whether the policies in question resulted in the differentiation of subjects, intentional or unintentional, or how

different subject-matter communities operated within a similar policy environment. Sampling designs need not be comparative, however, to cast a sharper light on subject-matter dynamics of a policy story. Being sure to include within a respondent sample individuals both with and without expertise in a single, focal subject area will also enable researchers to explore some of the questions posed in this paper.

Data collection plans that explicitly attend to subject matter. Making sure to develop data about the different ways that subject matter may enter the equation is also needed and easily neglected in policy research. Interviews of people in leadership or policymaking positions, for example, easily focus on the “big picture” of the leaders’ work, without pinpointing their assumptions about teaching and learning in particular subjects. Especially with regard to supposedly subject-neutral policies, interviews of teachers may avoid asking about the way their subject-specific practice is affected. Furthermore, opportunities are easily missed to consider the subject-specific dimension of a mediating condition (e.g., revealed by a content analysis of policy tool documents to detect assumptions about learning in a subject area, or by interviewing focus groups of members from different subject-defined communities of practice). There are numerous opportunities in almost any policy research design to capture data relevant to the subject-matter story, if this is conceived as a priority for research.

CONCLUSION

In short, the subject matter context has many ways of shaping the story of policy formulation, enactment, and impact. In much the same way that it is hard to imagine how teaching can be understood without reference to the subjects being taught, illuminating the effects of policy on teaching and learning implies a comparable attention to subject-matter context. Taking subject matter into account in the ways that we have explored clearly complicates the researchers’ task, as it does the design and implementation of the policies themselves. After all, subject-neutral policies are generally simpler to conceive and execute, and as such they often appear to solve issues of political compromise, resource allocation, and uniform treatment alluded to earlier in the paper. Leaving subject matter out of research on such policies may also simplify the analytical task, but it does so at a potential cost: an important part of the story may be missed, and the analysis may fail to represent or detect what is going on and why.

As researchers look at the explosion of interest at the state level in improving the quality of teaching and teachers, they can easily appreciate how and why a subject-matter perspective belongs in their studies, if their ultimate goal is to help policymakers have a good chance of assisting teachers with this difficult and important work. Policies that support teacher mentoring is a clear example. While many states and localities are trying to institute mentoring programs for new teachers, not all are recognizing that the mentors need to be proficient in the specific subjects teachers teach. By providing generic mentors, policymakers ensure that the main guidance new teachers are likely to receive is around generic classroom management. While there are clearly things that new teachers can learn from veteran teachers in any subject, there is reason to believe—and some evidence (e.g., Grossman, Thompson, & Valencia, 2002)—that generic mentoring fails to help newly entering teachers resolve some of the most pressing concerns regarding their new role. A teacher struggling to understand the mathematics underlying a new algebra curriculum is unlikely to find the advice of an English teacher

particularly helpful, just as an English teacher anxious about how best to respond to the writing of her English language learners is likely to want the advice of another English teacher, or perhaps a skilled ESL teacher. Cohen and Hill's analysis (2001) of the California mathematics reform also suggests the importance of providing rich subject-specific learning opportunities for teachers to support serious reform of teaching and learning. Absent such professional development opportunities—all of them deeply steeped in the content of mathematics—teachers were less successful in implementing reform. Research that probes such issues is essential for the improvement of policymaking.

With better frameworks for understanding these kinds of connections between policy and teaching practice, scholars will be able to provide policymakers with evidence and insights concerning a central set of policy design and implementation puzzles that are often unrecognized at present. Scholarship in the policy arena can benefit from a more nuanced and differentiated examination of policy at work in different school subject contexts. Ultimately, policymakers may be more likely to frame policies that provide teachers with the support they most need to help students learn.

ENDNOTES

- ¹ This figure is adapted from one developed originally by David Cohen, Steve Raudenbusch, and Deborah Ball (2003). Their version highlights interaction *among* learners, in addition to interaction with other points of the triangle.
- ² Our analysis concentrates on policy actions that are most directly aimed at elements of teaching practice. However, policies that address the larger contexts in which teaching takes place may also affect the classroom, such as policies concerned with governance, workplace conditions, parental choice, or fiscal management.
- ³ Some policies, while designed to address a particular subject matter, may end up affecting other subjects as well. Policies that specify the amount of instructional time to be spent in a particular subject area might be considered subject-specific policies. For example, Chicago recently mandated that elementary school teachers spend two hours a day on teaching reading. This kind of policy targets only a particular subject—reading—but ends up impacting teaching and learning across the curriculum. To accommodate two hours of reading instruction every day, teachers might well omit other areas from their instructional programs such as science and social studies.

REFERENCES

- Angus, & Mirel, J. (1999). *The failed promise of the American high school 1890-1995*. New York: Teachers College Press.
- Ball, D. L., & Cohen, D. (1995). What does the education system bring to learning a new pedagogy of reading or mathematics? Paper presented at the annual meeting of American Educational Research Association. San Francisco, CA: April.
- Ball, D. L., & Cohen, D. (1999). Developing practice, developing practitioners. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 3-32). San Francisco, CA: Jossey Bass Publishers.
- Ball, S. J. (1987). *The micro-politics of the school: Towards a theory of school organization*. London: Methuen.
- Barnes, S., Barnes, D., & Clarke, S. (1984). *Versions of English*. London: Heinemann.
- Battista, M. T. (1994). Teacher beliefs and the reform movement in mathematics education, *Phi Delta Kappan*, 75(6), 462-70.
- Brophy, J., & Good, T. (1986). Teacher behavior and student achievement. In Wittrock, M. (Ed.), *Handbook of research on teaching, third edition* (pp. 328-375). New York: Macmillan.
- Buly, M. R., & Valencia, S. (2003). *Meeting the needs of failing readers: Cautions and considerations for state policy*. Center for the Study of Teaching and Policy, University of Washington.
- California Educator (2002). Scripted learning: A slap in the face or blessing from above? *California Educator*, 6(7).
- Clune, W. (2001). Toward a theory of standards-based reform: The case of nine NSF statewide systemic initiatives. In Fuhrman, S. (Ed.), *From the capitol to the classroom: standards-based reform in the states-One Hundredth Yearbook of the National Society for the Study of Education (NSSE)*. Chicago: University of Chicago Press.
- Cohen, D. K., & Hill, H. (2001). *Learning policy: When state education reform works*. New Haven: Yale University Press.
- Cohen, D. K., Raudenbusch, S., & Ball, D. L. (2003). Resources, instruction, and research. *Educational Evaluation & Policy Analysis*, 25, 119-142.
- Council of Chief State School Officers (2000). *Using data on enacted curriculum in mathematics and science: Sample results from a study of classroom practice and subject content*. Washington, DC: Author.
- Educational Evaluation & Policy Analysis (1990). Entire thematic issue. *Author*, 3(12).
- Fuhrman, S. (Ed.) (2001). *From the capitol to the classroom: standards-based reform in the states-One Hundredth Yearbook of the National Society for the Study of Education (NSSE)*. Chicago: University of Chicago Press.
- Gallucci, C. (2003). Communities of practice and the mediation of teachers' responses to standards-based reform. *Educational Policy Analysis Archives*, 11(35), at <http://epaa.asu.edu/vlln35.html>.

- Grossman, P. L., Kirst, M., & Schmidt-Posner, J. (1986). On the trail of the omnibeast: Evaluating educational reforms in the 1980's. *Educational Evaluation & Policy Analysis*, 8, 253-266.
- Grossman, P., Thompson, C., & Valencia, S. (2002). Focusing the concerns of new teachers: The district as teacher educator. In A. Hightower, M. S. Knapp, J. A. Marsh, & M. W. McLaughlin (Eds.), *School districts and instructional renewal* (pp. 129-142). New York, NY: Teachers College Press.
- Grossman, P. L., & Stodolsky, S. S. (1994). Considerations of content and the circumstances of secondary school teaching. *Review of Research in Education*, 20, 179-221.
- Grossman, P. L., & Stodolsky, S. S. (1995). Content as context: The role of school subjects in secondary school teaching. *Educational Researcher*, 24(8), 5-11.
- Hawkins, D. (1974). I, Thou, and It. In D. Hawkins, *The Informed Vision: Essays on Learning and Human Nature*. New York: Agathon Press.
- Hallinger, P., & Heck, R. (1996). Reassessing the principal's role in school effectiveness: A review of empirical research, 1980-1995. *Educational Administration Quarterly*, 32(1), 5-44.
- Hightower, A. M., Knapp, M. S., Marsh, J. A., & McLaughlin, M. (Eds.) (2002). The district role in instructional renewal: Making sense and taking action. In Authors, *School districts and instructional renewal* (pp. 193-201). New York: Teachers College Press.
- Ingersoll, R. (2002, January). *Out-of-field teaching, educational inequality, and the organization of schools: An exploratory analysis*. Center for the Study of Teaching and Policy, University of Washington.
- Jennings, N. (1996). *Interpreting policy in real classrooms: Case studies of state reform and teacher practice*. New York: Teachers College Press.
- Kansas Biology Teacher (1999). Creationism and the Kansas Board of Education—Entire thematic issue. *Author*, 8(2).
- Knapp, M. S. (1997). Between systemic reforms and the mathematics and science classroom: The dynamics of innovation, implementation, and professional learning. *Review of Educational Research*, 67(2), 227-266.
- Knapp, M. S. (2004). Professional development as a policy pathway. *Review of Research in Education*, 27, 109-158.
- Knapp, M. S., & Associates (1995). *Teaching for meaning in high-poverty classrooms*. New York: Teachers College Press.
- Little, J. W. (1993). Professional community in comprehensive high schools: The two worlds of academic and vocational teachers. In J. W. Little & M. W. McLaughlin (Eds.), *Teacher's work: Individuals, colleagues, and contexts*. New York: Teachers College Press.
- Madaus, G. F. (1988). The influence of testing on the curriculum. In L. N. Tanner (Ed.), *Critical Issues in Curriculum—Eighty-seventh Yearbook of the National Society for the Study of Education* (pp. 83-121). Chicago: University of Chicago Press.
- Madaus, G. F., & Clarke, M. (2001). The adverse impact of standardized testing on minority students:

- Evidence from one hundred years of test data. In Orfield, G., & Kornhaber, M. L. (Eds.), *Raising standards or raising barriers? Inequality and high-stakes testing in public education* (pp. 85-106). New York: The Century Foundation Press.
- Malen, B., & Knapp, M. S. (1997). Rethinking the multiple perspectives approach to education policy analysis: Implications for policy-practice connections. *Journal of Education Policy*, 12(5), 419-445.
- McLaughlin, M. W., & Talbert, J. (2001). *Professional communities and the work of high school teaching*. Chicago: University of Chicago Press.
- Mewborn, D. S. (2003). Teaching, teachers' knowledge, and their professional development. In Kilpatrick, J., Martin, W. G., & Shifter, D. (Eds.), *A Research Companion to Principles and Standards for School Mathematics* (pp. 45-52). Reston, VA: National Council of Teachers of Mathematics.
- Negrone, P. (2000). The superintendent's progress: Moving from "Lone Ranger" to lead learner in an urban school system. In Senge, P., & Associates (Eds.), *Schools that learn* (pp. 425-432). New York: Doubleday.
- Nelson, B. S. (1999, January). *Building new knowledge by thinking: How administrators can learn what they need to know about mathematics education reform*. Newton, MA: Education Development Center, Inc.
- Peterson, G. (1999). Demonstrated actions of instructional leaders: An examination of five California superintendents. *Educational Policy Analysis Archives*, 7(18), at <http://epaa.asu.edu/v7n18.html>.
- Place, N. (2000). *Policy in action: The influence of mandated early reading assessment on teachers' thinking and practice*. Unpublished doctoral dissertation. Seattle, WA: University of Washington.
- Porter, A. C., Smithson, J., & Osthoff, E. (1994). Standard setting as a strategy for upgrading high school mathematics and science. In Elmore, R. F., & Fuhrman, S. H., (Eds.), *The governance of curriculum* (pp. 138-166). Alexandria, VA: Association for Supervision and Curriculum Development.
- Price, J. & Ball, D. L. (1997). There's always another agenda: Marshalling resources for mathematics reform. *Journal of Curriculum Studies*, 29, 637-666.
- Protherough, R. (1989). *Students of English*. London: Routledge/Kegan Paul.
- Resnick, L., & Glennan, T. (2002). Leadership for learning: A theory of action for urban school districts. In Hightower, A., Knapp, M. S., Marsh, J. A., & McLaughlin, M. W. (Eds.), *School districts and instructional renewal* (pp. 160-172). New York: Teachers College Press.
- Roderick, M., Nagaoka, J., Bacon, J. & Easton, J. Q. (September, 2000). *Update: Ending social promotion; passing, retention, and achievement trends among promoted and retained students 1995-1999*. Chicago: Consortium on Chicago School Research.
- Schulle, J., Porter, A., Floden, R., Freeman, D., Knappen, L., Kuhs, T., & Schmidt, W. (1983). Teachers as policy brokers in the content of elementary school mathematics. In L. Shulman & G. Sykes (Eds.), *Handbook of teaching and policy*. New York: Longman.
- Siskin, L. S. (1994). *Realms of knowledge: Academic departments in secondary schools*. Washington, DC: The Falmer Press.

- Siskin, L. S., & Little, J. W. (1995). *The subject in question: Departmental organization and the high school*. New York: Teachers College Press.
- Smith, M., & O'Day, J. (1991). Systemic school reform. In Fuhrman, S. H., & Malen, B. (Eds.), *The politics of curriculum and testing* (pp. 233-268). Bristol, PA: The Falmer Press.
- Spillane, J. (2002). District policy making and state standards: A cognitive perspective on implementation. In Hightower, A., Knapp, M. S., Marsh, J. A., & McLaughlin, M. W. (Eds.), *School districts and instructional renewal* (pp. 143-159). New York: Teachers College Press.
- Stecher, B. & Chun, T. (2001, November). *School and classroom practices during two years of reform in Washington State* (CES Technical Report 550). Santa Monica, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST).
- Stein, M. K., & D'Amico, L. (2002). District as professional learning laboratory. In Hightower, A., Knapp, M. S., Marsh, J. A., & McLaughlin, M. W. (Eds.), *School districts and instructional renewal* (pp. 61-75). New York: Teachers College Press.
- Stodolsky, S. S. (1988). *The subject matters: Classroom activity in mathematics and social studies*. Chicago: University of Chicago Press.
- Stodolsky, S. S., & Grossman, P. L. (1995). The impact of subject matter on curricular activity: An analysis of five academic subjects. *American Educational Research Journal*, 32(2), 227-251.
- Stodolsky, S. S., & Grossman, P. L. (2000). Changing students, changing teaching. *Teachers College Record*, 102 (1), 125-172.
- Stodolsky, S. S., Salk, S., & Glaessner, B. (1991). Students' views on math and social studies. *American Educational Research Journal*, 28(2).
- Taylor, G., Sheppard, L., Kinner, F. & Rosenthal, J. (2003). *A survey of teachers' perspectives on high-stakes testing in Colorado: What gets taught, what gets lost*. CSE Technical Report 588. Santa Monica, CA: National Center for Research on Evaluation, Standards, and Student Testing (CRESST).
- Wenger, E. (1998). *Communities of practice: Learning, meaning, & identity*. Cambridge, UK: Cambridge University Press.
- Wilson, S. M. (2002). *California Dreaming*. New Haven: Yale University Press

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