HOW THE ALCHEMY MAKES INQUIRY, EVIDENCE, AND EXCLUSION

Thomas S. Popkewitz
University of Wisconsin–Madison

An odd thing happens on the way to school. As the sorcerer of the middle ages sought to turn lead into gold, modern teaching and teacher education produce a magical transformation in the disciplines of the sciences, social sciences, and humanities. School subjects transmogrify the disciplines into social and psychological concepts about, for example, developing children's intuitive understandings, meeting academic standards, or forming the dispositions, attitudes, and content knowledge held by children. I call this transformation an alchemy.

The alchemy of school subjects provides a way to think about the theory or frame of reference that organizes inquiry and constitutes evidence in teacher education. First, the organization of teaching school subjects is directed to the administration of the dispositions, sensitivities, and awareness of the child and teacher, what in earlier times was called the soul. Second, the alchemy obscures the normalizing and dividing practices of teaching. This includes reformulating questions of diversity into a particular curriculum enactment that has consequences for social exclusion and inclusion.

ALCHEMY OF SCHOOL SUBJECTS

Research on pedagogical content knowledge and clinical experiences assumes that teaching school subjects brings the academic knowledge of science, social science, the arts, and literature to children. But an alchemy occurs as the knowledge of an academic field moves into the school. School subjects are organized in relation to the expectations related to the school timetable, conceptions of childhood, and organizational theories of teaching. The question of academic or disciplinary fields is transmogrified into social psychologies of instruction and theories for changing the dispositions and characteristics of the teacher and child. The magic of the transformation is to reconfigure the academic fields in schools so that only the namesake appears, as a ubiquitous doorplate to mark a house.

The fact that an alchemy exists in schools is not surprising. Children are not scientists or mathematicians. What is surprising is the peculiar school alchemy, three aspects of which are explored in this article. First, psychology is superimposed onto pedagogical practices. Its focus is the administration of the child. Second, teacher education research evaluates and calculates the governing of the soul of the teacher and the child. And third, school subjects are treated as secure, fixed things of subject content and propositions. This crystallization of disciplinary knowledge enables the pedagogical enactments that govern the soul. The three elements of the alchemy shape and fashion inquiry and evidence of teacher education.

Psychology as the translation tool. The translation of school subjects into psychological concepts is obvious when curriculum standards are examined. Music and mathematics education, for example, are different practices, but they have the same organizing principles. The standards of curriculum are retrofitted into psychologies of the child. National curriculum standards in music are fundamentally about the child's ability to think (informed decision making or problem solving), to develop skill in communication (defending an argument, working effectively in groups), to produce quality work

Journal of Teacher Education, Vol. 53, No. 3, May/June 2002 262-267

(acquiring and using information), and to make connections with community (recognizing and acting on responsibilities as a citizen). The standards of mathematics education are no different. They are arranged through psychological studies of age-related learning. School subjects are thus transmogrified into the performances of the psychologies of the child and teacher!

In mathematics education, the alchemic transformation can be explored further. On the surface, the discussion is about teaching children about mathematics. Teacher education research focuses on the content and structure of teachers' knowledge, such as learning about the development of children's mathematical thinking and problem solving. Best practices in instruction, for example, are to teach problem solving in algebra and geometry and children's learning multiple solutions in making conjectures and justifications. The evidence of research is the identification of children's thinking processes or the teacher's pedagogical content knowledge that furthers the problem solving. However, the problem solving of mathematics education is a fiction of the alchemy. The problem solving of mathematics is not some universal system of rules about conjectures and justification but an academic field of cultural practices concerning norms of participation, truth, and recognition that change over time (see, e.g., Van Bendegem, 1996). The research on mathematics education focuses on psychological theories of problem solving and the management practices related to the classroom of children's learning. The principles selected as mathematics concepts conform and translate into the expectations of pedagogy as studies of children's thinking. The evidence of learning mathematics is formed through the lenses of cognitive psychology, notions of child growth and development, and sometimes social-psychological concepts, such as situated learning. Expected teacher performance in mathematics education is to develop instruction that captures children's intuitive understanding of conventional mathematics concepts.

These fictions of pedagogy, however, have real consequences. The alchemy is no longer a theory to interpret schooling; it mediates the experiences of teachers and researchers. National curriculum standards and prospective teacher performance outcomes consecrate psychology as the practical knowledge of teachers. The alchemy also constructs identities for children and teachers as the evidence of student achievement and teacher portfolios in the alchemy follow an individual's career.

Evidence in teaching and teacher education relates to the governing of the soul. We have been brought up to believe in the separation of church and state and of religion and public schooling. But my evoking of the soul is not a religious conception of the church. G. Stanley Hall (1924) spoke about the soul when arguing for thinking about

An alchemy occurs as . . . school subjects are organized in relation to the expectations related to the school timetable, conceptions of childhood, and organizational theories of teaching.

the child as an adolescent. Contemporary pedagogy does not use the word. Instead, pedagogical work is on individuals' self-improvement, autonomy, responsible life conduct, and lifelong learning.

The language of today's soul is of modernity, but it is still about the soul. Revelation is transferred to secular strategies. The focus of President Bush's (2001) document *No Child Left Behind* is "to build the mind and character of every child, from every background."[1] Likewise, the struggle in professional development is the soul of the teacher. Research targets "the lived experiences" and the dispositions, beliefs, and attitudes of the prospective teacher.

A physics lesson in a national study of an alternative teacher education program provides an exemplar. Concept mastery is not the prime purpose of the lesson. The purpose is to get children into cooperative small group learning, to motivate them and provide them with self-esteem (Popkewitz, 1998b). The words are about the psychology/social psychology of the

child and not about physics, no matter how noble these words are. Instead, the physics of the lesson is a place marker for governing the child's psychological development and growth. One can conjecture that only the namesake of an academic discipline is saved in school subjects.

The crystallization and transmogrification of disciplinary knowledge. The academic practices of the sciences and social sciences are made into secure, fixed properties of knowledge. The prescribed knowledge enables pedagogy to focus on the calculation and change of children's capabilities and capacities. The language of teacher education is revealing in this respect. School subjects are classified as bodies of knowledge, systems of concepts, generalizations, and procedures that children learn. Mathematics is transformed into procedures for a child learning how to justify and make conjectures related to mathematical ideas.

Teacher education research evaluates and calculates the governing of the soul of the teacher and the child.

The linguistic quality of the words—*bodies*, *content*, *content coverage*, or *conceptual knowledge*—treat disciplines as inert, unchanging, and unambiguous things (concepts or proofs) that children learn. In determining how good teacher education programs are, research examines how well teachers "know" their content or subject matter, the scope and coherence of the curriculum concepts, and the relation of these variables to children's achievement.

This way of reasoning about school subjects is taken for granted in conventional and alternative models of teacher education. The Fordham Foundation and National Council for Accreditation of Teacher Education's performance-based standards have different ideological positions in the debate about teacher education reform (see, e.g., Cochran-Smith & Fries, 2001). But each assumes the composition of school subjects in the formulations of change in teacher education. Evidence of student teachers' understanding is measured by their conceptual understandings. *Learning* is defined as finding multiple ways that make apparent the presupposed logical and analytical foundations of scientific propositions or mathematical properties. The learned child is one who explores and manipulates the patterns, regularities, and properties in existing conventional mathematical ideas. The selection of conventional ideas in curricula crystallizes and stabilizes the academic field for pedagogical interventions.

An irony of the crystallization is found in a dramatic pedagogical move to greater student participation, greater personal relevance, and emotional accessibility in science textbooks (McEneaney, in press). The changes also insert the iconic image of the scientific "expert" with a particular authority through wider claims of the natural world as ordered and manageable through science. Thus, while teacher education research measures classroom participation and collaboration in classrooms, the evidence about instruction may obscure how the spaces for individual action and participation actually decrease.

The working of the alchemy is especially apparent when the sociology and history of science are considered. Science, social science, and the humanities, core subjects of schooling, entail a continual relation between the knowledge of a field and the cultural practices that make that knowledge possible. Latour (1999), for example, argues that science is an assemblage of associations and networks whose processes modify, displace, and translate phenomena into the propositions of scientific knowledge. Thomas Kuhn's (1970) distinctions about "revolutionary" and "normal" science, as well, point to the competing standards and rules for "telling the truth" and the different stakes that are authorized (and want to be authorized) as groups compete in and across disciplinary fields.

Modern social science and history are, as well, cultural practices in which there is a continual relation between knowledge systems, methods, and social contexts. One can think of the emergence of psychology and sociology at the turn of the 20th century as embodying

changing principles about personal competence and achievement (Popkewitz & Bloch, 2001). Notions of community, for example, were brought into pedagogy in the first decades of the 20th century through a working relationship between the Chicago School of Sociology and the Hull House, a relationship that included John Dewey and Herbert Mead. Theories about the home and community were to regulate the personal and interpersonal relations of the child and family in the new institutions of modern societies. The reemergence of qualitative methods in the 1970s was not the result simply of efforts to find better research methods. Qualitative methods investigated the communities and the "negotiated order" of classrooms in a manner that responded to a perceived breakdown in social cohesion and participation (Popkewitz, 1981).

At a different level, the cutting edge of science embodies debates and struggles about what is taken as truth and the system of representations. One can think of an important part of science as strategies to make the familiar strange, to think about the mysterious and unfamiliar, and to raise questions precisely about that which is taken for granted. A molecular biologist on my campus had a cartoon on her door of a scientist holding a butterfly net. The net was positioned to catch a question. The cartoon, for her, typifies science—to find the questions rather than codify conventional ideas!

Although one might take different views of science and social science from my brief outline above, it should be clear that teaching of school subjects has little to do with the disciplinary practices of the sciences or the arts. And why should they? The psychologies of childhood, learning, and cognition are inventions that have different purposes from those of understanding and translating disciplinary knowledge into pedagogical problems (Popkewitz, 1998a). Dewey's scholarship on participation and community embodied cosmopolitan values that were to challenge various processes of modernization in the early 20th century. Vygotsky's psychology brought the ideals of Marxism into the upbringing practices of the child. G. Stanley Hall combined romantic visions, Christian ethics, social biology, and science into notions of growth and development.

Pedagogical/psychological theories are not necessarily bad and may have importance in the governing of schooling. And there may be strong social and political reasons for children's learning how to solve problems or collaboration. But the evidence of teacher education research consecrates a particular knowledge as teaching and teacher education. The three aspects of the transmogrification of disciplinary knowledge—the translation of school subjects into psychology, the governing of the soul, and the crystallization of disciplinary knowledge—construe and construct the evidence of teaching methods, clinical experiences, and the making of curriculum standards and measurement. Research attests to the efficacy of the alchemy in the processes of teacher education.

SOCIAL INCLUSION AND EXCLUSION: THE DIFFERENTIAL ADMINISTRATION OF THE TEACHER TO ADMINISTER THE CHILD

The alchemy not only is about a magic transformation but also involves principles that normalize and divide. The alchemy is an inscription device about the kinds of people who learn or do not learn in schools. The relocation of school subjects into psychology inscribes divisions that locate the child who does not have the dispositions and sensitivities inscribed in the alchemy. The deviant child is the child who does not learn the alchemy, does not follow the conduct of the alchemic problem solving, and thus needs to be rescued through better management and self-management. Few notice that the evidence of teaching school subjects, pedagogical content knowledge, and curriculum standards are about the psychological well-being or the deviancy of the child.

The alchemy's transformations into a struggle for the soul make possible theories of deviance. Walkerdine's (1988) research on mathematics education, for example, argues that verbalization and justification emphasized in child-centered pedagogies embody gendered, classed, and racial conceptions of the child. The valuing and exclusions are not overt. The dis-

tinctions that classify classroom discussions, participation, and achievement inscribe the divisions that make "the other" in the child.

A study of an alternative teacher education program for urban schools illustrates further the normalizing and dividing practices of the alchemy (Popkewitz, 1998b).[2] Urban education is a public commitment to equity and justice. It is a state policy that targets groups of children and families for special help because of poverty and/or discrimination. And it is a category used by different social groups to increase participation and resources.

The alchemy of school subjects may pose as useful knowledge, but the paradoxes and ironies of the frame of reference for evidence may not be useful.

But urban education is evidence of more than its public policy. The alchemy of school subjects organizes the practices of prospective teachers at all levels of schools. Teaching a school subject was the given organizational fact in the judgment of performances. The pedagogical practices, however, were concerned with a particular kind of person who is vested with the capacities and capabilities. The child of urban education was a continuum of values ordered by the distinctions and differentiations of the problem-solving, collaborative child and teacher. That continuum was expressed by a student teacher who said, "These children in my [urban school] are different from my brother." The seemingly innocuous phrase invokes an asymmetry between the singularity of the norms that identity the brother and those of the population taught in the urban school. The brother serves as a metonym that divides. The urban child is one who lacks self-esteem and is in need of remediation.

The urban child is interned and enclosed in a continuum of values. The urban child has a poor self-concept and where there are improper family habits for a child to read at home or to do homework. The family of the urban child is dysfunctional—single parent, low income, lacks books in the home, and so on. The urban child learns through doing rather than through abstract knowledge. The urban child has different learning styles from other children. Teaching is to rescue the child with low self-esteem, a division from the unspoken characteristics of high self-esteem. All the rescuing are paradoxical. The system of reason makes it so that child can never be of the average.

When urban education is a category of teacher education research, there is an inscription of a field of cultural practices that marks the child as different from unstated norms and values. The distinctions have little to do with geography and place. Children outside cities are classified as urban children. And the urban children of the wealthy are not classified as targets of urban education.

Urban education is often a category that is related to other categories, such as diversity and multiculturalism. These terms are important to public policy and questions of equity in society. Yet when brought into research in teacher education through the alchemy, the normalizing and dividing effects of pedagogical practices may be obscured. Research projects, for example, discuss how perspective teachers need to reorganize their subject knowledge into knowledge about teaching subject matter to diverse students. Community involvement in preservice teacher education is to learn how to teach in an urban environment. But the notions of diversity and community do not exist by themselves. They are part of an assemblage of distinctions and divisions to classify the urbanness of the child. Teaching is described, for example, to better the chances of students to liberate themselves from the depressed conditions of life in urban areas. Diversity is also coupled with teaching hard-to-reach students. The reforms are to correct inequities, but the alchemic struggle for the soul places the child in opposition to some "other."

CONCLUSION: INQUIRY, EVIDENCE AND THEORY

While schooling is always an intervention that involves distinctions and divisions, I have

questioned the frame of reference in the conduct of studies of professional schools, student teaching, and clinical experiences. The evidence of teacher education is not merely "there" to classify but is bounded by prior principles that structure evidence in teacher education.

The alchemy draws attention to a central theme in contemporary research, that is, the division between theory and practice. The frame of reference or theories that perform as the alchemy are not the realm of talk but productive elements in ordering principles of action and participation in teacher education and research. The alchemy narrates what is practical and useful. Research programs, state policies, and school reforms take the ordering procedures of the alchemy as the evidence of success or failure. Yet the evidence of the experiences of teaching and student teaching is shaped within a prior system of reason, or frame of reference that is continually illustrated in teacher education research (Britzman, 1991; Fendler, 1999). The experiences on the ground are not something real or natural that are excavated by research.

The alchemy of school subjects may pose as useful knowledge, but the paradoxes and ironies of the frame of reference for evidence may not be useful. The distinction of theory as different from research and practice is an "epistemological obstacle," to use loosely Gaston Bachelard's (Jones, 1991) famous term, for understanding the field of cultural practices in teaching and teacher education. Policy and research cannot leave practice or experience as an unmediated reality.

NOTES

1. I appreciate Matt Curtis's bringing this document to my attention.

2. I focus on the urban although the study explores how urban and rural discourses of education use the same categories and distinctions of deviance that are typically associated with urban education—the child who has low self-esteem, who learns by doing, and so on.

REFERENCES

Britzman, D. (1991). *Practice makes practice: A critical study of learning to teach*. Albany: State University of New York Press.

Bush, G. (2001). *No child left behind*. Washington, DC: U.S. Department of Education, Office of the Secretary, Government Printing Office.

Cochran-Smith, M., & Fries, M. K. (2001). Sticks, stones, and ideology: The discourse of reform in teacher education. *Educational Researcher*, *30*(8), 3-15.

Fendler, L. (1999). Predication, agency, and critical intellectuals. In T. Popkewitz & L. Fendler (Eds.), *Critical theories in education: Changing terrains of knowledge and politics* (pp. 169-190). New York: Routledge.

Hall, G. S. (1924). *Adolescence: Its psychology and its relations to physiology, anthropology, sex, crime, religion and education* (Vol. 1). New York: Appleton.

Jones, M. M. (Ed.). (1991). *Gaston Bachelard: Subversive humanist: Texts and reading*. Madison: University of Wisconsin Press.

Kuhn, T. (1970). *The structure of scientific revolutions*. Chicago: University of Chicago Press.

Latour, B. (1999). *Pandora's hope: Essays on the reality of science studies*. Cambridge, MA: Harvard University Press.

McEneaney, E. (in press). Elements of a contemporary primary school science. In G. S. Drori, J. W. Meyer, F. O. Ramirez, & E. Schofer (Eds.), *Science in the modern world polity: Institutionalization and globalization*. Stanford, CA: Stanford University Press.

Popkewitz, T. (1981). Qualitative research: Some thoughts about the relation of methodology and social history. In T. Popkewitz & B. Tabachnick (Eds.), *The study of schooling; Field based methodologies in educational research and evaluation* (pp. 155-180). New York: Praeger.

Popkewitz, T. S. (1998a). Dewey, Vygotsky, and the social administration of the individual: Constructivist pedagogy as systems of reason in historical spaces. *American Educational Research Journal*, *35*(4), 535-570.

Popkewitz, T. S. (1998b). *Struggling for the soul: The politics of education and the construction of the teacher*. New York: Teachers College Press.

Popkewitz, T., & Bloch, M. (2001). Administering freedom: A history of the present—Rescuing the parent to rescue the child for society. In K. Hultqvist & G. Dahlberg (Eds.), *Governing the child in the new millennium* (pp. 85-118). New York: Routledge Falmer.

Van Bendegem, J. (1996). The popularization of mathematics or the pop-music of the spheres. *Communication & Cognition*, *29*(2), 215-238.

Walkerdine, V. (1988). *The mastery of reason: Cognitive development and the production of rationality*. London: Routledge.

Thomas S. Popkewitz *is a professor in the Department of Curriculum and Instruction at the University of Wisconsin–Madison. His research is concerned with the field of cultural practices that orders teaching, curriculum, and teacher education, that is, how teaching and children are seen, thought about, and acted on in the reform projects of schooling.*