Whose heaven and whose redemption? The alchemy of the mathematics curriculum to save (please check one or all of the following: (a) the economy, (b) democracy, (c) the nation, (d) human rights, (d) the welfare state, (e) the individual)

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The making of mathematics education is a fabrication that can be called an alchemy. As analogous to the sorcerer of the Middle Ages who sought to turn lead into gold, the alchemy of school subjects transforms the knowledge of the disciplines into social spaces of schooling. The new social spaces of interpretation and regulation in pedagogy conform to the expectations related to the school timetable, conceptions of childhood, and, in today's language, through such psychological registers embodied in notions of 'concept mastery', 'cooperative learning', and concerns about the 'motivation' and the 'self-esteem' of children.

Except for the name of the discipline and the words of disciplinary knowledge, school subjects have little relation to the intellectual field that bears its name in schooling. The problems of teaching and assessment are only tangentially related to space of mathematics, music or history. Pedagogy is to govern the psychology of the child: the ability to think (informed decision-making, problem solving), skill in communication (defending an argument, working effectively in groups) production of quality work (acquiring and using information), and connections with community (recognizing and acting on responsibilities as a citizen).

Why is the alchemy important? First, the alchemy of school subjects is a particular system of reason whose effects are the fabrication of the kinds of people administered in schooling. Second, the alchemy stabilizes school content knowledge in order to make the child's soul as the site of administration. The mathematics education is to order the capabilities and dispositions of the child. Revelation is transferred to strategies that administer personal development, self-reflection, and the inner, self-guided moral growth of the individual personality and character. In this sense, the alchemy of school subjects shapes and fashions the kinds of people that children are and are to become. Third, it is a site in which the relations between the state, society, community and individuality are worked and reworked. Fourth, principles are generated that qualify and disqualify individuals to act and participate.

While research on the social processes of differentiation in classroom practices does identify strategies that prevent access or the lack of representation of particular populations, the research leaves unscrutinized the field of cultural practices that make for the double sense of modern school subjects: the translation of mathematical representations as devices that constitute social realities for action, and the construction of the child and teacher as historical 'subjects' who act on those representations.

P. Valero & O. Skovsmose (2002) (Eds.). Proceedings of the Third International MES Conference, ***Addendum****. Copenhagen: Centre for Research in Learning Mathematics, pp. 1-26.*

> Would it not be a great satisfaction to the king to know at a designated moment every year the number of his subjects, in total and by region, with all the resources, wealth & poverty of each place; [the number] of his nobility and ecclesiastics fo all kinds, of men of the robe, of Catholics and of those of the other religion, all separated according to the place of their residence?...[Would it not be] a useful and necessary pleasure for him to be able, in his own office, to review in an hour's time the present and the past condition of a great realm of which he is the head, and be able himself to know with certitude in what consists his grandeur, his wealth, and his strengths?
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> Marguis de Vauban, proposing an annual census to Louis XIV in 1686 (cited in Scott, 1998, p. 11)

I start with this quote to begin a conversation about school subjects and mathematics education as related to the conditions of governing the modern state. But my interest in the state is not to talk about the laws, bureaucracy or interests of the state as an entity of who 'rules'. My use of governance is related to an understudied side of power. Governance refers to the principles of classifications that differentiate and order who we are, should become, and those who are not 'capable.'

The mathematics curriculum, in this context, is an ordering practice analogous to creating a uniform system of taxes, the development of uniform measurements, and urban planning. It is an inscription devise that makes the child legible and administrable. The mathematics curriculum embodies rules and standards of reason that order how judgments are made, conclusions drawn, rectification proposed, and the fields of existence made manageable and predictable.

I consider mathematics education in this manner not only because mathematics education is one of the high priests of modernity. Mathematics education carries the salvation narrative of progress. The narratives are of the enlightened citizen who contributes to the global knowledge society. The story of progress is also told about a pluralism of the diverse people who come to school. Yet while the speech is about a universal child who is not *left behind*[1] and *all children will learn*, some children are never even brought to the table! How does that happen? What are the concrete cultural practices in the curriculum that produce the distinctions and divisions that qualify some and disqualify others?

I approach the problem of inclusion and exclusion through an analogy to the medieval alchemy. 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 of the disciplines of the

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1 This is the title of President Bush's 2002 educational initiative.

sciences, social science and humanities. School subjects transmogrify academic 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.

The transformation or alchemy of mathematics into the social spaces of the school involves overlapping cultural practices that I explore. The first section discusses the mathematics curriculum as an inscription devise for making the child visible and administrable. The administration of the child is to produce the inner characteristics and capabilities of child who operates with the freedom of the citizen. Second, the transformation of academic knowledge into school subjects entails an alchemy. Psychology is the translation tool of the curriculum. The focus is governing the soul. Academic discipline knowledge is stabilized and crystallized in order to effect that governing. The irony of the modern curriculum is that the fixing of academic knowledge is to produce the flexible, active and problem-solving child. The third section explores how the alchemy reformulates questions of diversity into particular curriculum enactments that have consequences for social exclusion and inclusion.

Pedagogy analysed as a governing practice is, at first glance, similar to classroom studies about the social differentiation produced in teaching. Such studies raise question about how identities are constructed in unequal societies and are important correctives to equity studies that are solely concerned with social access or the lack of representation of populational groups. But such research leaves unscrutinized the field of cultural practices that translates the cultural spaces of mathematics into the social spaces of schooling. This translation constitutes the double sense of the alchemy: the pedagogical translation of mathematical representations as devices that constitute social realities for action, and the construction of the child and teacher as historical 'subjects' who act on those representations. I ask about the enclosures and internments inscribed by the system of reason that orders school subjects. Questions of equity are more than looking for the instructional access or achievement of specific populational groups (Popkewitz & Lindblad, 2000). Equity is bound to exploring how the double sense of school subjects and individual subjects are fabricated through the system of reason that orders and classifies the child and teacher.

My focus is to diagnose the system of reason. I take as the task of inquiry to show the contingency of the arrangement that we live by showing how thought has played a part in holding those arrangements together and to contest the strategies that govern human possibilities. I focus primarily on U.S. curriculum debates although many aspects of the alchemy circulate in other contexts but with different historical detail and configuration.

The art of governing: The modern State and standards to make the citizen legible

The system of reason that travels in U.S. mathematics education is not merely an expression of a normative goal of children learning a new sacred knowledge of modernity - the language of science and technology. Mathematics education is related to a long historical trajectory of governing through constructing standards for the modern state. During the 17th and 18th centuries, a new strategy of the governing the state appears. That governing was to calculate and to make people legible the people so that they can be administrated in the name of society. In the past and again today, to govern is to develop the right classification and the correct sorting devices for charting a course of action. State planning entails strategies that will change society for the better and which will prevent any future joining of the ranks that deviate from the norm. This making of standards for state governments might seem far away from the matters of mathematics, but it is not. So, please bear with me for a moment.

Standards were invented to develop the capacity to have direct knowledge and access to what was previously opaque. Reliable means of enumerating and locating its population, gauging its wealth, and mapping its land, resources and settlements were to intervene and regulate the people in the realm of the State. The new governing practices arranged people into populations to make them administrable. Taxes, for example, were variable and unsystematic before these changes. People had no last names and could not be tracked to be included in the census that made the state manageable. Measurement was almost random as each local area had its own system to measure (*a hand*, *a foot*, *a cartload*, *a basketful*, *a handful*, *a within earshot*) that prevented any central administration (Scott, 1998).

But standards involve more than mapping the health and territories of the citizen. The idea of the Republic and democracy embodied ideals of the citizen through standards that enable the freedom and liberty of the modern citizen. This relationship between State standards and the citizen is evident in, of all the odd places, the standards of measurement. The installing of the metric system in the 19th century had multiple purposes. It was a means of administrative centralization, commercial reform, cultural progress, and democratic change. The academicians of the revolutionary republic of France, for example, saw the metric system as an intellectually important instrument to make France 'revenue-rich, militarily potent, and *easily administered'* (Scott, 1998, p.32). The standardized measures were to create an equal citizen. If the citizen did not have equal rights in relation to measurements, then it was assumed that the citizen might also have unequal rights in law. The Encyclopedists writing immediately prior to the French Revolution saw the inconsistency among measurements, institutions, inheritance laws, taxation, and market regulations as the greatest obstacle to making a single people (Scott, 1998, p. 32).

It is not far from the notion of *an easily administered* citizen of the Encyclopedists to consider current debates about school subjects. The school subjects are not merely identifying and organizing academic disciplines into formats that children learn. If one historically considers the school subjects in the beginning of the 20th century, they installed standards to make the child's conduct legible, *easily administrable*, and equal. The logic underlying the teaching of mathematics and other curriculum, for example, was less related to the academic discipline than to a romantic, even spiritual hope of the future of a liberal democracy and a fear of deviance engendered in the hope (Popkewitz, 1987; 2001). Pedagogy was to fabricate the child who would become the citizen of the future and, to paraphrase curriculum writers of the time, to prevent the barbarians from knocking at the American door. The barbarians were multiple 'others' that entailed the fear of the breakdown of cultural values after the American Civil War, the double worship and horror of the new images of the city and industrialization, and 'the uncivilized' American Blacks, Native Americans, and groups of immigrants arriving from Europe who brought foreign cultures and radical political ideas to the U.S. In this context, it is possible to understand mathematics education as a normalizing pedagogy to calculate the inner capacities of the child through training in observation, experimentation, and reflection through relevant practical problems (Stanic, 1987; also see Popkewitz, 2001).

Standards are important for modern governing and the administration of the welfare of the citizen. Who would argue against The Center for Disease Control in Atlanta, for example, that identifies and tracks Legionnaires' disease, toxic shock syndrome, and AIDS, among others, through its mapping resources? Or, argue against the need for mapping land and resources for environmental and/or economic reasons? The crux of the debate is not whether there should be or not standards but how the system of reason in schooling inscribes standards about what we are, should be and whose heaven is placed in the docket.

Alchemy of school subjects

As I read the literature on teacher education and curriculum, there is a certain celebration that reminds me of the 17th century Quarrel of the Ancients and the Moderns. Then the question was whether the Moderns stood on the shoulders of the past in the name of progress. Today's Moderns in U.S. curriculum reforms are resolute in remaking the child in the name of progress and to undo the possible fall from grace of some children. The vocabulary of redemption and progress of the new Moderns is expressed as *classrooms as a community of discourse*, *teacher reflection*, *pedagogical content knowledge*, identifying the *teacher's wisdom and best practices*, *collaboration*, and *using the expertise* of science. The American educational research debates deploy these words in

assuming that schools teach the academic knowledge of science, social science, the arts and literature to children.

My discussion goes against the grain. School subjects conform to the expectations related to the school timetable, conceptions of childhood, and organizational theories of teaching. The psychology and social psychologies of instruction are the grammar and syntax of the conversions. This alchemy to school subjects inscribes certain conventional symbolic and formalized knowledge of academic disciplines.

The fact that an alchemy exists in schools is not surprising. Children are neither scientists nor mathematicians. What is surprising is the peculiar school alchemy of the school curriculum. Three aspects of mathematics education are explored in this section. First is the translation tool of pedagogy. These are psychology and a social psychology (sometimes called 'discourse'). For the practical purposes of the curriculum, the translation tools transform mathematics into the administration of the child. Second, teaching and teacher education research are practices to govern *the soul*. And third, school subjects are treated as secure, fixed things of subject content and propositions. The crystallization of disciplinary knowledge has a two trajectory. It reduces the field of social inquiry that is open for scrutiny while increasing student's participation in a narrower range of spaces. This double closing and opening occurs under the rubric of equity and empowerment. The following section considers the standards of the alchemy, if I can play with the word, as principles that qualify and disqualify individuals for action and participation.

Psychology as the translation tool

The translation of school subjects into psychological concepts is obvious when curriculum standards are examined (Popkewitz, 2000). Music and mathematics education, for example, are different cultural practices but they have the same organizing principles in the curriculum. The standards of a curriculum are retrofitted into particular 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 (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. Psychological research on learning is viewed as central to the selection and organization of teaching (National Council for Teachers of Mathematics, 2000, p.20). The curriculum is 'to develop conceptual understanding in which students justify their thinking and problem-solve.' (National Council for Teachers of Mathematics, 2000, p.11).

Translations of mathematics into communities of discourse

The alchemic translation into psychology seems, at first glance, in opposition to current reform literature. Mathematics education is likened to the culture and discursive community of the academic discipline of mathematics. Nelson, Warfield, & Wood (2001), for example, argue that mathematics education should draw on the discipline itself. 'From the field of mathematics come ideas about the nature of the discipline itself. Mathematics is not taken to be only a static, bounded discipline with a rich record of knowledge to be transmitted, but a humanistic field that is continually growing and being revised and that consists of 'ideas created by human beings, existing in their collective consciousness…' (drawing from Hersh, 1997, p. 19, in Nelson et al, p.6). The academic discipline, for example, is referred to as 'a *community of knowers* who share in the construction of beliefs or knowledge.'

Lampert (1990) also pursues the Bringing of school practices closer to the culture of academic mathematics is also found within a different intellectual tradition that focuses on social linguistics rather than cognitive sciences. Lampert (1990) argues that reform of mathematics teaching is to alter the roles and the responsibilities of the teacher and students. Drawing on Lakatos' (1976) discussion of mathematics and the philosophy of science (Kaplan, 1964), curriculum design differentiates the activity of doing mathematics from its reconstructed logic. The latter records the formal, deductive procedures of justification once a problem is solved. The intuitive process of mathematics, that is, how mathematics is done, requires a different logic for organizing teaching. Lampert, for example, discusses mathematics as a process of *conscious guessing, the taking of risk*, processes of problem-solving that move in uneven ways (*zig-zags)* and refutations as well as proofs. An image of mathematics instruction is evoked as an endeavor of *moral courage* and a tentativeness in non-linear and uncertain processes. The goal of curriculum is to develop 'a discourse community' in which children stand back from their own personal knowledge to evaluate its antecedent assumptions, argue about the foundations of its legitimacy and to be willing to have others do the same.' This quality of risk taking, she continues, is very different from classrooms in which the arguments of mathematics are based on a set of beliefs about certainty.

But once homage is paid to something called 'the community of discourse in mathematics', the alchemy is put into place. Psychological and social-psychological notions about administering the inner characteristics of the child are the prime time of instruction. The distinctions and categories in contemporary mathematics education 'the turn [to] the field of psychology toward cognitive science…' '[T]heories of instruction need to be consistent with what we know about how children learn and think.' (Nelson, Warfield & Wood, 2001, p. 5). Mathematics education is an ordering and administrating the interior 'mind' or dispositions of the child, whether from Piagetian developmental

notions about learning, radical psychological constructivists, symbolic interaction's notions of the classroom as a negotiated order.

While the applications of psychological traditions in classroom research of mathematics education is generally well thought out and systematic, my interest in this discussion is the frame of reference or system of reason that orders the problems, evidence of teaching, and possibility of school change. 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). For example, Dewey's scholarship on participation and community was to inscribe cosmopolitan values that were to challenge various processes of modernization in the early 20th century. Dewey did not seek to develop a pedagogy of mathematics. Vygotsky's psychology brought the ideals of Marxism into the upbringing practices of the child. G. Stanley Hall's notion of adolescence combines romantic visions, Christian ethics, social biology, and science into notions of growth and development. Current work in artificial intelligence and cognitive sciences were supported initially through defence department efforts to revise the training of the military in light of changing notions of warfare that emphasized communication systems (Noble, 1991).

Few seem aware that the room created about classroom mathematics is the room of a psychology to administer the child and not a pedagogy of mathematics. The content of mathematics is subservient to its psychological handling and, for practical purposes, mathematics is the imagination of psychology and social psychology. The alchemy is no longer a 'theory' to interpret schooling but the rules and standards of the pedagogical psychology is consecrated as the practical knowledge of teachers, the organizing principles of national curriculum standards, and in the performance outcomes of prospective teachers.

Fabricating problem-solving as a psychology rather than of the field of mathematics

One of the central doctrines of curriculum reform is children's problem-solving. So it is in the mathematics teaching. Problem-solving is a general phrase that can be thought of in multiple ways, such as through philosophical reflections, the sociology of knowledge, cultural anthropology, or even studies of the field of mathematics, among others possible lenses. But when textually examined, problem-solving in mathematics education is fabricated through the system of reason embodied in the practices of a particular psychology formed in relation to teaching. Research focuses, for example, on the organization of knowledge in memory, such as the structure imposed on concepts when they are stored in long-terms memory and how that structure enables children to make the concepts of mathematics more accessible (Nelson, Warfield & Wood, 2001, p.6).

But problem-solving is not some natural process found in the child but a fabrication. I use the notion of fabrication to signal two elements of research that overlap in the alchemy of curriculum. One, the categories and distinctions about children's learning, teaching, and school achievement are fictions. G. Stanley Hall, for example, introduced the notion of adolescence as a fiction for thinking about and studying children's development in school. Problem solving is another fiction of modern curriculum reform to help the teacher and researchers think about and organize the practices of the classroom. But the fictions of social science and schooling are also potentially 'make' that world. The categories of children's problem-solving, for example, produce research programs that describe the 'problem-solving', develop curriculum to promote the problem-solving, programs of remediation and assessment are created for those who do not learn to be problem-solving, and dossiers construct biographies that chart the individual performances in problem-solving activities, such as in portfolios of teachers' work in promoting problem-solving.

The double sense of fabrication - as fictions and making -is a quality of social science and schooling that continually needs scrutinized. My particular interest is in the way that the fabrications of the psychology of curriculum play out in the school alchemy. Problem-solving research is more than 'capturing' children's thinking about problems. Research translates and transports the phenomena under investigation into a particular system of categories and calculations to normalize what constitutes thinking and action. There is not only the observation of how the mind works when a researcher observers when 'connections are formed between new information and existing knowledge structures or when new information leads to cognitive conflict and therefore, to the reorganization of existing structures in order to resolve that conflict' (Warfield, 2001, p.137). A taxonomy is produced that fabricates thought and mathematical thinking itself through the research. The tasks of multi-digit division, for example, are made into a set of a child's thinking procedures that are catalogued as practices of *guess and check*, *take numbers apart*, *counting back*, *adding groups*, *forms division* (Warfield, 2001, pp 141-142).

But the fabrication of the child is also the fabrication of the teacher. The sciences of problem-solving are to reform the teacher as the child is reformed. The wisdom of the teacher is to incorporate the best practices arrived through the psychological sciences of teaching. The focus is on 'research based information on children's mathematical thinking is used as framework to organizing teaching' (Nelson, Warfield & Wood, 2001, p.7-8) 'Drawing on her understanding of the mathematics involved and her understanding of how children solve word problems, she asked her children to categorize their strategies for solving division word problems and then to differentiate between the operations used in those strategies and the structure of the problems that made them either partitive or quotitive division problems' (Warfield, 2001,

p.140). The research is to organize not only how to think of the mind, but how the teacher should think about the child.

The transportation system of psychology is no longer recognized as a transportation system. In the classroom research, the teacher's 'mathematical understanding contributed to her being able to learn about her children's thinking in ways that extended beyond the strategies they used to solve this problem' (Warfield, 2001, p 143).

The psychological notion of 'problem-solving' circulates in research that views classrooms as situated learning and 'communities of discourse.' A central metaphor of the U.S. National Standards in Mathematics (2000) is the use of the word of 'discourse' that travels along with the language of symbols, proofs, conjectures, discussion and classroom talk. Lampert (1990) provides an elaborate discussion of children's conversations and argumentation in a mathematics lesson that places children's practices as synonymous with that of the 'mathematical culture.' Children's discussions are treated as if it was 'developed within a mathematical community of discourse' (pp. 44-45). Children's activities are referred to where students 'put themselves in relation to the establishment of valid arguments in the discipline' (p.54) and as ' mathematically legitimate.' But while the language changes to that of discourse, the principles of organizing, calculating and ordering of the inner characteristics of the child remain the same.

Perhaps the research of schooling can be no other way. Science reclassifies and re-orders the experiences of the world into new ways of thinking and acting on the world. And one might say that whatever children are doing is an important instructional goal and *the show* should go on. Further, the research is good research as it enables a more effective instructional program. These might be so but they are built on smoke and mirrors. Pedagogical principles have less to do with mathematics and more to do with administrating the inner characteristics of the child. The only relation to the field of mathematics is that the calculations of the child are being done through their working with symbol system of a mathematical content.

The transformation and transmogrification of the alchemy of the curriculum brings to mind *The Heidelberg School of Landscape Painting* in Australia. German and French painters trained in romantic traditions migrated to Australia in the middle of the 19th century. They sat in their studios to paint the landscapes. But the pastoral images of Australian seemed as if they were mimicking those of continental European context, thus establishing a European image in the construction of the nation. The painters 'eyes' were so well-trained that they seemed not to notice that the verdant greens of northern Europe had little place in the warmer climate of Australia.

So it is with the alchemy of school subjects. Children are not only learning how to problem-solve and teachers learning how to manage and facilitate

children's learning. The alchemy introduces new enclosures and internments. The mathematics curriculum consecrates the icon images of numbers as tests of the reality of the world. As the veracity of mathematics in empirically testing the truth of statements spread to greater realms of social affairs through 'making mathematics relevant', the expertise of science and its numbers in the curriculum reduce smaller spaces in which one's own knowledge can be authorized. This is argued, for example, in McEneaney's (in progress) study of science textbooks over the past decades. She found a dramatic pedagogical move for greater student participation, greater personal relevance and emotional accessibility. But the changes in student participation also inserted the iconic image of the scientific 'expert.' That expertise entails a particular scientific authority over wider claims of the natural world as ordered and manageable through an expertise that lies outside of the child. The iconic image of science may also be inscribed in the knowledge given as that of mathematics. The irony of this double move of inserting the iconic image of scientific knowledge and student relevancy is that instruction may obscure the relative spaces opened and closed for individual action and participation.

The evidence of teaching as the governing the soul

The translation of mathematics education into the psychological discourse of 'problem-solving' makes the thinking as neither the teachers nor the child! Mathematics is reclassified and re-conceptualized into the fabrications of the child's processes of thought. The significance of the fabrication, I will argue in this section, relates to curriculum as a practice of governing *the soul*. I will use the notion of community (community of discourse, classrooms as communities) as an exemplar of this inscription.

Revelation through reason

My evoking of *the soul* is not a religious conception of the church. G. Stanley Hall spoke about *the soul* when arguing for thinking about 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.' That is the modern soul of pedagogy!

Revelation is transferred to secular strategies. Reform is the administration of change. Reason is the catechism. The National Council for Teachers of Mathematics' Standards, for example, focus on the ways teachers and children reason in order to produce a future citizen who act with the freedom and liberty. As with earlier reforms 19th century, the future is seen as dangerous and uncontrollable unless children in the present can be disciplined for action and participation. 'All students need an education in mathematics that will prepare them for a future of great and continual change' (p.8) and ' …that *all* concerned be committed to improving the futures of our children' (National Council for

Teachers of Mathematics, 2000, p.8, my emphasis). The problem-solving that I spoke about earlier is one example of teaching children a disciplined reason.

The inscription of a calculated reason to order action is a strategy to tame change. A hallmark of liberal democracy is uncertainty as the certainty of God and placements of birth are replaced. The spread of systems of reason in a democracy enables social stability and harmony of the future that without reason as a guide would be uncontrollable. It is the context of the uncertainty of the future that the reformed teacher is responsive to change as 'a ubiquitous feature of contemporary life, so learning with understanding is essential to enable students to use what they learn to solve the new kinds of problems they will inevitably face in the future' (National Council for Teachers of Mathematics, 2000, p.21).

The administration of the uncertainty of future through the calculation of the thinking travels in multiple trajectories. President Bush (2000) statement of educational goals, entitled No Child Left Behind, for example, makes the soul of the child as a way of accommodation the future. Educational reform is ' to build the mind and character of every child, from every background.'[2] Calculating reason to administer the individual is embodied in the new social sciences of the 19th century. Psychology and sociology inserted new methods of rationalizing the interior of the individual and childhood through new forms of calculating personal competence, attention, perception and achievement (see, e.g., Crary, 1999; Popkewitz & Bloch, 2001). Notions of family and the community, for example, were brought into pedagogy through a working relationship between the Chicago School of sociology and the Hull House, a settlement house for helping the new immigrants. 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 re-emergence of qualitative methods in the 1970s was a method that not only brought the researcher closer to the *real* world and meanings of teachers and children. Qualitative methods symbolically gave value to community affiliations and the 'negotiated order' of classrooms in a manner that responded to a perceived breakdown in social cohesion and participation (Popkewitz, 1981).

The soul of the child is embedded in the language of educational science. Research is to move the teacher and the child from their intuitive understandings to the conventional knowledge of mathematics. This research agenda embodies the alchemy that makes mathematics as the psychological principles of ordering the being of the child. Nelson, Warfield & Wood, (2001), for example, argue good teaching entails the 'vision of mathematics instruction that took seriously the fact that children construct their mathematical knowledge . . . the work of teaching would consist of developing instructional contexts in which student

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2 I appreciate Matt Curtis bringing this focus in the document to my attention.

could move from their own, intuitive, mathematical understandings to those of conventional mathematics.' The goal of instruction is not only mastery of content but 'having students see mathematics as a sense-making activity' (Nelson, Warfield & Wood, 2001, pp.6-7). But the sense-making is no longer the child's but that of the system of reason that orders, classifies and divides the child's inner characteristics.

The struggle for the child's soul is a struggle for the professional soul of the teacher. The images of the child and the teacher continually exist in relation to each other. This struggle is told in multiple historical contexts (e.g., see Warde, 2001 about Brazil; Nóvoa, 1991, in Portugal, and Mattingly, 1975 and Murphy, 1994 in the U.S.). Today, the soul of the teacher is expressed as 'the lived experiences', and the dispositions, beliefs, and attitudes of the prospective teacher. The struggle for the child's and teacher's soul is evident as well in the social psychologies concerned with classroom discourses and the negotiated meaning of classroom knowledge. Ball (2001), for example, uses her own teaching practices as a research strategy to enter into the mind of the child. But the research also enters into and administers the mind of the teacher. Ball argues that 'I also aim to create a practice that is responsive to students' ideas, interests, and lives. I strive to hear my students, to work with them as they investigate and interpret their worlds. I want to respect who they are, as well as whom they can become. (Ball, 2001, p.13). Instruction is to 'hear below the surface' features of children's talk and representations' 'so [teachers] will not miss the mark by considering a student wrong who has in fact an interesting idea or is carrying out a nonstandard procedure, but one with mathematical promise. Suspending one's desire for students to get answers right and thinking mathematically about what a child might mean are among the most difficult problems of teaching' (Ball, 2001, p.19).

The National Standards for teaching mathematics (National Council for Teachers of Mathematics, 2000) inscribe the administration of the soul through a progressive language of changing the child: 'A major goal of school mathematics programs is to create autonomous learners . . . ' But the producing the autonomous child is also an administration of the teacher who administers the child. The teacher and the child are to embody dispositions toward '*continuous self-improvement.*' To produce '*continuous self-improvement*' embodies shaping the child in the images of the Standards. 'Effective teachers recognize that the decisions [teachers] make *shape* students' mathematical dispositions and can create rich setting for learning' (p.18). The role of the teacher is to ' *monitor students' capacity* and inclination to analyze situations, frame and solve problems, and make sense' (p.19). The problem of teaching is to order and monitor what before was hidden from the view of the teacher: the sense making apparatus of the child.

The Shepard's eye of the 19th century teacher is now replaced with a secular eye of being watchful of the child's interest and constructions. The Shepherd's Eye of the teacher saw children as the prophetic task of 'professing' Christian faith (Depaepe, 2001). The child was 'emancipated' through the administration of ethical philosophical reflection. Science was not an appropriate developmental object of education in the prophetic task of teaching.

Contemporary reform no longer has the Shepard's eye watching the child. Salvation is no longer found in an afterlife but in the good works engaged through earthy endeavors. Revelation is transferred to strategies that administer personal development, self-reflection, and the inner, self-guided moral growth of individual personality and character. The teacher remakes her desires through the suspension of her 'desire' for the child's right answer.

The languages of the new teacher are secular, democratic and liberal. It is to give voice to the child and to 'hear' their ways of giving meaning to the problems of school subjects. Research is to classify 'the content and structure of teachers' knowledge' in thinking about the mind and dispositions of the child. Classroom teaching has moved from knowing merely an answer to a mathematical problem. It is to administer the inner processes of the mind that orders the understanding: to 'knowledge of how to arrive at an answer problem (48x 1/4)' and ' her knowledge of her children and the trust she had in their thinking…' (Warfield, 2001, p.150). '[T]he trust in their thinking' and the notion of valid knowledge and understanding is in fact the trust in the fabrications that codify the notions of problem-solving derived from psychology of the administration of the child and not mathematics.

Research carries romantic notions that are signified by norms of the teacher who values the child who thinks differently than the teacher, who respects the child's ideas and lives, and finds virtue in what the child is and can become. The effective teacher governs the inner capabilities and principles of action which the child engages the world.

But the struggle for the soul is not only that of policy and research, but in the practices of teaching school subjects. For example, a physics lesson observed in a national study of an alternative teacher education program seems overtly as concerned with learning science (Popkewitz, 1998b). But the use of the words of physics marked out the territories for governing the child's psychological development and growth. The content purpose of the lesson was subsidiary to the psychological object of children working in cooperative, small groups and their learning *self-motivation* and individual *self-esteem*. The language of today's *soul* is of the psychology of modernity that is saved in the name of learning school subjects.

Community and the struggle for the soul

The notion of *community* is part of the doxa of political, pedagogical, and scientific discourses of change. Community frames educational discussions of

multi-culturalism and the challenges to the canons that dominate university literature and historical course of studies. With a different ideological agenda, neoliberal concerns with markets and privatization revision the political as located within the agency of the individual in communities. Community is also prefigured in the mathematics education. The school, the child, and the teacher are talked about as a *community of discourse*, *classrooms as communities*, *a discourse community*, and *a community of knowers*.

The significance of the use of the notion of community is in the textual practices rather than as normative ideals that stand outside of historical configurations. The civic ideal of community is related to the sublime in which the home of God is found (Cronon, 1996). In the early 19th century U.S, the landscapes of nature were the places where one has a better chance than elsewhere to glimpse the face of God. This idea of God in nature is expressed in the idea of the New World, initially a religious phrase that evoked images of the Garden of Eden. Community became the new cathedral by which individuals could be brought into a face-to-face relation with God's creations of Nature. The urban planning that took place in the 19th century installed ordered gardens and parks in which communities were to better function in relation to God. But the notion of community also expressed the return to the conditions in which neighbors form the democratic institutions that predate modernity.

The Protestant religious motifs about the individual's good work and liberal democratic commitments were inscribed in the early American social sciences conceptualisations of the notion of community. The Chicago School of Sociology interacted with settlement programs concerned with re-settling the new European immigrant in the early decades of the 20th century. Diverse ethnic communities of immigrants were to be joined into a more general social and collective identity related to nation-building. The writings of John Dewey who worked with the Chicago reformers and social scientists deployed the notion of community to develop a collective, American identity that reworked the relation of religious and political images in the notion of the child. The reinstalling of face-to-face interactions through theories of the family and community were to produce democracy and its images of the sublime in the urban environment.

Community is a word resurrected in today's reform discourses. At one level, community is a salvation narrative that speaks of the state's collective obligation to promote community involvement among previously marginalized groups. The professional teacher is one who revives the democracy by working more directly with parents and communities. Contemporary reforms about school-community partnerships and school goals are 'steering' mechanisms in which a plurality of local communities find solutions to general collective social and political goals. Community participation and decentralized political decision-making, for example, co-exist with centralizing processes of the new education management schemes of testing and 'Total Quality Management'

(TQM). New school mathematics reforms inscribe 'classrooms [as] mathematical communities *writ small* and key reform documents envision the classroom as a mathematical culture governed by roughly the same norms of argument and evidence as govern discourse within communities of scholars in the disciplines themselves'(Nelson, Warfield, & Wood, 2001, pp.6-7).

Community is a project of political reflection that aligns the aspirations and capacities with the aims of government. The child and teacher located in *the classroom community* involve a new social space of moral relations in which individuals have obligations and allegiances to multiple and heterogeneous communities (Rose, 1996; 1999; also (Hennon, 2000). Although nineteenth century projects of community were concerned with the social and the collective social movements, contemporary political discourses focus on community as a micro-point of management that is no longer anchored in the ordered spaces of society. The teacher and child act in a continuous life course of personal responsibility and self management of one's risks and destiny. This self-management of risk is what was earlier inscribed in the notion of the 'autonomous learners who are continuously involved in self-improvement' (cited earlier in the National Council for Teachers of Mathematics, 2000). The new flexibility is to learn the psychological dispositions and capacities for making reasonable choices.

The crystallization and transmogrification of disciplinary knowledge

The pedagogical struggle for the soul needs to be considered within the particular way in which mathematics is translated into the projects of the curriculum. Mathematics is made into 'content' of school subjects that have secure fixed properties of knowledge. 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. The linguistic quality of the words of the mathematics curriculum - bodies, content, content coverage, or conceptual knowledge - treats disciplines as inert, unchanging and unambiguous 'things' (concepts or proofs) that children learn. While research in mathematics education emphasizes the flexibility and autonomy of the child and teacher that flexibility is determined in relation to what is already known and fixed. The National Council for Teachers of Mathematics (2000), for example, works on the child through a focus on problem-solving and an 'autonomy' through fixing the notion of mathematics knowledge.

School mathematics is a content that describes and assesses what is already defined as 'real.' It is a thing that is applied to the real world as it 'has powerful uses in modeling and predicting real-world phenomena' … Mathematics [is an intellectual tool to] enable children to order and control the world as it really exists: the curriculum 'should offer experiences that allow students to see that mathematics has powerful uses in modeling and predicting real-world

phenomena' (p. 16).[3] The stability of knowledge emphasizes a coherent and well-articulated curriculum in which, 'effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well (National Council for Teachers of Mathematics, 2000, p.16).

The learned child is one who explores and manipulates the patterns and regularities of a given world exposed through a reason presupposed in the logical and analytical foundations of mathematics. Teaching mathematics entails teaching the analytical and symbolic systems of mathematics through a psychology: children are to practice an inductive and deductive reasoning (Malloy, 1999). Mathematical reason is a stable entity, as one author states as 'the development and justification of use of mathematical generalizations' (Russell, 1999). The learned child is one who explores and manipulates the patterns, regularities, and properties in existing *conventional* mathematical ideas. Evidence of student-teachers' understanding is measured by their *conceptual understandings.* The choice of c*onventional* ideas in forming the curriculum reforms crystallizes and stabilizes the academic field for pedagogical interventions.

The teacher is the manager of the child's learning the stable knowledge. 'Teachers need to understand the big ideas of mathematics and be able to represent mathematics as a coherence and connected enterprise' (National Council for Teachers of Mathematics, 2000, p.17). The big ideas are, for example, found in pre-service mathematics courses in which 'fractions can be understood as parts of a whole, the quotient of two integers, or a number on a line is important for mathematics teachers' (National Council for Teachers of Mathematics, 2000, p.17); and 'Teachers need to understand the different representations of an idea, the relative strengths and weaknesses of each, and how they are related to one another' (National Council for Teachers of Mathematics, 2000, p.17).

In one sense, the Platonic sense of certainty in mathematics is repositioned in curriculum even when that certainty is to be undermined. Lampert (1990), for example, as stated earlier, argues that mathematical thinking involves contingency and non-rational problem-solving (a zig-zaging). Yet while focusing on children's thinking, the curriculum reform inscribes a realist position as mathematical knowledge. Mathematics is taken-for-granted the essence of the empirical world that mathematics illuminates. The realism is embodied, in part, through drawing on Lakatos' quasi empiricism in describing the mathematics of science. The Platonic notions of certainty are retained as

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3 Problem-solving, for example, entails students who identify the characteristics of various quadrilaterals in grades 3-5; examine and make generalizations about properties of particular quadrilaterals in grades 6-8; develop logical arguments to justify conjectures about particular polygons in grades 9-12 (p. 16).

theorems are viewed as corresponding to properties of the read world outside our consciousness and which can be tested and made accessible.

The realist position has a double edge in teaching. The classroom interactions have a progressive sound as children are ‘figuring out what is true, once the members of the discourse community agree on their definitions and assumptions’ (p. 42). The figuring out what is ‘true’ is founded on an intellectual history of mathematical ideas, such as operation of exponentiation: writing numbers as powers of other numbers and comparing their orders of magnitude.’ The history is of the story towards a greater accuracy of telling the truth about the social world that teaching is to provide to children. Teaching is to ‘provide that this [proposition or proof] is true . . . (p.43). The stable knowledge is applied to children’s learning what is true by the psychology of the child that is to figure how children *know, think, revise, explain* (p. 34-italics in original). Again, it is possible to think about the children ‘figuring out what is true’ as a strategy for increasing participation and collaboration. But to return to an earlier discussion, that finding of the truth is strongly bounded as given by the logic of mathematics that assesses a given, real world rather than opening up the possibilities of that world for scrutiny. To use an earlier phrase, the principles of participation in the curriculum may involve small spaces of action, as the iconic figure of the expert and expert knowledge is inserted into the curriculum.

Perhaps it is not possible to undermine Platonic notions of certainty in mathematics even when considering its cultural qualities (Restivo, 1993). But even to accept the realism of mathematics requires recognition that the realism involves different cultural practices. For example, the one can think of foundations of mathematics as interacting with its cultural conditions in multiple ways: there are different views about its knowledge as embodying the logic of truth, that numbers are synthetic proposition and the *a priori* of Kant, or that the relation of classes is determined by its context (such as the properties of summing and discounting, figures of merit, and measurement problems). And there are also questions of the ways in which the self-evident classes embedded in the numbers involve a ranking and divisions related to cultural resources available for classifying.

Further, if an analogy of mathematics is made science, the continual relation between the knowledge of a field and the cultural practices are lost. 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 (1970) distinction between ‘revolutionary’ and ‘normal’ science, as well, points 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 that are lost in the alchemy of mathematics education.

The problem-solving of mathematics embody cultural practices about norms of participation, truth, and recognition that change over time (see, e.g., Van Bendegem, 1996). The biography of Nobel Laureate John Nash, is a story of mathematics as overlapping and multiple social and cultural worlds (Nasar, 1998). It is a story of the individual who works in solitude and in a community. That solitude, in Nash's case, is of an individual who has faith in rationality and the power of pure thought, but also in an imagination that precedes and helps in giving order to the laborious tasks of proof. Nash looks for originality, the patterns in the chaos, and the relation between the objects that seem intractable and what mathematicians know. His mathematics is also a constellation of a world of platonic forms that have crystallized and the world of transience, ambiguity, and the vicissitudes of daily life. The logical distinctions between these worlds of certainty and cultural conditionality do not exist in the practices of producing mathematical knowledge. The solitude and the creativity are woven with a world of collegiality in which the successes are evaluated and assessments made about what problems are worth solving, of institutional relations that for Nash includes, Princeton and MIT Universities, the Rand Corporation, and the National Science Foundation, among others.

At a different level, the cutting edge of science embodies debates and struggles about what is taken as truth and the system of representations. Again if the mathematics of the curriculum is related to science, one can think of science as strategies that 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.

While one might take different views of science and social science from my brief outline above, they have substantively different agendas and practices than the curriculum strategies discussed earlier as codifying the *conventional* ideas of a discipline in order to enact the struggle for the soul of the child. The selection of mathematical concepts conforms to and translates into the expectations of pedagogy. The debates and cultural practices in which the Platonic images of certainty are strove for are obscured as the numbers become fixed things to work on a stable world. The processes and evidence of mathematics education are formed through a frame of reference or system of reason that elides the ways in which pedagogy struggles for the soul in changing children's capabilities and capacities.

Social inclusion and exclusion: The differential administration of the teacher to administer the child

At this point, one might say, 'Ok, the curriculum is after the soul. Don't educators want children who are productive, happy, and healthy? And to get

proper outcomes, teachers cannot only be interested in external qualities and behaviors of children. And the use of psychology in the curriculum? Maybe', the pedagogue would add, 'it is not geared to understanding the mathematical community but pedagogy is about the making of the good, moral and ethical citizen. And it is important that children learn flexibility, problem-solving, and autonomy. So, what is the beef about the alchemy? The classrooms of the alchemy are nice places for kids to learn. The reforms respond to what educators think are the best, most effective ways of teaching the child.'

My response at this point is that these may be goals of teaching but does not take into account the alchemy. It is not culture of mathematics learned but the disciplining of the child that is an effect of power that encloses and interns the possibilities of the self. It removes the social mooring of knowledge of mathematics in pedagogy. One internment is, as previously discussed, is related to the notion of expertise in which autonomy and problem-solving produced greater children's participation in spaces filled with greater and greater iconic figures of the expert and expert .

But there is more to the alchemy. It is not only about a magic transformation but practices that normalize and divide. The alchemy is an inscription device about *kinds of people*. Maps are produced that construct moral spaces in which individuals have obligations and allegiances. The space is articulated through a psychology that inscribes an individuality that I argued is fashioned as continuously self-improving, flexible and active. The maps about these inner characteristics and capabilities of the child are simultaneously normalization of the child who does not 'fit' into that map; the deviant child who does not learn the alchemy and who does not follow the conduct of the alchemic problem-solving.

One device in normalizing the child is through universalising the characteristics and capabilities of the child. This universizing is embodied in the reforms that express a concern with *all* children learning and *no child* left behind. National Council for Teachers of Mathematics, (2000), for example, argues the curriculum is to prepare all children for the future. Those not classified as problem-solving, collaborative, autonomous, and self-correcting individuals are those who lie outside the moral space of the school and in need of rescue. Walkerdine's (1988) research on mathematics education, for example, argues that verbalization and justification emphasized in child-centered pedagogies of the new mathematics curriculum embody gendered, class and racial conceptions of the child. The valuing and exclusions are not overt. The distinctions that classify classroom discussions, participation, and achievement inscribe the divisions that make 'the other' in the child.

The *all-encompassing* language continually sets a map that places some qualities of the child as outside of normality. National Council for Teachers of Mathematics (2000) places this normality within a rhetoric of equity: 'The

vision of equity in mathematics education challenges a pervasive societal belief in North American that only some students are capable of learning mathematics.' The division installs a child who does not fit the distinctions of the universal 'all.' The deviant are 'students who live in poverty, students who are not native speakers of English, students with disabilities, females, and many nonwhites students have traditionally been far more likely than their counterparts in other demographic groups to be the victims of low expectations.' These students are outside and excluded, according to the report, because of low expectations. 'Expectations must be raised - mathematics can and must be learned by *all* students.' (National Council for Teachers of Mathematics, 2000, p. 13, italics in the original). The reference to *all* children is also a reference of the need to rescue certain children who deviate from the standards and are thus targeted for remediation. 'Some students may need further assistance to meet high mathematics expectations. Students who are not native speakers of English, for instance, may need special attention to allow them to participate fully in classroom discussions.' '[S]tudents with disability may need increased time to complete assignments, or they may benefit from the use of oral rather than written assessment' (National Council for Teachers of Mathematics, 2000, p.13).

A study of an alternative teacher education program for U.S. urban schools illustrates further the normalizing and dividing practices of the alchemy (Popkewitz, 1998b).[4] 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.

But urban education is not merely a phrase of commitment but it is also an amalgamation of discourses through which educational practices are mobilized. Urban schools are organized through the alchemy of school subjects. Social discourses about educational inequities were translated into pedagogical systems to teach school subjects for prospective teachers at all levels of schools. The pedagogical practices were concerned with a particular kind of person who is vested with the capacities and capabilities. The child of urban education was placed in a continuum of values that privileged the distinctions and differentiations of the problem-solving, collaborative child and teacher. That continuum value 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 identify 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

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

and in need of remediation that is also identified in the National Standards of Mathematics.

The urban child is one outside of normality. The child is interned and enclosed as a child with poor 'self concept', or the 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, lack 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*-esteem. The deviant child is one that child can never be 'of the average'.

The distinctions of 'urban; 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. When urban education is an inscription of a field of cultural practices that marks the child as different from unstated norms and values. Further, while urban education is a category often related to other categories, such as diversity and multiculturalism as important to public policy and questions of equity, the translation of these social concerns into the alchemy of pedagogy is assumed rather than questioned. The notions of diversity and community do not exist by themselves. They are part of an assemblage of distinctions and divisions to classify the urban-ness of the child. The reforms to correct inequities embody the alchemic struggle for the soul that may produce its opposite as some are outside the mapping of reason and performatively made into the 'other.'

Some concluding thoughts on the alchemy, the soul and exclusion

Pedagogical/psychological theories are not necessarily bad and may have importance in the governing of schooling. And there are strong social and political reasons for children learning to solve problems or collaborating. But once this is said, the alchemy comes into play in consecrating a particular system of governing through mathematics education. Embedded in the alchemy are the politics of school knowledge as it relates to issues of inclusion and exclusion. This question of knowledge is not of its bias nor it is of the interests served. It is related to one of the significant 'facts' of modernity. Power is exercised less through brute force and more through the rules of reason that orders the 'objects' through which action is produced. In particular, the alchemy of pedagogy embodies particular anxieties, displacements and principles for qualifying and disqualifying, and for inclusion and exclusions of individuals for participation and action.

The alchemy of school subjects may pose as useful knowledge about children's problem-solving. But the paradoxes and ironies of the frame of reference of the evidence of schooling may not be useful. 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 - fabricate principles of action and participation that are simultaneously excludes as it includes.

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 the alchemy are not* only the realm of talk but are 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 is excavated by research.

The alchemy draws attention to an epistemological obstacle, to use loosely Gaston Bachelard's 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. The frames of reference order the conduct of studies of professional schools, student and teacher experiences and school subjects are not 'merely' there but are bounded by prior fields of cultural practices that structure *evidence* of schooling.

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The rediscovered recipe includes extract of coca leaves, caffeine, plenty of sugar (it specifies 30 unidentified units thought to be pounds), lime juice, vanilla and caramel. Into that syrup, the all-important 7X ingredients are added: alcohol and six oils â€“ orange, lemon, nutmeg, coriander, neroli and cinnamon. The formula is very similar to the recipe worked out by Mark Pendergrast who wrote a history of the drink in 1993 called For God, Country & Coca-Cola. Cokeâ€™s secret recipe is, in fact, partly a myth. The soda has changed substantially over time. Cocaine, a legal stimulant in Pember which of the following statements is true? a) when you buy an equity, your potential loss is unlimited and your maximum potential gain is 100%. b) when you buy an equity, your potential loss is 100% and your maximum potential gain is unlimited. c)when you buy an equity, you are promised a stream of fixed dividends. b) when you buy an equity, your potential loss is 100% and your maximum potential gain is unlimited.Â a) median age of society. when an analyst is looking at a company for the first time, which of the following four activities does he do first? a) defines the industries in which the company operates. b) sizes the market in which the company sells. c) Calculates the companys market share. d) estimates the breakdown of the companys cost base.