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The Epic Narrative of Intellectual Culture as a Framework for Curricular Coherence

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Abstract. This paper describes a proposed middle school curriculum designed to coordinate the major subject areas around a single coherent story line, and to tell the epic tale of the development of formal intellectual culture from its distant origins to the present day. *Ourstory* explores the history of scientific culture from the perspective of foundational disciplines (history, philosophy, sociology, psychology, anthropology). It examines the growth of scientific culture against the backdrop of the world's traditional cultures, and balances the role of the sciences against the role of the arts in their respective contributions to the life of the mind.

1. Introduction

For the past three years I have addressed an array of pedagogical, philosophical, and psychological topics in my educational psychology courses by arranging them around a hypothetical curriculum design project. This curriculum, called *Ourstory*, was designed as a heuristic device, a way of keeping a number of pedagogical and disciplinary conversations clustered and related to one another as we try to envision a curriculum that overcomes the reductionism, the fragmentation, and the aesthetic and conceptual sterility of a typical school curriculum. *Ourstory* recognizes the virtues of a multi-cultural perspective and a postmodern social ethos, but it is built upon a conceptual framework that borrows distinct features from an older classical liberal tradition.

Few people today mourn the passing of the classical curriculum, based as it was upon mastery of the Latin and Greek languages and cultures, but there is a sense in which that old tradition of schooling enjoyed some significant advantages that disappeared along with it. History served a central role, providing an organizational framework for all of the knowledge, events, information, and ideas contained in that curriculum, providing a mechanism of coherence and order, and inducing much of the study to take the form of a story, built around human perspectives.

In the following scenario I will argue for the use of history in the teaching of science, but I will argue for a different use of history than has been customary among advocates of the history and philosophy of science (HPS) community. I will enter a plea that we stop thinking only in the limited framework of science

education and try to recognize that the whole of scientific culture forms an indivisible mass that must be taught altogether if it is to make sense to students as a culture, as a world view, and as a way of life. Turning our backs on the humanities and the arts and adopting a posture of contempt toward traditional cultures, while insisting on greater progress in science education, bespeaks a kind of parochialism that diminishes us all.

2. *Ourstory* - Structuring Education for Meaning

In a paper delivered to the HPS group in Calgary, June 1997, I raised the suggestion that we broaden the scope of our concerns beyond the teaching of science *per se* and begin to consider how best to teach the whole of scientific culture (Carson, 1997a). Science did not develop independently of the other formal disciplines, nor should the teaching of science be considered independently from the teaching of the arts, literature, history, and so on. Knowing how the main branches of intellectual culture interact, and knowing how prominent ideas obtain different modes of expression throughout the various disciplines is, in a word, necessary. The compartmentalization of culture into isolated disciplines and subdisciplines, which takes place routinely in institutions of formal education, produces a peculiar misrepresentation of the complex and dynamic relationships between the arts and sciences, and between humankind and its various cultural systems.

My suggestion is that we consider ways, early in the students' schooling, to help them understand how mathematics, science, literature, history, art, social sciences, technology, and so forth, emerged from the ferment of humanity's long social and cultural struggles. *Ourstory* uses as a model the notion of an epic tale. It recognizes the power of these narratives to bring together an audience, to create a shared experience, to connect individuals with their social histories, and to embed massive amounts of information into an easily accessible, memorable, and enjoyable form.

Consider a simple experiment. Take a thousand page novel. Identify every idea, description, event, and piece of information contained in it. Write each of these on a separate index card. Then shuffle the stack of cards (several tens of thousands, no doubt), and see how easy it is for someone unfamiliar with the original story to remember or make sense of all that information. Disconnected, out of sequence, and unrelated to one another, each particle of the story becomes an isolated learning task, much like the content of the typical school curriculum. Gestalt psychologists established over fifty years ago that the mind is among other things a pattern-seeking and a pattern-making mechanism (see Hunt, 1993, for a good popular history of these developments). Since then, cognitive psychologists (e.g., Ausubel, 1963, 1968; Novak, 1998) have demonstrated in a variety of ways that knowledge is more easily understood, learned, and remembered when it is situated within meaningful, organizing frameworks. Concept mapping, advance organizers, narrative knowledge structure, and other devices are all techniques designed to relate pieces of information to one another within a larger structure.

The plan of *Ourstory* is to combine the temporal frame of history, the spatial frame of world geography, and the conceptual frame of philosophy to tell the story of the world's major cultural developments. In this plan, history would serve as the main integrative framework. Told as a series of cultural episodes, this story attempts to move the learner through each historical moment of change, whether a discovery, an innovation, or establishment of a new cultural convention. Something becomes 'meaningful' because it is connected to other things the learner already knows (Novak, 1998). If we are seeking authentic, integrating frameworks, we must look to the nature of knowledge, culture, and human activity as they exist in the world 'out there'.

Science has never grown or thrived in isolation from the arts: 'Bluntly stated, the goal *per se* is not to teach science. The goal is to teach scientific culture. All of it. Science is one of the definitive branches. Wise policy will serve the entire culture, and all of its parts. We cannot be indifferent to the whole of our intellectual culture' (Carson, 1997a). When we teach science in isolation from the larger social, cultural, historical and philosophical contexts within which its growth has been hosted and nourished, it becomes unnecessarily cryptic. We lose sight of why knowledge is framed the way it is, and why it gets represented as it does. Often, there is a story behind the conventions that seem otherwise so peculiar. Students have trouble seeing it as a human activity, thus they have trouble seeing themselves as scientists, or being sympathetic to the ways in which scientists investigate phenomena and crystalize their resultant knowledge. There is a whole, gestalt-like, intuitive feel for the nature of the discipline that eventually 'clicks' with those who finally succeed at it. Sometimes that feel is there early on, in which case the learner never does understand why others have so much trouble with it. For some it develops after struggling with enough information. Most never get past the desperate strategies of rote learning and uncomprehending reliance on algorithms. They never get the pieces into an accurate structural alignment, nor understand clearly which aspects are empirical in nature, and which derive from convention and from human imagination. If the learner could go back to the beginning and see how the discipline evolved in the first place, how the knowledge was uncovered, organized, formalized, and shared, then a better intuitive feel for the nature of the enterprise would be possible.

The 'intellectual fragmentation' Matthews (1994) laments is not just within disciplines. It is, importantly, between disciplines as well. The project this article describes is an attempt to find the modern equivalent of an integrative liberal education, centered more fully than traditional liberal education around the historiography of science and technology, but mindful nevertheless of the crucial roles played by the arts and the humanities. When we stand back and look at those historic epochs in which the global project of science was advancing vigorously (Greek classical civilization, the Enlightenment, and the age in which we currently live, for example) we quickly recognize that the other major disciplines were also expanding, changing, and contributing to that progress. Synoptic histories of

culture, such as Janik and Toulmin's (1973) marvelous account of 1920's Vienna, demonstrate the point well.

As currently envisioned, *Ourstory* would serve to orchestrate the whole three year curriculum at the middle school level. (The term 'middle school' in the U.S. refers to junior high schools that have been reconfigured to create more intimate learning communities and to shift the pedagogical strategies toward social processes and constructivist learning orientations). Students enter middle school around the fifth or sixth grade (at approximately eleven or twelve years of age) just as an adult-like consciousness is beginning to emerge. Most stage theorists recognize that this is an age in which maturation takes a profound step, physically and emotionally, as well as morally and intellectually. Learners become capable of addressing relatively complex networks of ideas and topics, but they are just beginning to gain competence at formal abstract operations. They have a keen interest in human stories, personal dramas, the complexities of human life. They hunger for philosophical insights, drama, the intrigue of ethical dilemmas, exposure to the world's wealth of poetic beauty, wisdom, experience, and romantic engagement. Most are not ready for the austere precision of a formal discipline.

A curriculum framework like *Ourstory* would suit the middle school level well in part because this is the first age group capable of receiving it. In pilot studies we found middle school students to be highly receptive to the use of narrative histories of pivotal cultural events. And as these histories formed a sequence, students quickly made the necessary connections. If they can enter into the 'problem space' of a cultural advance and understand what the original problems and conditions were, they can do a creditable job of seeing a range of possible approaches and solutions, and that means they are also capable of understanding at some level the solution humankind generated under those conditions. At this age level, the history does not have to be precise, though of course it should be accurate.

There is another reason for locating *Ourstory* at the middle school level. In terms of realpolitik in the educational community, many middle school faculty and administrators are already determined to create an educational experience that is thematic, interdisciplinary, generalizing rather than overly specific, and based upon social processes and dialogue. They are more likely to consider a historically based model such as *Ourstory*. High schools, by contrast, are institutionally more rigid, and more inclined to model themselves after colleges. They focus on the content of the disciplines, and they teach each subject in relative isolation from one another. Coordination of any kind across disciplinary boundaries is notoriously difficult, as it is in universities.

Middle schools typically assign several cohorts of approximately twenty five students to a team of three or four teachers, who then rotate these cohorts among themselves throughout the day. One of these teachers (probably the history/social studies teacher) would take primary responsibility for teaching the main story line that *Ourstory* is framed around. That teacher would actually conduct the first lessons in the sequence that would provide the conceptual ramp into the associated

topics in mathematics, or art, or science, and the story line would then be picked up by those teachers as each line of discussion condensed into those particular areas of specialization. The social studies teacher might begin to portray the life of Thales, his immigration to Egypt, the conversations he supposedly had with geometers there. She might even provide the first lesson or two in the sequence as the mathematical conversation begins to yield the beginnings of classical geometry, or she may co-teach a few of these lessons with the mathematics teacher. When the mathematics teacher then takes over the mathematical part of the story, the social studies teacher would return to the main story line, which in turn would begin to produce additional leads out into literature, into art and architecture, into science, and so forth. These leads would be picked up and developed in those other classes. From the students' perspective, this would be a sequential voyage through the main developmental moments of civilizations, from ancient to modern, built up out of re-creations of the most culturally significant events.

All of these teachers, including the history/social sciences teacher, would still teach the usual material that is taught without *Ourstory. Ourstory* is not being conceived of as a whole curriculum, but rather as a curricular framework with just enough added material to produce this central story line and to structure a meta-discourse on the nature of knowledge and cultures. It would require about two or three hours out of each week. While this story line itself begins at the end of the last ice age and gradually makes its way to the present, it does not require the entire curriculum to dwell in the past. Nothing is covered in *Ourstory* that does not have significant implications for the present. And in all cases, the purpose is to explain the way things are today, by means of their antecedents. In the case of science education, contemporary topics would still be the main venue, but students would also experience re-creations of the cultural commitments, the main discoveries, and the evolution of investigative techniques that account for the transformation of natural philosophy and metaphysics into modern science over the course of twenty five centuries. They would visit with the pre-Socratics, who first began to outline the logical possibilities of natural philosophy. They would visit with the mathematicians who developed rational thought and who contemplated the logical structure of the physical world. They would enter into the presence of Aristotle, the great collector of all things human and natural, who organized and catalogued thousands of objects into orderly taxonomies. Along subsequent travels through history they would meet up with Archimedes, Galileo, Newton, Bacon, and others. It is not just the specific scientific discoveries that need to be learned. Perhaps more importantly, it is the grappling with investigative strategies and other procedural matters, even social matters. Robert Boyle's address to the Royal Society (1661) contains more than the fruitful suggestion to view as elements any substance that cannot be further reduced. It also contains a blueprint for the social protocols for contesting ideas, theories and points of view without rancor or personal invective. It explains why scientists insist that claims be presented in a manner that others can reproduce.

3. Practical Considerations

The resources for this curriculum project could be web based. They could be organized using a simple grid (see Figure 1). The horizontal axis along the top identifies conventional historical epochs of the kind Van Doren (1991), the Durants (1935/1975), and others customarily refer to. The vertical axis lists the cultural systems that constitute the main disciplinary venues in schools. This grid could be used as the main index for organizing a collection of web-based resources with extensive links to other sites. In order to ensure coherence a minimal story line would be obligatory, but this rich collection of resources could be selected from at the discretion of the teachers to determine how far to go into secondary and tertiary topics.

Historical epochs are addressed in chronological order, and the developments during each epoch in each of the disciplinary categories are examined in relation to one another. This approach constitutes an interdisciplinary, multi-cultural, multimedia approach to the study of mathematics, science, art, architecture, music, history, geography, natural language, literature, and other formal disciplines. It examines each discipline from a foundational perspective, providing a sense of coherence by exploring the social, philosophical, historical, and cultural dimensions of the development of these various disciplines within the context of the world's evolving scientific culture. These historic developments are seen in relief against the broader picture of the world's traditional cultures. The history of the relationship between traditional cultures and scientific culture is also explored.

The title of this project is meant to serve as a gentle reminder that the rise of science, and its influence on all the other formal disciplines and upon all traditional cultures, while a complex and often troubled story, belongs to all of humankind. The advent of scientific culture has drawn its inspiration from numerous cultures and at the same time has had a profound influence on every society on earth. While the project of science gained significant advances in Europe, it did not originate exclusively in Europe, and in the twentieth century its modern impetus moved beyond the borders of Europe to become a truly global phenomenon. Its development is tied up with the painful history of colonialism and other sorrows. It cannot be presented merely as 'subject matter' in schools while ignoring its deep historical and cultural significance. It is our commitment to tell this story with as much integrity and intellectual grace as possible.

The title *Ourstory* also serves as a reminder that, in all societies, the first obligation of education has always been to present 'our' epic tale, to tell the story of who we are, where we came from, what we as a people have come to believe, and so on. Use of the story-form, where appropriate, serves to restore a much needed coherence (Egan, 1986) and to address the adolescent's need for rich human perspectives.

But who are 'we'? In the late twentieth century, the possibility of a single grand narrative broke down (Lyotard, 1984). The post-modern condition is often

Ourstory

A History of Formal Intellectual Culture as Seen Against the Backdrop of the World's Cultural Traditions

Historical Epochs / **School Subjects**	**Early Cultures & Societies. (12th m. - 8th c. BC)** ***The Agricultural Revolution***	**Classical Civilizations** **Greece (600-320BC).** ***Literacy, Reason & Democracy***	**The European Middle Ages** **(410AD-1300)** ***Christianity and Islam***	**The Renaissance** **(1300'S - 1600)** ***Rebirth of Classical Learning***	**The Enlightenment** **(1660-1800)** ***Science and Romanticism***	**Modernity** **(1800-1920)** ***Technology. Imperialism***	**20th & 21st Centuries** ***Post-Modernism. Cultural Pluralism***
Social Studies, History & Geography	A1	A2	A3	A4	A5	A6	A7
Music, Art & Architecture	B1	B2	B3	B4	B5	B6	B7
Mathematics & Logic	C1	C2	C3	C4	C5	C6	C7
Science & Technology	D1	D2	D3	D4	D5	D6	D7
Literature & Language	E1	E2	E3	E4	E5	E6	E7
Traditional Cultures	F1 ***Egypt, Africa Mesopotamia***	F2 ***China, India, Israel, Rome.***	F3 ***Europe; Arabic civilization***	F4 ***American Indians; Inca, Aztec, Mayan***	F5 ***Africa Revisited: Tribal structures vs Colonialism***	F6 ***Clash of cultures: Traditional vs Scientific. Asia revisited.***	***Special topic: Philosophy of Language, Culture & Mind***

Figure 1.

described now as a decentralized mosaic of localized discourses with no central account even possible. Any narrative is political, any curriculum an indoctrination. Any single narrative is a chimera. Our story is a narrative of many voices. Like the old travelers' tales of the late middle ages, the only thing we have in common is the fact that all of us are on a similar journey. It is the form of the story, more than the specific events of each narrative, that forms the common bond.

Does *Ourstory* privilege Western civilization? Inevitably, perhaps, yes. But by their very nature schools do so anyway and in a far more insidious manner than would *Ourstory*. Schools perform many functions, worldwide, but in the end they are designed to teach those complicated formalized disciplines that cannot be learned by more natural modes of cultural apprenticeship. Schools are artificial environments developed for specific purposes, and those purposes generally take us into the cultural contributions associated with western civilization. Having said that, though, most critics of this project have been sympathetic to the argument that it is more honest to frame the discussion in terms of 'cultural systems', which every people on earth can lay claim to in one form or another, than it is to ignore the world's great wealth of cultural systems and to engage in an uncritical indoctrination into school subjects, and thus scientism. While *Ourstory* is attempting to focus on those specific developments that led to modern scientific culture, it certainly does not preclude teaching parallel developments in other cultures, or adapting the content to the cultural backgrounds of the students in any given educational setting. *Ourstory* is intended to dignify human ingenuity and variability in all its richness, but it also recognizes that the emancipatory function of education depends in large part on procuring for all students mastery of those domains of learning that are generally recognized as undergirding the scientific and technological culture that now pervades the earth.

As traditional cultures reassert their legitimacy, and as their members figure out how to negotiate co-residency in both a traditional and scientific culture, a new ideal of the educated individual will likely emerge. An educated and worldly person will be one who is comfortably situated within an ancient cultural tradition as well as competent in those domains of learning that will constitute a world wide scientific culture. One does not have to give up Judaism, Catholicism, or allegiance to Lakota culture to be a physicist. One may wish to recognize though that the austere logic and materialism of positive science simply cannot fulfill the human needs that gave rise to cultural traditions in the first place. Those traditions are ubiquitous for a reason. Scientific culture is a conceptual tool kit, but it is not a spiritual culture. Those who reject traditional cultures and attach their allegiance solely to a scientific worldview often make science over into a quasi- tradition, called scientism, and they risk becoming just as dogmatic as any tribal member toward his or her ancient ways of knowing.

The notion of cultural systems, like the notion of political economy, is deliberately broad and inclusive. It is a way of legitimating traditional cultures in the same way that we legitimate formal intellectual disciplines, as ways of knowing

that satisfy human needs and desires. Each formal discipline taught in the schools is regarded in *Ourstory* as a cultural system. So too, each traditional culture may be regarded as a cultural system. If one can immerse oneself in it as a way of knowing, then it may be seen as a cultural system. 'The concept of culture', says Geertz, 'is essentially a semiotic one. Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs . . . ' (1973, p. 5).

Although academic disciplines, like traditional cultures, tend to interact, they also tend to retain distinct identities. And, importantly, they tend to be incommensurable, one with another (Carson, 1997b). The conclusions of literature or of art simply are not of the same conceptual coinage as the conclusions of physics, any more than the conclusions of science can be reconciled with the world view of an America Indian culture. Different systems have different modes of investigation, different subject matters, different underlying assumptions, different standards of validity, different goals and purposes. They constitute different world views. All are sustained within different symbolic systems which, in turn, enable different views of reality. Whether ambiguity is a fringe phenomenon or the very essence of reality or of perception is unresolved. *Ourstory* takes a modest, 'trivial' position on the matter by simply recognizing that there are different, incommensurable cultural systems, which schools are expected to teach and which human beings can expect to encounter.

The notion of a curriculum based upon the exploration of cultural systems is not unique. Similar perspectives arise in the work of Aikenhead (1992, 1996a,b). He too identifies science as a cultural enterprise, a position that is not without controversy, especially among those who see science as the victor in a cultural-evolutionary struggle for superiority over tradition-based cultures, or who privilege it because of its putative universality. He recognizes that people participate in numerous cultures and subcultures, groups that share coherent yet distinct world views and perspectives, and that those cultures satisfy real needs. The passage into another culture is referred to by Aikenhead (1996a,b) as 'border crossing'. The difficulty of the passage into science depends upon the learner's existing cultural background and the degree to which the learner considers mastery of science necessary to future plans. He uses the five categories established by Costa (1995) to propose variations on the strategy of teaching, and even ponders for a moment whether five different curricula might be needed. Learners described as 'Potential Scientists' and 'Other Smart Kids' make the transition into scientific culture far more readily than those defined variously as '*I-Don't-Know* Students', 'Outsiders', or 'Inside Outers' (those who want to learn but are kept outside by prejudice or other institutional barriers). Using work from studies that have considered the problems faced by non-western students crossing the cultural borders into western science including Jegede (1994, 1995) and Jegede and Okebukola (1990, 1991), Aikenhead recognizes that even students of European heritage suffer similar kinds of disjunction if their own sociocultural backgrounds and aspirations do not happen

to align with the world view characterized in science. In a private letter comparing our respective points of view before the current project was developed, Aikenhead warned me that '... the relevance agenda defined by students often interferes with our rational agenda for teaching science in interesting ways' (1997). Trying to create access to scientific culture by a series of historical narratives may not work if students cannot identify somehow with the people depicted in those stories, or never develop empathy for the various problem spaces those individuals found so fascinating, or simply do not care. Clearly, much work remains ahead.

4. Units and Lessons

Let us now consider how *Ourstory* would organize the episodes of cultural development it is based upon. A sparse, central narrative could be provided students either in written form or taught less formally by one of the teachers on the middle school team, in the tradition of oral story telling. That teacher would coordinate the related modules taught by other teachers so that coherence and continuity are maintained. The telling of the story, spread out over a three year period, handled by different teams of teachers, would occur in relatively concise sessions, which would serve as advance organizers, perhaps for a week's work. The student's engagement in this story would then consist of scripted exercises that would take the student working in small groups into the problem space of an event that was represented in that central story line.

The narrative on Thales for example could be followed by an experience using ropes and wooden stakes in which basic geometrical formulations are represented. Problems presented in concrete form, as the Egyptians knew them originally, become problems seen with the mind's eye. They are drawn on paper, and then these representations are taken to be representations not of ropes and wooden stakes but of lines and points. Theoretical entities thus emerge from these activities, and we begin to face the same ontological and epistemic questions that led Thales, Pythagoras and others to develop geometry as an abstract science, and led Plato to contemplate the ontological status of pure ideas.

Resources for teaching these episodes could be catalogued into a web-based collection using the grid described earlier. Each cell in the grid represents a discipline, or a cluster of associated disciplines, as it lines up under the heading of a particular historical epoch. Clicking on a cell brings the reader to that respective historical epoch and discipline. The resources contained within that section are limited and carefully selected. We are not pretending to provide a comprehensive history of the particular epoch or discipline. Rather, we seek to identify the most significant events which promoted the growth of those disciplines toward their current state, and those events that spilled out from their incubation zone in one discipline to affect the general course of intellectual culture. The selection process and orchestration of a story line involves careful concept mapping (Novak, 1998), for it is the connectedness of significant cultural developments that establishes much of their

meaningfulness. It also involves an understanding of the role cultural tools play in the life of the mind, how specific developmental advances articulate from each new set of instruments developed for the mind, and how learning involves a recapitulation of these historical developments in the development of the individual, as Vygotsky recognized. (For a discussion of these points, see Scribner, 1995).

One example would be in cell E1 (Literature & Language; Early Cultures & Societies) where we would find a unit on the advent of writing, the development of early alphabets, and the first democratization of literacy among the Hebrews and the Greeks (Jean, 1994). The advent of an easily mastered writing system and its diffusion into a whole society alters that society profoundly.

A second example, in cell C3 (Mathematics & Logic; The European Middle Ages), occurs when the combined use of place value and base ten spread from their incubation zone in India through the Arabic lands and into Europe. The system we use today makes use of Arabic numerals and symbols for zero, for addition and subtraction, multiplication and division, and during the nineteenth century was added a symbol to replace the words 'is equal to'. Our unit on these events would explore the greater efficiency, the additional capabilities, the aesthetic beauty and simplicity, the conceptual empowerment, and the historical significance of these brilliant contributions to intellectual culture. Nothing learned early by children should be taken for granted forever, but should be revisited when appreciation becomes possible for the learner.

A third example might be found in B7 (Music, Art & Architecture; Postmodernism) when innovators in all three of these artistic disciplines break entirely free of neo-classical conceptions of art and beauty, and create works which challenge the very definitions that these disciplines have taken as axiomatic since classical times (cf. Stangos, 1994, especially pp. 6; 110–134; 256–290). The notion that there is an eternal, permanent standard of beauty in the universe produces a profoundly different consciousness (and suggests an entirely different approach to education) from the notion that beauty is purely an individual preference and prerogative. Does this shift in the theory of aesthetics constitute a great liberation from the constraints of convention, or a demolition of timeless values? Students would have the opportunity to see how philosophically divergent viewpoints play out in the theatre of formal (or is it post-formal) art. In so doing, they will be challenged to think more deeply about what art is, and what role it plays in any society. Because all of the disciplines are being examined by historical epochs, they would also see that in an age when physicists are recognizing that there are 'no privileged frames of reference' in time and space, a similar notion has invaded the realms of ethics, aesthetics, literature, historiography, and so on. Powerful ideas define entire cultural epochs.

A fourth example might be found in D5 (Science & Technology; The Enlightenment) when Lavoisier and his associates created the new nomenclature for elements and compounds, a change not only in the language, but in the conceptualization of matter. Lavoisier's original introduction to *The Elements of Chemistry*

(1965/1789, pp. xiii–xxxvii) draws the reader into reflection on the relationship between language and thought, a topic still of keen interest two centuries later.

Pivotal events like these are connected to larger historical and cultural trends, always. While the student learns in science class about the contributions Lavoisier made to the origins of chemical science, she will also learn in her history class about the Revolution that cost him his life, and she will see how the shift in power from social elites to ordinary people found expression in the arts, as in the transition Mozart and others made from classical to Romantic music. In such a context, the art itself begins to make more sense. So do the styles in which it is created, and the modes of thought it represents.

When students study the Enlightenment in *Ourstory*, they would examine contemporary developments taking place in music, in art, in literature, in the political discourse, as well as in science, technology, and mathematics, and they would look for thematic connections and that metaphorical resonance of ideas across disciplinary boundaries that tends to occur in any culturally robust epoch. In this context, the students immersed in the culture of the Enlightenment would encounter the beginnings of analytical geometry, chemistry, physics, classical and romantic music, neo-classical architecture, the political essays underpinning liberal democracy, the beginnings of the romantic protest against science, the first machines, laissez-faire capitalism and its discontents, and so forth.

Ourstory requires significant collaboration by teachers. But it repays the effort by creating a coherent discourse for teachers and students alike. And it creates additional perspectives on those disciplines that may otherwise have lapsed into sterile entombment as 'school subjects'. '*History* is not a distinctive subject-matter to be inquired into. It is rather at once a trait of all subject-matters, something to be discovered and understood about each of them; and a distinctive way of inquiring into any subject matter' (Randall (1962), quoted in Scribner, 1995).

5. The Curriculum as Epic Tale

Ourstory moves history from the fringes of the curriculum to the very center, constrains it in this use to the history of formal intellectual culture, and then arranges the approach to all of the other disciplines as branches off from this main trunk. The primary focus would be on events that had lasting significance for the mental landscape we now inhabit as participants in modern scientific culture. Yet it recognizes a world made up of many cultures and a standard of liberal education in which mastery of different cultural systems is the key.

Students often complain that the subject matter they are taught in school is irrelevant and disconnected, that they are unable to see why these various subjects need to be learned. Why study mathematics, or science, or art, or history, or literature? There is no mechanism in the present curriculum for addressing these questions, other than a rather crass and superficial examination of how skill in math or science can lead to employment opportunities, higher salaries, and more

commodities. Teachers who try to provide a deeper response quickly realize that the explanation needed is too extensive to produce *ex tempore*. It needs to be built into the entire curriculum.

This is a human story. It is about us. All of us. It tells us about how humans have responded to various challenges, and about the consequences of their various discoveries, innovations, and decisions. The full account of this story, even in the most telegraphic outline form, takes time to tell. It also takes time to construct the explanation that formalized intellectual disciplines, languages, and cultures, are the very stuff that mind is made of. They are the matrices in which formal cognition is manifested. Without the language and the cultural icons and the disciplined ways of thinking and seeing, our cognition reverts to unreflective awareness. But with these disciplines, we gain control of our minds, we extend the range of ideas we are able to entertain, and we deepen our understanding of the world around us. New languages, new semiotic systems, new concepts, formulas, theories, ideas, or works of art are the substrate through which the mind gains extension (Hirst, 1973). We cannot expect students to be motivated to learn unless they have some deep prescience of the benefits that will obtain from such demanding work.

As we mentioned at the beginning of this article, one advantage classical liberal education enjoyed over our present set of specialized and disconnected offerings was a kind of historically based coherence. Mathematics, philosophy, ethics, literature, art and other disciplines resided within a kind of storyline generated by the history of two civilizations that had completed their life cycles long ago. It is that kind of coherence, adopted to modern conditions, that this project seeks to emulate.

We have located *Ourstory* as early as possible in the schooling process, in part because we doubt if high schools or universities can (or even should) attempt a similar approach. This project is an attempt to shift the framework and foundation of a liberal arts and sciences education down to the middle school level. If done successfully, it should become easier for high schools and universities to engage in the more specialized study characteristic of these institutions without students feeling the kind of disconnection that comes from studying an abstract discipline out of context and without adequate background. Typically, we do not lose the student halfway through the year; we lose her in the first few weeks, such that she never feels at home within the symbols and processes of the conceptual game, be it calculus, physics, or history. Understanding how a discipline began, how it evolved, and how its early pioneers came to cherish it is part of the human interface that helps to personalize the entry into one of these formalized cultural disciplines. If we can relive those moments, then we should also be able to acquire the excitement and interest that attended them.

The approach is not without its legitimate cautions and criticisms. It does entail, almost of necessity, a rather superficial treatment of the historical dimensions of any of the subject areas, including science. Matthews (1992) points out the typical pitfalls of lacing the teaching of science with quasi-history and pseudo-history to spice it up or to enhance interest. Such history tends to be bent to the pedago-

gical intent. It tends to be superficial. Our approach does not pretend to provide a comprehensive history of each discipline, or an exhaustive treatment of specific historical events. It seeks to provide students with an organizing framework that allows them to see formal disciplines as products of human activity and human society. Major advances in one domain of human learning will tend to produce effects in other domains. Not only do mathematics, science and technology interact, but advances in these disciplines have tended to produce new challenges, new purposes, and new ideas in arts and letters as well. Being able to see them as connected helps students acquire the conviction that a fuller understanding of the world will require some level of proficiency in each of the major domains of learning.

Finally, it should be stated that this curriculum is not intended to substitute the history of a subject for the subject itself. It does not replace physics with physics-for-poets. Emphatically, it is designed to produce enough interest and a clear enough initial orientation in each of these human enterprises that students will be attracted to them and want to participate in the benefits these disciplines historically have bestowed upon humankind. The intent is to produce support for a rigorous, demanding curriculum.

6. Summary

Every traditional society on earth has its epic tale. These complex narratives answer to fundamental human needs which have become generally ignored in the specialization and compartmentalization of our own advancing intellectual culture. Cognitive science suggests a mind very different from the one behaviorists subscribed to, a mechanism that seeks and makes patterns, that copes with detail by relating it to larger organizing structures, and that sees the external world through the lens of personal frameworks (Caine & Caine, 1991). The combined use of narrative knowledge structures and history as organizational schemata is beginning to look more respectable than at any time since the collapse of classical liberal education a century ago. We learn the various disciplines in school because they empower the human mind. This is nowhere seen more dramatically than in the historical record where the collective empowerment of humankind is writ large. Efficient new instruments for the human intellect contribute to the cycle of development, enabling new cultural expressions, which in turn empower the mind with additional bases of thought, hence Vygotsky's views about the co-evolution of mind and culture (Vygotsky, 1978; Wertsch, 1985, 1995). A cultural education does in a sense recapitulate this cycle of development within the individual (Egan, 1997, pp. 26–32). Narrative knowledge structures are present in the epic tale of traditional cultures; they aid memory and comprehension. They were present in the classical curriculum several generations ago for the same reason, and they should contribute to the curriculum of today.

Speaking at the Harvard tercentenary celebration early in the twentieth century, president James B. Conant said: 'The older educational discipline, whether we like it or not, was disrupted before any of us were born. It was based on the study of the classics and mathematics; it provided a common background which steadied the thinking of all educated men. We can not bring back this system even if we would, but we must find its modern equivalent' (McCord, 1936, p. 213). In this project, we are seeking a modest step in that direction.

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