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ABSTRACT

An argument is put forth for restructuring the community college curriculum around recurring constructs common to all disciplines. First, introductory comments review various perceptions of essential learning, offering support for the position of constructivists and proponents of writing across the curriculum that learning is an activity and a process, rather than a body of knowledge. Next, the role of writing in the learning process is discussed, suggesting that writing assignments in any course require students to make connections and construct meaning. After summarizing the constructivist view of learning and language acquisition and applying it to academic learning, the paper identifies two constructs that are common to all disciplines: perceiving differences and dividing, and perceiving similarities and connecting. Next, the relationship between writing and other constructs of thinking is examined, using examples provided by faculty attending a series of interdisciplinary writing seminars at Raritan Valley Community College. Additional examples of organizing perception and experience into coherent constructs through metaphor are provided, followed by a discussion of the implications of a constructivist approach for curricular change. (EJV)

USING WRITING TO INTEGRATE THE CURRICULUM: THE CONSTRUCTS AT THE CORE

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What learning is essential? The question is an ancient one, but its answer seems more important than ever as our knowledge explodes and fragments, as literacy and enrollment in the humanities decline, and as the qualifications necessary to a work force become harder to predict in a rapidly changing technological economy. The question perhaps has a special urgency on the community college level because of our dual commitment to career education and liberal arts. A new way of addressing the question may be emerging from the convergence of current research in two fields of study, from composition theory which looks at writing as a process of making meaning and from a constructivist theory of linguistics which looks at language as a medium that shapes thought.

Traditionally, essential learning has been defined in terms of a core of courses, including courses in the humanities and sciences, to encourage students to develop general knowledge as well as the specialized knowledge of their major fields. To us, to counter curricular incoherence and cultural literacy, Education Secretary William J. Bennet calls for "a clear vision of what is worth knowing and what is important in our heritage that all educated persons should know." (The Chronicle, p. A4)

Two books recently on the best seller list of The New York Times also help to define that traditional vision. In the Closing of the American Mind Allan Bloom wants to see the classic texts of western civilization restored to the heart of the curriculum. Essential learning, according to Bloom, is a knowledge of the democratic values that give western civilization and the college curriculum coherence, and that give education its pre-eminence in our society. E. D. Hirsch, Jr. in Cultural Literacy provides an index of facts which he considers essential learning for any college graduate. This traditional response, in turn, has created ideological disputes. Such views of curricular reform have become politicized and reformers labeled variously as elitist, relativistic, racist, sexist, or ethnocentric, depending on the nature of the texts considered essential to the core.

Learning, in all of these instances and ideological orientations, seems to be a body of knowledge, a collection of facts, a noun, and the learner a recipient of essential learning. In contrast, in the alternative perspective provided by the writing across the curriculum movement and constructivist theories about the nature of thought and language, learning can also be viewed as an activity, a process, no matter what the text or ideology. In the constructivist view the word learning is also a verb form, and the learner an active construer of meaning, especially the learner who writes frequently in all courses.

Writing Across the Curriculum and the Learning Process

Historically, the writing across the curriculum movement can be traced to the work of English theorist, James Britton, and to the London School Project, begun in 1971, which explored the relationship between thought and language in general and in the forms and purposes of language across the curriculum. The movement views writing as a process whereby we develop our ideas and discover what we think, rather than as a product, a transcription of what we already know.

Focusing on theories of composition, Janet Emig writes in "Writing as a Mode of Learning" in The Web of Meaning (1983), "Writing represents a unique form of learning--not merely special, but unique." (123) We know more after we write, than before. Writing is thus important in every course, not just in the province of the composition teacher.

To develop and support her thesis, Emig draws on the work of contemporary psychologists and on learning theorists; James Bruner, for example, A. R. Luria, Lev Vygotsky, John Dewey, George Kelly, Jean Piaget. As we write, we learn by doing: the hand is enactive; the writer is physiologically as well as intellectually engaged. As we write we also learn by seeing: we can view and review and revise the thinking made visible and manageable on the page. And as we write we are translating and organizing experience and sensory perception into the medium of language, a profoundly and uniquely human process of symbolization.

Focusing on a theory of language, Rutgers professor of linguistics, Dr. Wallis Reid (1987), in an unpublished paper elaborating the constructivist relation between language and thought, writes, "We discover what we think in attempting to express it." Language is not simply an audible and visible representation of inaudible and invisible thought. Rather, and most significantly, it is a "dynamic shaper of thought." Because of the very nature of language and because of its inherently organizing systems, students are actively engaged in making connections and constructing meaning whenever they write in any course, whether or not the written text is used for evaluation, whether or not the instructor even sees the text.

The Constructivist View of Learning and Language

In the constructivist view of human nature, such an active construing of meaning from experience characterizes human behavior from the moment of birth. The world for the infant is not a buzzing mass of confusion, but rather a series of stimuli that are systematically sorted into patterns. The brain is programmed with a language acquisition device that enables the infant to sort progressively the sounds of language into a meaningful system. As Noam Chomsky has pointed out, once the predictable, replicative system of transformational grammer is acquired, the human being is able to construct an unpredictable variety of meaningful sentences. The finite patterns are imitated, but are used to construct an infinite number of creative utterances.

The acquisition of language can serve as a paradigm for the nature of all learning. The human learner is programmed to sort experience into patterns that can be used to anticipate, predict, or control events. Jerome Bruner (1986) writes, "Language is (in Vygotsky's sense as in Dewey's) a way of sorting out one's thoughts about things. Thought is a mode of organizing perception and action." (72) George Kelly (1963) writes, "Man looks at his world through transparent patterns or templates which he creates and then attempts to fit over the realities of which the world is composed." (8-9) Kelly calls these patterns constructs.

Constructs may be personal or communal. Academic disciplines, academic theories, rhetorical forms, language itself, are all forms of communal constructs. Personal belief systems are examples of personal constructs. Ideologies are examples of large, subsuming construct systems. The use of any construct system, however, whether personal or communal, will always be an individual construing process, a kind of transaction between the individual construer and the outside world. The meaning of any event will therefore not be inherent, but construed, even at the point of perception.

The academic learning that is essential, according to the constructivist, is the acquisition and creative application of templates of intellectual inquiry in general, and specifically the acquisition and application of the templates which define particular disciplines. Instead of looking at learning as a compilation of discrete facts, learning becomes the mastery of patterns of thinking that can subsume larger and larger numbers of facts.

Bruner is eloquent:

> We have learned . . . that the arts of sensing and knowing consist in honoring our highly limited capacity for taking in and processing information. We honor that capacity by learning the methods of compacting vast ranges of experience in economical symbols - concepts, language, metaphor, myth, formulae. The price of failing at this art is either to be trapped in a confined world of experience or to be a victim of an overload of information. What a society does for its members, and what they could surely not achieve on their own in a lifetime, is to equip them with a ready means for entering a world of enormous potential complexity. It does all this by providing the means of simplification - most notably, a language and an ordering point of view to go with the language. (1966, 6-7)

What is essential, from Bruner's point of view, is that our students actively and consciously engage in utilizing the specialized language and efficient constructs of our disciplines, rather than simply memorize a mass of information.

Constructs at the Core of the Curriculum

The number of patterns operative at the core of the curriculum may well be finite, though their applications, like the applications of Chomsky's transformational grammar, may be infinite. There might be a unified field of core constructs.

Kelly helpfully identifies the nature of organizing systems of constructs pervasive in all thought. Constructs are dichotomous: they are bi-polar. He writes, "A construct is a way in which some things are construed as being alike and yet different from others." (111) A construct is a kind of sorting system, a reflection of one of the most basic processes of thinking: perceiving differences and dividing, perceiving similarities and connecting.

The dichotomy is familiar in descriptions of thinking. In Creativity (1976) Silvano Arieti writes,

> We have repeatedly seen that one of the mainstays of human cognition is the ability to associate similar things and then distinguish similarity from identity. (136)

According to Vygotsky in Thought and Language, (1962)

> In genuine concept formation it is equally important to unite and to separate. Synthesis must be combined with analysis. (76)

Similarly, James Moffett in Teaching the Universe of Discourse (1968) writes,

> Mental growth consists of two simultaneous progressions - toward differentiation and toward integration - we build our knowledge structure upward and downward at the same time. (79)

The constructs of splitting and joining are so fundamental to the workings of mind, that they must also be fundamental to thinking across the curriculum.

Writing and Constructs Across the Curriculum

This relationship between writing and core constructs of thinking became apparent in interdisciplinary writing seminars held at Raritan Valley Community College over a period of three years under the auspices of the Fund for the Improvement of Collegiate Education. As faculty shared writing assignments from their diverse courses, we could see underlying patterns of similarity: the ability to observe and infer is important in clinical nursing, in the chemistry lab and in the poetry workshop; classification is important in biology and sociology and in

organizing the data of an expository essay; perceiving hidden assumptions is important in political science and mach; narration learned in an English class might serve a case study in the psychology class or an ethnographic study in an anthropology class.

As faculty themselves wrote in the seminars, familiar patterns of thinking became visible and identifiable on the page. In an impromptu writing assignment, for example, faculty were asked to describe first a single object selected from a random collection of rocks, shells, pine cones, branches, and feathers, and then to describe a pair of disparate objects. In the descriptions of single objects, observations led to inferences. There was an inevitable polarity between what was signified and how it was significant, as well as an inevitable joining of perception and abstraction.

In the descriptions of paired disparate objects observations led to metaphor. A stone and a shell became juxtapositions of mountains and the sea. A feather and a forsythia branch became paradigms of nature's patterning. The pairing of objects led to the perception of significance and then mutuality, in spite of the apparent randomness of the pairing.

Such constructs of observation and pairing could be seen to have obvious and important applications across the curriculum, yet they are generally implicit in the curriculum, even hidden and overlooked in the need to cover the information of the course. In a paper delivered - the Ford Faculty Seminars at the University of Massachusetts in 1978, "Speculative Instruments: Language in the Core Curriculum," (1981) Ann E. Berthoff notes the pervasive role of observation, "Observation is

central to all disciplines: Learning to look and look again is learning to question." (116) For Berthoff, recognizing and applying the construct is part of the essential learning of the curriculum.

She cites T. R. Henn's lectures at Cambridge, collected under the title, The Apple and the Spectroscope, in which he emphasizes the similarity between observation in the biology lab and close analytical reading of a poem. Berthoff writes, "I have always advised English majors to minor in biology, if only because they need an understanding of organic structure as a way of understanding organic imagery."

Seeing relationships is thus essential within courses as well as between courses. In order to be integrative across the curriculum, the replication of such processes must be an explicit focus of instruction and an explicit stimulus to writing in diverse courses.

As critical as observation is in every course and to construing meaning, faculty members may be unaware of its role as a construct in their courses. In a project called Peer Perspectives Professor Sheila Tobias arranged to have master teachers present units of math or science to faculty colleagues expert in other disciplines. After a conventional demonstration in a science class, an accomplished colleague from the law school was compelled to ask, "What was I supposed to see?" Apparently, faculty need to focus explicity on the specialized ways they see as insiders to a discipline. Students, in turn, need explicit instruction in

the selective perception of a discipline as well as the challenge to perceive selectively in the process of construing meaning in that discipline.

In biology, Professor Roger Johnson had students randomly collect five samples of flowering plants. In class students had to compare them on the basis of six characteristics; color, for example, or leaf arrangement; make a diagnostic chart, and write a taxonomic key to two of the five species. His students were actually applying the constructs of seeing and sorting characteristic of biology. Similarly, in a music course, Dr. Roger Briscoe played excerpts of three different kinds of music; an African piece with soprano solo and drums, a Mozart symphony, and a bit of electronic music. Students had to identify common elements in the pieces and answer the question, "What is music?" In a maternity nursing class, students viewed a film called "Saturday's Children," showing the diverse experiences of five mothers giving birth. As preparation for their clinical experience on a maternity ward, Professor Helen Jones had her students respond to the film by writing about their perceptions of the diverse needs of each patient within the similar phases of the birth process.

In each instance, because they were writing as part of the course and because they were given the focus of a disciplinary construct based on similarities and differences, students were required to see and sort

in specialized ways. Thus, in each course, they were learning a specialized vocabulary and learning about ways of observing and sorting diverse data at the same time.

What is essential to the integration of the curriculum, however, is that students also see the interdisciplinary commonality of such patterns and the power of such patterns in the construction of meaning. It is a commonality that can help make explicit the metadiscipline of language pervasive in all thought.

In the fifth week of the ten-week FICE seminars Raritan Valley College faculty were asked to respond extemporaneously to the topic, "Describe a problem in your discipline and the way you help students solve it." Roger Johnson, professor of biology, wrote the following response in a ten-minute free writing:

> A problem in uderstanding Ecology is to be able to view nature as a system of many interacting, often interdependent parts. Like economics, there are many variables possibly contributing to the outcome, and a manipulation of one component often has almost unforseen repercussions. To help students understand and view the population of a forest as a system, we construct flow diagrams or component models showing the parts and the influences of one on others. One assignment I give students is a written population study of red grouse. From this we draw a picture which includes each of the various factors which are influential on the population - such as food supply, predators, climate and behaviors like dominance, age, structure, clutch size. Then we draw arrows between these factors to show positive or negative effects, thus emphasizing interactions as well as structures. I have tried this myself in preparation for teaching, from an article about the effects of medical technologies on society. The article described so many compounding and far-reaching effects of even one technology that I found drawing a picture to be very helpful.

In this ten-minute piece professor Johnson has described a construct and a methodology that have applications across the curriculum.

The altering of a single variable has far-reaching effects in many contexts. In economics, students can trace the ramifications of an increase in the price of oil and can classify the effects in terms of different regions of the United States. Not only would students be learning about the effects of a single variable on the economy, but also about the relationship between geography and commerce. In sociology, students could trace the ramifications of a single variable on the life of the elderly; like deafness, for example, and in the process learn how intricate is the social network and the place of every individual within it. What is essential to learning in Roger Johnson's text is not just the facts his students will learn about red grouse, but what they will learn about the delicate balance of our environment and also what they will learn about thinking. What is essential is a generalizable construct.

A second resonant aspect to Professor Johnson's text is his use of a flow chart and the juxtaposition of opposites; positive and negative effects, and interactions and structures, to help him and his students visualize and organize a concept. In "Speculative Instruments: Language in the Core Curriculum," Ann Berthoff recommends using images and oppositions to help students develop concepts:

> A sketch of a cotton dress with two columns underneath provides a structure to help organize the facts about the perspectives of the Africans and the British colonists. The cotton dress is seen on one hand as symbolic of one crop economy, a foolish and oppressive , morality, a patronizing and manipulative attitude, and just plain irrational; on the other hand, from the point of view of the British, it stands for freedom from subsistence farming, enlightenment, and the civilization of heathen tribes. (1981, 125)

Again, pairing is essential. The imagery and oppositions compel abstract thinking and so Berthoff calls them "speculative instruments." They may also be called constructs since they enable students to construe meaning.

Visualization and dialectic are as important to the poet and novelist as to the scientist. Crick and Watson relied as much on their copper wire model as on intricate chemical formulas to understand the double helix structure of DNA. Whether students create them or write in response to them, flow charts and models can help learning in math, data processing, even in a study of the intricacies of A Midsummer Night's Dream. In all instances, what students are learning is not simply content, but cross-disciplinary constructs that help them construe meaning from content and that need to be reinforced explicitly as students cross and mix apparently discrete disciplines.

Constructs and Metaphor

One of the most notable ways language effects the organization of perception and experience into coherent constructs is through metaphor, defined by Lakoff and Johnson in Metaphors We Live by as a "systematicity that allows us to comprehend one aspect of a concept in terms of another." (1980, p. 10) Metaphor is one way we can make sense of a new experience in terms of a known gestalt, most usually an experiential

gestalt. Jerome Bruner (1986) cites the metaphoric connection Neils Bohr noted between an experience he had with his son and a scientific eureka:

> The idea of complimentarity in quantum theory, he said, came to him as he thought of the impossibility of considering his son simultaneously in the light of love and in the light of justice, the son just having voluntarily confessed that he had stolen a pipe from a local shop. His brooding set him thinking about the vases and the faces in the trick figure-ground pictures: you can see only one set at a time. An then the impossibility of thinking simultaneously about the position and the velocity of a particle occurred to him. (51)

There is a metaphoric mutuality between the pattern Bohr perceived in his personal life and in thinking about physics. The transition was provided by the imagery and dialectic of the figure-ground illusion. The illusion was so conveniently empty of either existential or scientific resonance, it could subsume either.

In an introductory chemistry class, Dr. Paul Schueler reinforced the metaphorical nature of Le Chatelier's Principle by having students relate it to personal experience. Ironically, it mirrors Roger Johnson's ecological construct. The principle reads, "When a system in a state of dynamic equilibrium is disturbed by some outside influence that upsets the equilibrium, the system responds by undergoing a change in direction that reduces the disturbance and, if possible, brings the system back to equilibrium." Students were to write about some experience or phenomenon that either adhered to Le Chatelier's Principle or that demonstrated behavior opposite to it. By applying the principle alternatively to experience and to chemistry, students were learning about themselves, were learning about chemistry, and were learning about metaphor as a fundamental way of thinking in science as well as in literature.

The explication and application of constructs in writing across the curriculum does not replace an emphasis on content, but does suggest a way of teaching content. In fact the constructivist approach is very much in the spirit of both Hirsch and Bloom. Hirsch does not intend his controversial index to be utilized as an inventory of discrete and unrelated facts, but rather as "schema" that can help organize knowledge and understanding. (51-56)

Similarly, Bloom describes the knowledge that comes from reading classic texts as forms of organizing constructs. It is important for students to know the works of Descartes and Pascal, not as ends in and of themselves, but as a means of juxtaposing and construing opposing modes of thought. He writes,

> On my last trip to France I heard a waiter call one of his fellow waiters "a Cartesian." It was not pretentiousness; he was just referring to what was for him a type. It is not so much that the French get principles from these sources; rather they produce a cast of mind. Descartes and Pascal represent a choice between reason and revelation, science and piety, the choice from which everything else follows. (52)

In this perspective Descartes and Pascal are not being viewed as historical figures to be readily identified in a test of cultural literacy. Instead, they are viewed as metaphors for helping us construe our vision of the world.

A constructivist approach can accommodate ideological approaches to texts as well as traditional approaches. A single text, like Measure for Measure, for example, could be read from a Marxist, Freudian, feminist, and traditional perspective; in each case the basis of the construct

would be a different point of polarization; whether between rulers and ruled, latent and manifest sexual consciousness, masculine and feminist orientations, the clash between tragic and comic conventions; and supporting details in the play would be perceived selectively and accordingly. Not that the constructivist approach would have to be relativistic, but rather that in making value judgments, students have to be clear about constitutive assumptions and methodologies.

Implications for Curricular Change

Rethinking the curriculum in terms of recurrent constructs has implications for individual faculty members, for curriculum committees, and for administrators as well as students. It assumes that writing will be pervasive all courses, that faculty will be given opportunities mutually to structure individual courses in terms of sequences of constructs that have interdisciplinary applications, and that administrators will provide the means for faculty to develop interdisciplinary courses around sets of constructs. Writing seminars for faculty, the New Jersey Master Teacher Program, and Sheila Tobias's Peer Perspectives Project, are all practical ways to begin the dialogue.

In her writing journal Professor of Secretarial Science, Dr. Carol K. Mauermeyer, describes this rethinking process:

> I tried a writing assignment with my students last week. It occurred to me then as it occurs to me after reading Dr. Emig's article, that the quality of teacher prepared assignment - question, problem, etc. - will set the tone for the level of response received from the student. That is to say, if I give

> the student something to respond to which only requires that the student answer with a low-level response, then I am really not doing anything to encourage or to help develop higher cognitive functions for that student...Should my writing assignments be structured and planned so that I make sure that I move from the simple to the complex? Do I ask simpler questions in the beginning and then move up to comparison and contrast/analysis, and then evaluation? To me, this sounds correct, but it requires a great deal of thought on my part (as the teacher) with the learning objective set for my students clearly in mind.

The reform and integration of the curriculum will begin with faculty members thinking of their courses in terms of the sequences of intellectual operations required of their students as well in terms of the conceptual sequences of material that must be covered.

Thus, in biology, by mid-semester, Roger Johnson's students had to sort a collection of thirty branches into a series of dichotomous groups of ever-decreasing numbers, until they were left with thirty groups containing only one branch representative of a unique constellation of attributes. In music, by mid-semester, Roger Briscoe's students had to be able to hear forms of ever-increasing complexity, from sounds to fugues, from sonatas to symphonies, and in the process had to develop ways of answering the question, "What constitutes 'good' music?"

The learning that is essential then is the explicit structuring and hierarchical restructuring of patterns that help students make sense of and organize the information of a discipline. What is essential for learning is a continuous reshaping of our own thinking as well as the thinking of our students. Such a re-forming of the curriculum will come from a recognition of the forms of thinking that bond us, in spite of the diversity of our individual

disciplines, and from a respect for the heuristic effects of writing. At the core of the curriculum is first an intellectual integrity, the operations of mind mirrored and enabled by the transformations of language, and secondly the existential integrity of individual students as they integrate the meaning of the curriculum with the meaning of their lives.

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