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Structures That Teach: Using a Semiotic Framework to Study the Environmental Messages of Learning Settings

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ABSTRACT

Everything within the learning setting holds the potential for learning and teaching. A significant, often overlooked source for accessing new information lies in the learner's knowledge and use of cultural values, habits and norms. In addition to listening and reading texts, learning takes place through daily interaction with building and communication structures. These structures are representations of cultural values that are read by all who inhabit learning settings. They are structures that teach. The messages of these structures remain with students long after they leave learning settings. Like language, knowledge of culture serves as an everyday and ever-ready resource for information about how to gather and share knowledge and ideas about how learning proceeds. This article describes the value of documenting some of the environmental messages of these structures using a semiotic interpretive research approach. Semiotics explores the signs and systems of signification that are used to engage learners. Messages are organized and expanded using four main categories: 1) Architectural Messages; 2) Text and Curriculum Messages; 3) Social/Behavioral Messages and 4) Policy Messages. The study suggests that a semiotic consideration of learning settings allows identification and critique of ineffective environmental messages and suggests the creation of messages that will lead to more effective knowledge, habits and routines.

INTRODUCTION

As Cunningham (2002) notes, "The school environment can have a dramatic effect on the educational process; however, this reality often is overlooked" (p. 1). Recent attempts to make better use of buildings as learning tools have seen the incorporation of educational concepts into institutional building design, structures and outdoor spaces. In this way, buildings become learning tools (Bingler, 1995). Taylor (2003) calls this seeing buildings as "three-dimensional textbooks," where "built and natural environments reveal the ideas, laws and principles which we presently are trying to teach children from textbooks" (p.1). In the Alberta Energy program, *Energy Sleuth*, for example, students examine energy education principles using the material structures of the physical learning setting to understand and develop the concepts, energy and heat (Shapiro-Zimnicki, 1989). With this knowledge, students then become energy loss activists. They track down heat loss and energy waste in learning environments and share their findings with fellow students and teachers. Buildings might be used in a unit on the topic, sound through featuring the sound barrier qualities of walls in the study of acoustical principles. Or students may examine the interrelationships between plants and animals by investigating schoolyard ecology. In these examples, the physical features of learning environments function as a form of curriculum *text* to build and enhance concepts, skills and attitudes. The term *text* used in this way refers not to the printed pages of a book, but to potential readings of the interwoven sets of messages that are read as cultural rules about how communication and learning will proceed. A building's architectural design, its physical structures, and the activities within the learning setting are also representations of cultural and social features that constitute other kinds of *structures that teach*. These structures embody values that reflect the goals, ideals and aspirations of the culture that provide rules for the design of the learning setting. They are also read as text forms by all who inhabit and visit learning communities, primarily administrators, teachers, parents and students.

CULTURAL/SOCIAL STRUCTURES THAT TEACH

Everything within the learning setting holds the potential for learning and teaching. A significant, often overlooked, resource is the ordinary, everyday experience of interacting with the building and communication structures available in learning settings. These structures offer representations of cultural values that remain with students long after their learning experiences. As with language, knowledge of one's culture serves as an everyday and ever ready resource for ideas and actions. We employ this knowledge daily as we learn from and communicate with one another. When educators begin to view everyday cultural practices as learning resources, they can engage in critical reflection on the ideas and messages they convey. In Danesi's (1994) view, the everyday factual world is one that we inherit because we all possess a body and a perceptual system, in other words, the equipment needed to process everyday culture. He writes that the artifactual world is not inherited, "but is transmitted in some culturally-specific context and form that is regarded as communal knowledge. This world undergirds commonsense" (p. 14). Williams (2000) refers to this everyday knowledge as "ordinary culture."

Ordinary culture has two aspects, the known meanings and directions which

its members are trained to; the new observations and meanings which are offered and tested. These are the ordinary processes of human societies and human minds, and we see through them the nature of a culture: that it is always both traditional and creative; that it is both the most ordinary common meanings and the finest individual meanings. (p. 33)

Learning environments are appropriate settings for identifying structures that convey the messages of "ordinary culture" and "communal knowledge." These structures are read as texts that teach ways of valuing the environment and sustainable practices. This article examines the potential of semiotics to uncover features of some of the everyday cultural and social communication structures that speak messages about the environment and the development of sustainable habits and practices. A semiotic interpretive approach allows us to critique the ways cultural structures help teach environmental ideas and values. Deepening understanding of the nature of these structures can make a valuable contribution in the design of teacher education and professional development programs.

SEMIOTICS AS AN APPROACH IN THE CRITICAL STUDY OF THE ENVIRONMENTAL MESSAGES OF LEARNING SETTINGS

Semiotics is a particularly useful synthesis of several social science approaches that study social meanings and social action. Semiotics began as *semiology* in Europe through the work of Swiss linguist Ferdinand de Saussure (1857-1913). Saussure (1959) viewed language as a system of signs. Words are not viewed in isolation. They obtain their meanings relative to their placement in a larger system, the language of a culture. His foundational work is referred to as formal semiotics and focuses on language as part of a sign system. During Saussure's lifetime, American philosopher, Charles Sanders Peirce (1839-1914) built a theory of communication and signification. Pierce's (1931, 1985) interests were not limited to linguistic signs. He examined a wide range of sign forms comprising human communication. He also studied non-human communication systems. Modern anthropology and the ecological approach to the study of mind developed by Gregory Bateson (1972) also serve as foundational resources for studies in social semiotics. Social semiotics goes beyond formal semiotics to study how human beings use signs to construct the life of a community. Social semioticians examine how signs and sign systems are used as codes to communicate in a particular society or culture. One of the major purposes of social semiotics has been to unite the study of human behavior with the study of society.

This purpose fits well with one of the chief goals of education, to enhance the capacity of learners as interpreters of signs within their own culture, and also to enhance their skills as creators and users of signs and sign systems. Understanding the complex ways that we use these sign and symbol systems provides deep insight into the ways that we help learners become both sign consumers and sign users. Semiotic interpretive studies hold the potential to more deeply inform and guide readings of messages about the environment in learning settings and to also help learners conceptualize and act in new and more effective ways.

Semiotics uses the term sign to mean a cultural unit. In the semiotic view, the sign is regarded as the smallest unit of meaning, and refers to something that stands for something else. For example, as a sign, the color green in certain cultural settings is a sign that it is all right to go forward. In western culture, to "be green"

indicates an attempt to be ecologically aware or environmentally conscious. Waving one's hand in one context means goodbye, in another, it is an indication of a desire to speak. A key insight of semiotics is that signs, sign systems and their meanings involve the constant correlation of content and expression through everyday communication. A semiotic analysis of a learning setting focuses on signs as they exist within *communication processes as structures that teach* in learning settings rather than a sole focus on individual linguistic forms. Although semiotics has been largely uninterpreted for educational practice, there have been a few studies that consider sign and signification systems in educational settings (Ball, 1990; Berbekar, 1989; Bernstein,1972; Bowers, 1990; Crenshaw, 1991; Golder & Gerber, 1990; Halliday & Martin, 1993; Lemke, 1990; McLaren, 1986; Siegel, 1989).

AN EXAMPLE SEMIOTIC READING OF "ACTIVITY STRUCTURE" AS TEXT IN A LEARNING SETTING

Cultural views and values are embodied in the physical structures of buildings designed for learning and they are also present in the "unwritten rules" of classroom communication and behavior. Lemke (1990) suggests that cultural views and values are available for study in two ways: 1) through *activity structures* that portray sequences of actions and expected behavior in learning settings, and 2) through an examination of the *functions* of these patterns of actions (p. 49).

We can see an example of *activity structure* through the examination of discourse in learning settings. Discourse, as conceptualized by Foucault (1970) organizes human experience and, thereby generates a particular way of thinking about the world. Discourse is conceptualized in this way as a social resource, offering the means to explore the function of the learning setting as a communication system more directly – both as it is socially defined and as the result of historical forces. Through examining discourse, we see what rules are followed to generate new understandings and what kind of knowledge can be generated. Discourse analysis can also be used to enable the critical examination of what might be the acceptable roles of educators and learners and the behaviors that best define and support these roles. In semiotics, communication structures act as signs and form signification systems. These systems and their functions are read by participants as *texts* that reveal messages of how learning proceeds

The following example of semiotic analysis example provides a learning setting context for identifying and exploring the nature of an activity structure typically seen and read in the high school setting. Linnea, a grade eleven biology teacher is working with her grade eleven (ages 16-17) class:

Linnea: So we are planning our trip to Cougar Lakes to work with our Stream Ecology lab unit next week. How many do not yet have in their permission form?

[Several students raise their hands]

Linnea: Ok, we need to get those in tomorrow… at the latest, ok?

So, this question of leaf litter in the streams. We read about this, and that this, this item, this concept is often not taken into account in studies of… the stream, of stream ecology. Is this a good thing or does it just clog things up

or what?

[Several students raise their hands]

Linnea: Lee?

Marc: Well, I think we talked about it being important to all kinds of life in the stream and to photosynthesis.

Linnea: All right, you have two ideas here. Life in the stream and photosynthesis. Let's start with life in the stream. Who will track, or outline what this is all about.

[Anoo raises her hand]

Linnea: No one else? Anoo?

Anoo: Well, the leaves and some insects and probably some materials from, um birds lands in the stream. I guess any pollution that might be in the area also, like chemicals and such… The leaves and materials decay. They produce things, like materials, that the animals living in the stream need, like fish and some of the other insects there… well also frogs and any salamanders that might live there too.

Linnea: Good, good. Well done, well said. And so what do we call these materials that you say are produced?

David: Litter? Like leaf litter and other litter?

Linnea: Try to speak a little louder, please. He said leaf litter. Well, yes. But at a finer level, we want to refer to these materials, the ones that are useful as nutrients. They are substances that are both biotic, parts of organisms and abiotic. So what happens with these nutrients, well first of all, what are the names of some of these nutrients?

[Several students raise their hands]

Dawn: Carbon, nitrogen, carbon dioxide, I guess, and we said some sugars.

Linnea: And what happens with these nutrients that are being dispersed in the stream from the leaf litter and other materials?

[Several students raise their hands]

Marc?

Marc: The plants that are in the water use them for photosynthesis, and most are recycled.

Linnea: You got it. Cycling and recycling. Nutrient recycling. And that is what we are going to get a chance to test for and see next week.

Viewed semiotically, we can see a pattern of communication and interaction here that acts as a sign or form of text for students, *a structure that teaches* about the concepts being learned. The structure teaches also about how learning discourse proceeds in the learning setting and what the rules are – who will speak and when, who will ask the questions, and who will provide the answers. A general pattern structure, typically offered as good teaching procedure is analyzed adapting

a framework described by Lemke (1990, p. 52) and elaborated in this example as the following:

- Teacher asks question
- Students bid to respond (Hand sign)
- Teacher nominates a student to respond
- Student responds
- Teacher evaluates student response as correct, incorrect or partially correct
- Student elaborates, or
- Cycle repeats

In this typical lesson discourse, we see at pattern of interaction that creates expectations and sets rules for the ways that classroom conversation takes place in environmental learning, in this case, but is typical of learning in many subject areas:

- The teacher begins the conversation
- She waits for students to raise their hands, a sign that they wish to contribute
- The teacher calls on students individually or asks another question designed to focus the discussion.

While this patterned interaction shows students what to expect in the classroom, it is the teacher who holds power and control in the setting. As a ritual of interaction, a critical analysis of this culturally created structure may at times reveal messages that we do not want students to embrace and which we may wish to disrupt. While content knowledge is reinforced, and this is the function and purpose of the lesson, students may in fact be learning that they do not have significant ideas of their own to contribute. In this lesson structure, learners do not learn to conceptualize questions of their own. These messages may be disrupted when new or different activity structures are employed. New messages about how learning will proceed become available as *text*, for example, when learners are guided to design problem questions based on personal research interests or observations or in guided inquiry. When learners engage in their own research, or in projects that involve them in action to improve the environment, lesson activity structure speaks a different message about the way that learning proceeds in environmental learning settings.

LEARNING STRUCTURES AS A RESOURCE FOR PLANNING IN TEACHER EDUCATION

In the semiotic study of science learning (Shapiro, 1996; Shapiro & Kirby,1998), a taxonomy of the nature and types of message features was developed to document the types and nature of some of the messages of science in science learning and teaching. Semiotic analyses of features of learning settings have been shared with practicing teachers and student teachers to help them consider the ways that the ways we use language, signs and sign systems speak a message about how our culture view and values science and scientific knowledge. Discussions with teachers lead to considerations of how these features of everyday cultural knowledge might be used more explicitly as messages to build learner understandings. The research has inspired semiotic investigations to consider the ways learning settings speak messages about use and care of the environment. We

have undertaken a systematic study to observe and document the messages of science learning settings. The primary categories used in that work have been used to examine, consider and organize some of the messages and activity structures when considering the environmental messages of learning (Shapiro & Kirby, 1998, pp. 230-231). These are:

- Architectural Messages
- Text and Curriculum Messages
- Social/Behavioral Messages
- Policy Messages

A wide range of formal and informal learning settings have been visited to observe and document the environmental messages of learning settings. Graduate students, practicing teachers and student teachers have helped gather observational and digital data and have engaged in discussions relating to observations and documentation. These discussions have allowed us to begin to expand the primary categories to consider the environmental messages presented and read in learning settings. Currently in use as a resource for conversation, these categories are used to engage practicing educators and student teachers in discussions about the nature and types of environmental messages in learning settings.

Table 1. Considering the Types of Environmental Messages in Learning Settings

ARCHITECTURAL MESSAGES
Reading the School Building
The physical setting of the building/placement in the community
Entrances to the building(s)
Architectural features – artistic/purposeful
Structure of the building/organization of rooms and furniture within the setting
Existence of designated spaces for environmental learning
Classroom Messages
Messages of interest in, concern and action for the environment on classroom walls, bulletin boards, other spaces
Furniture arrangements, seating
Arrangements for learning about the environment – natural materials, tables, displays, facilities
Images of learners studying the environment

TEXT AND CURRICULUM MESSAGES
Resources for teaching about environmental education
Images of the environment/methods available for study/images of those who study the environment professionally
Portrayals of environment as subject matter content/activities of environmental researchers
Science/environment/technology connections

SOCIAL/BEHAVIORAL MESSAGES
Activity Structures/Rituals of Social Interaction
Rules of conduct/rituals of interaction and behavior
Invitations to those outside the community, parents, speakers and others

Organization of environment/furniture, etc. to support connection and communication
Teaching Approaches
Teaching strategies that guide learning behaviors
Lecture, Problem solving, Action learning, Activism
Teacher enthusiasm for the topic
Environmental fairs/home projects
Relative priority given to environmental education
Opportunities for student inquiry/research
Involvement of parents
Opportunities for out of classroom activities

POLICY MESSAGES
School Administration
Timetabling – amount of time devoted to environmental/sustainability topics
Nature of change to environment/ecological leadership in the school
Library resources available
Emphasis on acquisition of environmental resources
Library displays
Extra to classroom experiences – environmental clubs, activities, field studies, tree planting days, school-wide environmental or science programs, special speakers
Financial resources allotted to environmental education
Generalist or specialist teaching emphasis
Collaboration among teachers
Physical Use of School Facilities
Special environmental resources distribution area
Special rooms or outdoor spaces set aside for environmental education
District
Support for environmental consultancy role
District resource centre for educators
Nation/Province/State
View of the importance of environmental education in the curriculum
Amount of time officially allotted to environmental education
Existence of a program of studies devoted to environmental learning
Testing practices/standards of achievement related to environmental learning
Community Involvement
Community involvement/Parent groups/support
Corporate sponsorship
Media involvement
Opportunities for criticism
Activism

The architectural and physical features of learning settings *teach*, as representations of cultural values and understandings that remain with students long after they have left the educational experience. Yet the potential of these features is often overlooked as a resource for learning and teaching. Helping educators and teachers in preparation view learning settings semiotically, is an excellent way to demonstrate the value of organizing opportunities to use signs, language and activity structures as resources for learning. As systems of signification, they are an important means through which learners access cultural knowledge and values. When teachers master the signs and

symbols of our culture and become aware of those of others, they know when to break the unspoken rules to become inventive in using new approaches in interaction. The learning setting itself is an embodiment and expression of a culture's views of right forms of action and values. Learning settings are created to produce and perpetuate these ideas and values. Values relating to the use of time, for example, are spoken through the amount of time allocated to the study of a particular subject by administration. The allocation of time speaks a message to both teachers and learners about the value placed on a subject of study (Shapiro, Richards, Ross and Kendall-Knitter, 1999). It is therefore worthwhile to look closely at sets of signification systems as structures that teach and ask questions about the values embedded in learning settings and how they impact learners. In another example, we might consider, at what kind of disadvantage are learners who do not share the same cultural communication code as the dominant population in a school? How can we usefully infuse our approaches to communication in learning settings to create messages of positive value about the environment and the importance of including all students in the conversation to be learned along with the cultural codes of behavior and interaction in a learning setting?

IDENTIFYING ENVIRONMENTAL THE VALUES REPRESENTED IN LEARNING STRUCTURES

In research on learning settings, the focus of many studies is based on the following question: "How are teachers and students working together in learning communities towards the acquisition of knowledge?" A semiotic interpretation of events examines learning and teaching with a different question: "How are teachers and students working together in learning communities representative of the values and activities of the larger culture?" Learning settings are created for the purpose of reproducing cultural values and norms. They are also examples of the values and cultural constructs of the social group that created them. A building's physical structure and the cultural organization of learning activities represent these values. These values and beliefs are embodied in the artifactual world of the learning setting. Ayers (2001) writes:

> A large part of the work of teaching is constructing the laboratory for learning: It must be sufficiently broad and varied to challenge a range of interests and abilities, and yet focused enough to offer students some coherent rhythms and goals. The learning environment is a complex living reflection of a teacher's values. (p. 48)

These physical structures and cultural approaches to the organization of social values are used by teachers as resources to create opportunities for learning. Learning settings are particularly fruitful environments for developing, through thoughtful readings of the activities there, appreciative (Watkins & Mohr, 2001) and critical perspectives (Bernstein, 1972; Lemke, 1987, 1990) on the values and intentions of the larger culture. Bauer (2006) suggests that at its foundation, all of environmental education should be moral/ethical. There are wide-ranging and contested views about how to approach environmental education, and in education generally, that raise important questions about *which* ideas and values *are* represented and which ideas and values *should* be represented is highly contested (Corrigan & Dillon, 2007; Jickling, 1992; Palmer, 1998). Rokeach (1976) was one of the first to lay a useful foundation to

consider the values of environmental learning. He presented a set of "Instrumental Values" or states of being that "contribute to a life ethic of positive moral value" (Table 2). These values were reviewed and expanded upon by Caduto, in his UNESCO commissioned review of human values relating to environmental education, an international study commissioned in 1985. Caduto proposed adding several additional "Terminal Values," shown on the right side of Table 2. These ideas can serve as a starting point to consider, through semiotic analysis, values that underlie the messages of environmental learning settings, and where the actions of people are supportive of the long term ecological health of the Earth.

Table 2. An Historical Review of Efforts to Identify Human Values of Importance in Environmental Education

Acts or States of Being that Contribute to a "Life Ethic of Positive Moral Value" Rokeach* (1976) p. 92, with additions by Caduto (1985) p. 33**

Instrumental values	*Terminal values*
Love: For people	A world at peace
For earth*	
	National security
Generosity*	Family security
Sharing*	Freedom for all people
Honesty	Equality
Ecologically positive behavior	Fraternity*
Responsibility	Moral courage*
Self reflectiveness*	Self respect
Cross-cultural empathy and concern*	Mature love
Forgiveness	Inner harmony
True friendship	Wisdom
Cheerfulness	A world of beauty
Helpfulness	Community support*
Politeness	
Tolerance*	A balanced global ecosystem**
Kindness*	
Sacrifice*	
Self-discipline*	
Literacy*	An egalitarian world order*

Fien (1993) also noted that an important feature of the critique of curriculum research is the "acknowledgement of multiple discourses and contestation over the nature and meaning of educational activities" (p. 15). Perhaps this contestation is at its height in the field of environmental education where, as noted by Thomashow (2002), "…in a field as wide-ranging as environmental studies, there will always

be curricular debates about the most important content, or what is often referred to as the 'knowledge base' of environmental studies" (p. 182). Classroom design structures, both physical and social are the embodiment of social values. They impact students, teachers and communities as important *structures that teach*. Using the resources presented in Tables 1 and 2 and the central ideas of this article, I engage student teachers in semiotic interpretive readings of learning to help them understand how cultural values and perspectives on the environment are represented through curriculum, school and community messages. The purpose is to help student teachers become wide-awake to the understanding that educators reproduce these messages as part of their knowledge of the cultural code. With this knowledge, they may see the value of disrupting structures that do not serve to help build important values that will help to address the current environmental crisis.

CONCLUDING REMARKS

Viewing learning settings using a semiotic lens helps us to consider the questions, "How are the messages representative of recurring patterns in a our culture's production of human meaning?" and "What messages must we, in light of current environmental challenges, rethink and perhaps disrupt?" The ways that students are impacted by these culturally constructed structures depend on social and personal developmental influences that are both internal and external (ACNielsen, 2004; Eco, 1976; Taylor, 2003; Yarbrough, 2001). Learners are consumers of sign and symbol systems. They are also symbol users. One of the larger goals of education is to enhance the capacity of learners as sign interpreters. Another goal is to help them learn to be creators and users of sign systems. Understanding the complex ways that we use these sign and symbol systems provides powerful insight into how we communicate with learners in environmental education settings. The intention of this work is to provide resources to help educators consider new ways of conveying positive environmental messages, and thereby, new ways of *inhabiting* learning environments to embrace new and more positive environmental behaviors and actions.

Helping educators gain insight into a semiotic consideration of learning settings offers them a powerful resource for identifying and critiquing the kinds of messages that currently exist. They may also then learn to conceptualize and build structures that teach new habits and routines that inspire responsible actions that help heal the planet and improve the well-being of all who inhabit the Earth.

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