

JEFF BEZEMER & GUNTHER KRESS:  
*Changing Text: A Social Semiotic Analysis of Textbooks*

SUZANNE LUNDVALL & NINITHA MAIVORSBOTTER:  
*Aesthetic aspects in meaning making - an explorative  
study of dance education in a PETE programme*

KRISTEN SNYDER, LUISA PANICHI & OLA LINDBERG:  
*On the issue of quality of experience in technology  
supported learning*

JACOB DAVIDSEN & MARIANNE GEORGEN  
*ICT as a tool for collaboration in the classroom –  
challenges and lessons learned*

CARMEN DANIELA MAIER:  
*Fostering environmental knowledge and action through  
online learning resources*

*Fredrik Lindstrand:*

INTERVIEW WITH THEO VAN LEEUWEN

# DESIGNS FOR LEARNING #1-2/10

# Fostering environmental knowledge and action through online learning resources

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*In order to secure understanding of environmental issues, to promote behavioral change and to encourage environmental action, more and more educational practices support and provide environmental programs. This article explores the design of online learning resources created for teachers and students by the GreenLearning environmental education program. The topic is approached from a social semiotic perspective. I conduct a multimodal analysis of the knowledge processes and the knowledge selection types that characterize the GreenLearning environmental education program and its online discourse. The multimodal analysis aims at identifying what types of knowledge and knowledge processes are communicated. The impact of knowledge processes upon the transformation of learning's forms and purposes, students' roles and environment's function is then examined. The analysis also aims to show how the new learning design addresses the expertise of multiliterate students allowing for diverse forms of engagement and interaction when fostering environmental knowledge and action.*

## INTRODUCTION

Although during the last decade, there have been integrated many programs related to environmental issues and sustainability in a wide range of curricular contexts, relatively few research investigations have focused on the complex aspects of environmental education. Rickinson (2006) considers that “we need to think carefully not only about ‘the what’ (i.e. foci and outcomes), but also about ‘the how’ (i.e. processes) of environmental learning” (p. 448). Similarly, Rickinson and Lundholm (2008) highlight that “insufficient attention has been given to questions of learners and learning” in environmental learning research (p. 341).

In my present exploratory study, I contribute to environmental learning research by focusing on the design of online learning resources created for teachers and students, specifically those created by *GreenLearning* which is a Canadian environmental education program. By using these learning resources, teachers are supposed to help their students “participate in their own learning while gaining a more holistic and hopeful understanding of today’s complex energy and environmental issues” (*GreenLearning* website, 2010). In this article, I analyze only one *GreenLearning* activity, namely the production of eCards, which are meant to assist students “share their knowledge and express

their opinions to others outside the classroom in an online environment” (*GreenLearning* website, 2010). In the course of this learning activity, the students are supposed to research in detail specific environmental topics, write and design an eCard, multimodally and send it to a friend, family member or decision maker. Figure 1, illustrates the way in which the students can proceed when creating an eCard.

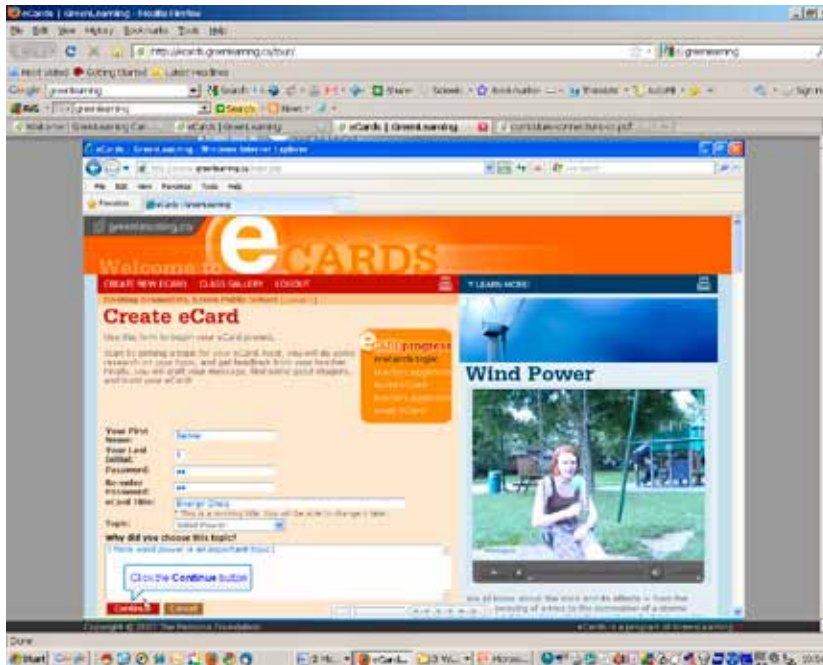


Figure 1. Screen capture from the beginning of the eCards video tour.

While engaged in these learning activities, the students interact in specific ways with each other, with teachers, with members of larger communities and with the environment. They have online access to a wide range of multimodal texts: articles with statistics, diagrams, maps, and photos, quizzes, interactive learning devices, video diaries, teachers' PDF files, fact sheets, e-mails, and success stories. I have chosen to investigate this *GreenLearning* activity because it obviously addresses and solves “the dual challenge of the need for individuals, institutions and communities to engage with environmental education and for the environmental education and learning itself to be engaging” (Stevenson & Dillon, 2010, p. 3). The creation of these eCards represents an important learning activity because, according to the teachers' materials available on the GreenLearning website, it provides an opportunity for cross-curricular learning: geography, social studies, science, language and arts. ECards also represent an effective tool for environmental learning because the stu-

dents are familiarized in depth with various topics such as climate change, solar energy, wind power, nuclear power, oil and gas, air quality, energy success stories, arctic glaciers, and so on. However, more important than the cross curricular learning opportunities, the relevant choice of environmental topics and the resulting product, is the interplay and effects of knowledge selection types and processes that are involved in this learning activity and in its recontextualization. Therefore, understanding how the students design knowledge in the course of this environmental learning activity is the first goal of my multimodal analysis. This understanding entails an exploration of the available learning materials from *GreenLearning* website as regards identifying the knowledge-making actions that the students are supposed to be engaged in while creating the eCards. The second goal is related to identifying what and how knowledge about this pedagogical practice is selected when recontextualized in the pedagogical discourse of the *GreenLearning* website: more exactly, how the students as actors are positioned and how their actions are represented in the multimodal texts in order to promote environmental learning.

#### THEORETICAL FRAMEWORK AND METHODOLOGICAL TOOLS

In order to understand how environmental knowledge and action are fostered through *GreenLearning* activities and website, my exploratory multimodal analysis is based upon a social semiotic perspective and upon the ideas of the pedagogy of multiliteracies which was first presented as a programmatic manifesto by the New London Group.

First, by studying the multimodal texts on *GreenLearning* website, I am interested in finding how the students actively design knowledge multimodally in the course of *GreenLearning* environmental activities. Therefore, I draw upon Cope and Kalantzis' perspectives upon knowledge-making actions, namely the "types of engagement with knowing or knowledge processes" (Cope & Kalantzis, 2008, p. 178). Cope and Kalantzis' approach to knowledge processes should be understood in relation to the pedagogy of multiliteracies. This pedagogy sees teachers as designers of learning processes and environments that acknowledge and make use of students' understanding of "the multiplicity of meanings and their continual intersection" facilitated by the proliferation of multimedia and hypermedia channels. (New London Group, 2000, p. 17). According to the New London Group, a pedagogy of multiliteracies focuses on the fact that, "language and other modes of meaning are dynamic representational resources, constantly being remade by their users as they work to achieve their various cultural purposes" (New London Group, 1996, p. 64). Later, Cope and Kalantzis (2009) specify that, in the pedagogy of multiliteracies, "all forms of representation should be regarded as dynamic processes of transformation rather than processes of reproduction" (p. 175). In connection with this idea, Kalantzis and Cope (2009) consider that meaning-making should be regarded as a transformative process because "meaning makers don't simply use what they have been given; they are fully makers and

remakers of signs and transformers of meaning” (p. 175). In order to encourage students to become active designers of meaning, teachers have to design learning activities that include a range of four knowledge-making actions: experiencing the known and the new, analyzing functionally and critically, conceptualizing by naming and with theory, and applying appropriately and creatively (Cope & Kalantzis, 2008 & 2009). These knowledge processes that can also be identified in the learning activities presented in the various multimodal texts of the *GreenLearning* website will be discussed and exemplified in the first part of my multimodal analysis. Each of them will be linked with its effects upon the transformations that take place in four areas of the education practice: the transformations of environment’s functions, of students’ roles, of learning’ forms, and of learning’s purposes. The multiliteracies approach has also been chosen for this multimodal analysis of an environmental learning activity because it “suggests a pedagogy for active citizenship, centered on learners as agents in their own knowledge processes, capable of contributing their own as well as negotiating the differences between one community and the next” (Cope & Kalantzis, 2009, p. 172).

Second, in order to identify “the potentials for learning” (Bezemer & Kress, 2008, p. 167) of the *GreenLearning* website, I explore how specific aspects such as actors and actions of this education practice are recontextualized in the *GreenLearning* discourse across various texts from the students’ video diaries to the teachers’ PDF files. Bezemer & Kress explain that the potentials for learning represent “the ensemble of semiotic features of a text or of an environment – objects, texts, people – that provides the ground for learning and in that way may shape what learning is and how it may take place” (Bezemer and Kress, 2008, p. 167). At the core of my investigation of *GreenLearning* website’ potentials for learning is the concept of discourse as defined by social semioticians such Kress (2010) and van Leeuwen (2008). When defining discourses as “meaning-making resources”, Kress (2010) explains that “discourse refers to ‘institutions’ and the knowledge they produce about the world that constitutes their domain”, and he mentions education among these institutions (p. 110).

According to van Leeuwen (2008), when actors and actions belonging to a certain social practice are recontextualized in a discourse, knowledge about them is selected according to the specific communicative purposes of the respective discourse. Consequently, certain aspects of a social practice “may be excluded from the discourse or transformed, and recontextualization may also add elements such as purposes and legitimations for the actions” (van Leeuwen, 2008, p. VII). In analyzing the knowledge selection types through which actors and actions are recontextualized in the *GreenLearning* website’s discourse, I employ van Leeuwen and Machin’s set of discourse-analytical concepts (van Leeuwen, 1995, 1996, 2000a&b, 2005a&b, 2007, 2008 and 2009, Machin & van Leeuwen, 2007). For example, the actors can be represented in terms of an activity through functionalization or “not in terms of what they

do, but in terms of what they, more or less permanently, or unavoidably, are” through physical identification (Machin & Van Leeuwen, 2007, p. 45). Apart from being categorized in terms of the functions and identities that they have in common, actors can also be identified through nomination in order to foreground their unique identity given by their name and/or surname (Van Leeuwen, 1996, 2008). Furthermore, in the representation actors can also be invested with active or passive roles: “Activation occurs when social actors are represented as the active, dynamic forces in an activity, passivation when they are represented as ‘undergoing’ the activity, or as being ‘at the receiving end of it’” (Van Leeuwen, 2008, p. 33). The discursive strategies employed when actors and actions belonging to the education practice of *GreenLearning* are recontextualized in the website’s multimodal texts will be the subject of the second part of my multimodal analysis.

#### THE KNOWLEDGE PROCESSES

By exploring the online learning resources from the *GreenLearning* website, I have found that the environmental learning activities in which the students are involved when designing and sending eCards are based on a series of interrelated knowledge processes. These will be discussed in connection with their impact upon learning’s forms and purposes, students’ roles and the environment’s function. Although, for the sake of clarity, each of these knowledge processes is discussed here separately and sequentially, it should be pointed out that in reality they cannot be separated as such in the flow of the environmental learning activities. They depend on each other and they may also occur simultaneously.

#### *Experiencing the known and the new*

Experiencing takes two forms, “the known” and “the new” especially when the students are in the phase of researching for their creation of eCards. “The known” and “the new” cover their experiences both in terms of knowledge content and knowledge representation forms. First of all, the students experience the known when they reflect on their personal experiences, motivations, viewpoints, “familiar forms of expression and ways of representing the world” in their own understanding (Cope & Kalantzis, 2009, p. 185). This “conscious, reflective work” (Cope & Kalantzis, 2008, p. 179) entails creating well-known forms of texts to which the students bring their personal knowledge about environmental issues. According to the lists of activities enumerated in the teachers’ PDF files available on the home page, the reflective work also entails identifying gaps in their personal knowledge about those specific issues. In his video which begins in his own garden, one of the students asks himself and the viewers: “We are concerned about the price of gas, but what other things should be concerned about?”

Second, they encounter the new when collecting new multimedia data such as video diaries and blogs in various geographical areas. They can also

use new interactive materials such as a wind turbine which can be launched from the home page. Using the game-like interactive device, the students are familiarized with the parts of the turbine, they can experience with the impact of wind direction and speed, and measure electrical output. Figure 2 represents a screen capture taken from the home page of the eCards video tour where the learning activity facilitated by the interactive wind turbine is demonstrated for viewers.



Figure 2. Screen capture of the interactive wind turbine.

Furthermore, they can read new forms of texts in the Topic Resource Center, and they can watch videos from experts in the field. Interacting with experts in the field is also possible through e-mails which the students can send directly from the website in order to ask specific questions related to the topics they research for their eCards. Some students can even engage with the experts. For example, one of the students recalls in her blog:

We were able to meet up with an American glaciologist [Dr. Jack Kohler], and he took us up to see the stakes that he had put in last spring. The experience was incredible...He let us measure the stakes for ourselves and help him take the GPS [Global Positioning System] readings. I learned a huge amount about glaciers and was overwhelmed by the size of the glacier and the amount that had melted (*GreenLearning website, 2010*).

Experiencing the known and the new are definitely not two separate learning activities since the students can also witness the personal experiences of their international colleagues. They certainly have similar motivations and perspectives upon environmental issues which they can easily recognize, but their experiences of various geographical areas can be very different. Therefore, the sharing of personal experiences broadens and nuances students' perspectives upon those issues. For example, students can watch the video diaries made by other students from Canada, Germany and the United Kingdom who sailed to the Arctic aboard a 120-foot, two-masted schooner. One of these students confesses in her video diary: "One of the most meaningful things that I take with me from the project is the glacier falling; the sound that it makes; it was mainly the sound that affected me, that massive roaring..." (*GreenLearning* home page, 2010). As viewers can simultaneously have eye contact with her and hear the sound that seems to haunt the author even after the expedition is over, the video confession has a strong impact because of its immediacy and honesty. By sharing her personal experience and reflections through the medium of a video diary with many colleagues who were not part of the expedition, both types of engagement with knowing are activated.

### *Conceptualizing by naming and with theory*

Conceptualizing processes take two forms that cannot be separated from experiencing processes because through conceptualizing, the experiential and the conceptual are combined. When conceptualizing by naming, students focus on categorizing and naming, and implicitly they also have to discern differences and similarities. When conceptualizing with theory, which "means making generalizations and putting the key terms together into interpretative frameworks" (Cope & Kalantzis, 2009, p. 185), the students are supposed to build abstract models, synthesize information from a vast range of multimodal sources, and integrate diverse subject areas.

The lists of activities enumerated in the teachers' PDF files and the students' texts available on the home page suggest that, in the process of creating the eCards, the students are required to turn their experiences and acquired knowledge into generalizations that can be applied in various contexts. For example, as they are supposed to learn about renewable and non-renewable forms of energy, after gathering information about each of them, they have to categorize them according to previously established parameters. Then they have to draw distinctions of similarity and difference, and to build up multimodal models. As it is stated on the website, this learning activity "challenges students with higher order thinking" (*GreenLearning* website, 2010). This higher order thinking is also put into practice because to establish their categories and to build up models, the students have to find, interact with and understand a multitude of multimodal resources from scientific articles and statistics to interviews or videos. Cope and Kalantzis (2000) explain that "when learners



juxtapose different languages, discourses, styles, and approaches, they gain substantively in metacognitive and metalinguistic abilities and in their ability to reflect critically on complex systems and interactions” (Cope&Kalantzis, p. 15).

### *Analyzing functionally and critically*

Critical reflection is linked with another knowledge process, namely the process of analyzing. Analysing involves two kinds of knowledge processes: analysing functionally and analysing critically. Functional analyses include “processes of reasoning, drawing inferential and deductive conclusions, establishing functional relations such as cause and effect and analysing logical and textual connections” (Cope & Kalantzis, 2009, p. 186). Critical analyses involve evaluation of both personal and other people’s viewpoints, interests and motivations.

The students are involved in this knowledge-making action both when they structure and revise their own research work and eCards’ texts, and when they access and use information related to their topics of interest. When researching for their eCards, the students are supposed to learn about renewable and non-renewable forms of energy, climate change, air quality and related areas. While doing so, they simultaneously need to explore various relations between causes and effects. For example, the students are asked: “How can knowing about the air you breathe help protect your health?” (*GreenLearning* website, 2010). Similarly, having to describe the relationship between climate change and mass extinction, the students are again supposed to distinguish between causes and effects. The students are also expected to identify and evaluate alternative sources of electrical energy, including oil, gas, coal, biomass, wind, waves and batteries. For related topics, the students have to answer questions as: “What can you do to conserve energy and become more energy efficient? Can your family or school replace a traditional energy source with a renewable source?” (*GreenLearning* website, 2010). And what is more important, they are also supposed to interrogate the interests behind an action. One of the recurrent learning tasks highlighted on the website involve the evaluation of solutions to environmental problems proposed by various groups like government, industry, environmentalists, community members, etc. In Figure 3, a screen capture from the home page of the eCards video tour, some of the teachers’ questions and parts of the students’ answers are exemplified.



Figure 3. Screen capture of questions and answers from the home page of the eCards video tour

### *Applying appropriately and creatively*

Applying also involves two types of knowledge processes: applying appropriately and applying creatively. The first process implies “the application of knowledge and understandings to the complex diversity of real world situations and testing their validity”, while the second process involves “making an intervention in the world which is truly innovative and creative and which brings to bear the student’s interests, experiences and aspirations” (Cope & Kalantzis, 2009, p. 186).

The *GreenLearning* students are expected to apply their knowledge appropriately in a specific situation when they are asked to create eCards with their own words and graphics targeted at convincing specific audiences. They are required to “use appropriate visual, print and/or other media effectively to inform and engage the audience” (*GreenLearning* website, 2010). Meanwhile, they are also supposed to gradually create their own repertoire of multimodal representational resources and to reflect upon the multimodal affordances of the chosen representational resources in order to employ them appropriately. When they have to distill an environmental message that they think is important, they need therefore to apply their knowledge creatively. For example, sending an environmental message to a decision-maker implies finding the communicative strategies of appropriate advocacy and consequently becoming persuasive knowledge providers.

Cope and Kalantzis (2009) claim that “learning is a process of self recreation” (p. 186). In the context of *GreenLearning* activities, this process implies the

gradual development of active citizenship and character as these eCards are sent more than once to various recipients, and each time the students are involved in reflecting upon the consequences of their actions. The development of their “multilayered identity” (Kalantzis and Cope, 2000, p. 146) as active students and citizens implies not only that they are able to pinpoint the problems and ask for others’ commitment to solve them it also implies becoming conscious of their share of responsibility. In one of the eCards, the students acknowledge: “We are the problem. We need to be the solution” (*GreenLearning* website, 2010).

After presenting the knowledge processes through which environmental learning takes place, the next part of this article focuses on how the actors engaged in this education practice and their actions are recontextualized in the discourse of the *GreenLearning* website.

### THE KNOWLEDGE TYPES

The actors and the actions belonging to this education practice are recontextualized in the discourse in specific ways across several media and various multimodal texts. The knowledge about them and their actions has been selected in order to make it possible for users of the website to appropriately identify, understand and engage in the knowledge processes that have been presented in the above section.

The discursive recontextualization of students is taking place through their representation both as a group and as individuals. There is a continuous interplay between selection processes of generalization and individualization at the level of both visual and verbal modes. This dynamic interplay facilitates the communication of specific knowledge about the development of the students’ identities and roles, as a group and as individuals actively engaged in the dynamic knowledge processes that have been discussed in the first part of this article. As a group, they are recontextualized through visual and verbal functionalization because they are identified in terms of their learning activities, namely they are students. At the same time, the visual differentiation in terms of physical characteristics, such as age, race and gender, allows a large range of viewers from various contexts to identify with them. The individualization process is realized visually through close-ups of individual students engaged in their learning activities. The individualization through singularity is realized visually through big close-up images, and verbally by disclosing the students’ names, for example, Amy who presents her video diary of the falling glacier. Obviously, the students are represented as conscious agents in the learning process because the allocation of active roles is continuously foregrounded visually and verbally. For example, when addressed by their teachers, the students are told: “What you think about energy issues matters, and your original creative message can make a real difference” (*GreenLearning* website, 2010). This type of representation through which the students are foregrounded as agents characterizes the discursive recontextualization of students both as in-

dividuals and as a group, and both in the course of individual activities and in interaction with each other and their teachers. In one of the video diaries, one of the students reflects on the impact of her role as a reliable agent not only in the learning process, but also in the transformation of other social practices:

“It was also very empowering to know that the measurements that I was taking were going to be documented in real scientific journals and that [they] would be consulted by scientists all over the world and I did it with my own hands and eyes (at only 16!)” (*GreenLearning* website, 2010).

The multimodal associations of students with each other, their teachers, experts in the field, and their various contexts of learning outside the classroom, strengthen the image of this active role of students. Verbally, this association is repeatedly emphasized: “introductory videos, produced with students” (*GreenLearning* website, 2010). Furthermore, in connection with the recurrent representation of students learning in contexts outside the classroom, Maier finds that “the visual representation of various educational activities taking place in the middle of nature strengthens the actors’ identity as intentional agents in the overall discourse” (Maier 2009, p. 516).

The selection of knowledge about actions in the *GreenLearning* discourse is heavily marked by the addition of legitimations that are continuously linked with the strong agency role allocated to students. For example, in “Energy success stories”, the students are told: “Young people like you are taking action all across Canada to make their communities a better place” (*GreenLearning* website, 2010). Due to the students’ active role, the *GreenLearning* activities are mainly legitimated through the role model authority that is allocated to these students either through their own words or through their teachers’ statements. When this type of legitimation is provided by the students, their role model authority is strengthened by the students’ awareness of our shared responsibility:

Right now, we are at a stage where we completely control our destiny. We can choose to push our planet’s climate beyond its tipping point, or we can start now to take action to attract the attention of the media, and get more people to follow us. The 28 of us have already begun to do our part. The rest depends on whether you decide to do the same (*GreenLearning* website, 2010).

Apart from this kind of addition through which students are invested with role model authority, the actions are also legitimated in the *GreenLearning* discourse through instrumental rationality which “legitimizes practices by reference to their goals, uses and effects” (Van Leeuwen, 2008, p. 113). For example, the students explicitly justify their environmental activities: “We, the youth, rise to help spread the message to the masses and help them understand the damag-

ing consequences of our actions” (*GreenLearning* website, 2010). These legitimations are moreover linked to the active and dynamic roles allocated to the students involved in this environmental learning activity. Van Leeuwen (2008) suggests that: “Generally, the greater the power of a particular role in a social practice, the more often the agents who fulfil that role will be represented as intentional, as people who can decide to act on the world and succeed in this.” (p. 114).

### CONCLUSIONS

In my analysis, I have highlighted that the innovative design of *GreenLearning* activities is meant to facilitate a series of important transformations. First of all, the potentials for learning are multiplied through the new forms and purposes of the activities. When engaged in knowledge-making actions, the students have to be creative both in terms of the forms in which knowledge is accessed and produced, and in terms of what they do with the knowledge content. Using the *GreenLearning* website’s online resources, the students gain a new role as producers, providers and communicators of environmental knowledge. Furthermore, when creating their personalized messages through their eCards, the students’ multilayered identities as students and also as citizens are activated. They are no longer involved only in passive knowledge acquisition, but also in advocacy becoming persuasive knowledge providers and therefore taking the difficult step “from knowledge to action” while still in school (Davis, 2007, p.96). At the same time, environment is no longer an object of learning; it becomes both object and context of learning when, outside the classroom, students are involved in experiencing environmental problems at first hand. In this way, the “wide gap between the world as it is depicted in the school and as it appears to students with their experience of that world” (Kress, 2007, p.29) has been definitely narrowed down.

After summarizing these findings, it can be concluded that by allowing diverse forms of engagement and interaction when fostering environmental knowledge and action, the newly structured learning design of *GreenLearning* both acknowledges, addresses and creatively uses the expertise of the multiliterate students.

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