

# MULTIMEDIA HYPERSCAPES: TOWARDS ECOLOGICAL STRATEGIES

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## Abstract

In this day and age there is a need for a conceptual framework relating Multimedia Hyperscapes to a new way of thinking that goes beyond the traditional “clockwork approach”, namely, to reach a more “ecological approach”. When we have a number of learners connected among themselves we can create activities based on **ecological principles**. Basically, these involve the evaluation of all the relevant information and the combination of the best solutions to solve complex problems. In our experiments at Universidade Aberta the construction of hyperscapes was achieved through knowledge mapping. Because the Web makes possible new modes of collaboration and interaction, groups of students could work together very effectively on such tasks as gathering information, designing Web pages, discussing relevant topics, organizing events, writing assignments, making multimedia presentations, among other. In the course of creating fractal hyperspaces on the Web, with integration of varied multimedia materials, the range of cognitive strategies used by students during the learning process became evident, both at individual and collective level, and learning styles could be easily identified.

## Introduction

Today we are becoming - perhaps our “selves” are becoming – digital like in character. Our identities, our communications, our work is being constructed by and through digital technology (e-mail, homepages, courseware, etc.). Any division between people and technology is becoming more and more artificial as we are constantly building hypermedia spaces that grow in an organic and generative way through people’s interactions. This is the environment where learning occurs these days.

Multimedia Hyperscapes (Bidarra, 2001) may be conceptually identified with the last link in a chain that extends from hypertext or hypermedia “pages” to vast knowledge “spaces” on the Web, where the latter tends to grow and get the “landscape” dimension. But hyperscapes are also cognitive artefacts that offer expressive power to authors and support active learners in the development of knowledge paths that are relevant to their own aims and needs. As people try to make sense of the fragmentary information that surrounds them they tend to create branched structures of knowledge that depart from a single node, a starting point. Typically there is something that triggers new thoughts, perhaps an unexpected question or a provoking idea.

Inspired by Resnick’s *eThinking* (2002), we discuss in this article the need for a conceptual framework relating Multimedia Hyperscapes to a new way of thinking that goes beyond the traditional “clockwork approach” to reach a more “ecological approach”. Ever since the 17<sup>th</sup> Century we have been presented with Newton’s

mechanical view of the universe, nonetheless, in the present day new ideas from ecology, ethology and evolution are influencing scientific research in many areas. Ecological strategies, according to Resnick, are very common in the biological world and share two common characteristics: **response to local conditions** and **adaptation to change**. These can also be described as decentralized, simple, flexible and robust problem solving strategies.

## **Ecological Learning Strategies**

If we consider the growth and impact of the Internet, we may reach the conclusion that the **digital revolution** (Negroponte, 1995) is much more important than was in the past the invention of the printing press by Guttenberg: this new revolution is translated in an immense potential to learn new forms of thinking and new ways of organizing social structures at all levels (Levinson, 1998). The network is, in its essence, a tissue of collaborations of many parts that can create a critical mass and reach certain states in an extremely effective way, and because the network is the whole world its complexity is so big that at the local level we do not perceive the global changes that are taking place. We just scratch on the surface. Perhaps we are at the threshold of a new culture, no doubt very rich in information, that forces us to read history in a non-linear way. In other words, sequential reasoning becomes difficult as we try to catch up and order the many fragments of information that reach us every hour, every minute, every second.

Constructing knowledge by means of multimedia hyperscapes represents a shift from a very centralized didactic style, based on the teacher as the main source of knowledge, to a flexible networked learning environment where the student is able to construct meaningful structures through connections to multiple sources of information. In particular it enables ecological habits of thinking within a vast, complex and unpredictable environment. Incidentally the Web may be compared to any natural ecosystem because it has no centralized decision-making device. Thus the ecologies of the Web make possible the use of information and knowledge to attain highly effective global results.

To differentiate between **knowledge** and **information** is essential, according to Salomon (2000, p. 4):

- *Information is discrete, knowledge is arranged in networks with meaningful connections between the nodes.*
- *Information can be transmitted as is; knowledge needs to be constructed as a web of meaningful connections.*
- *Information need not be contextualized; knowledge is always part of a context.*
- *Information requires clarity; the construction of knowledge is facilitated by ambiguity, conflict and uncertainty.*
- *Mastery of information can be demonstrated by its re-production; mastery of knowledge is demonstrated by its novel applications.*

Instructional strategies make use of networked information to communicate domain concepts. An instructional strategy that is relevant to ecological thinking has been described in Mayer's *Constructivist Model of Learning* (1999):

1. **Select** relevant information
2. **Organize** incoming information
3. **Integrate** relevant information

Immersed in a technological maze – the World Wide Web is sometimes confusing and unpredictable - new modes of interaction seem to emerge. After studying the modes of hypermedia development by students and teachers working as a team, relying on cognitive and concept mapping tools, we were able to understand the mechanisms used by learners to dominate the complexity of the vast available resources. These students were in fact applying **ecological thinking**.

### **Designing Knowledge Hyperscapes**

Ecological learning strategies may be supported by the construction of multimedia hyperscapes, considering that Web design activities:

- introduce the notion of hyperlinked knowledge spaces enriched with digital multimedia;
- suggest a potential for the development of highly interactive constructivist learning environments;
- permit the creation and growth of networked learning communities using synchronous and asynchronous communication devices.

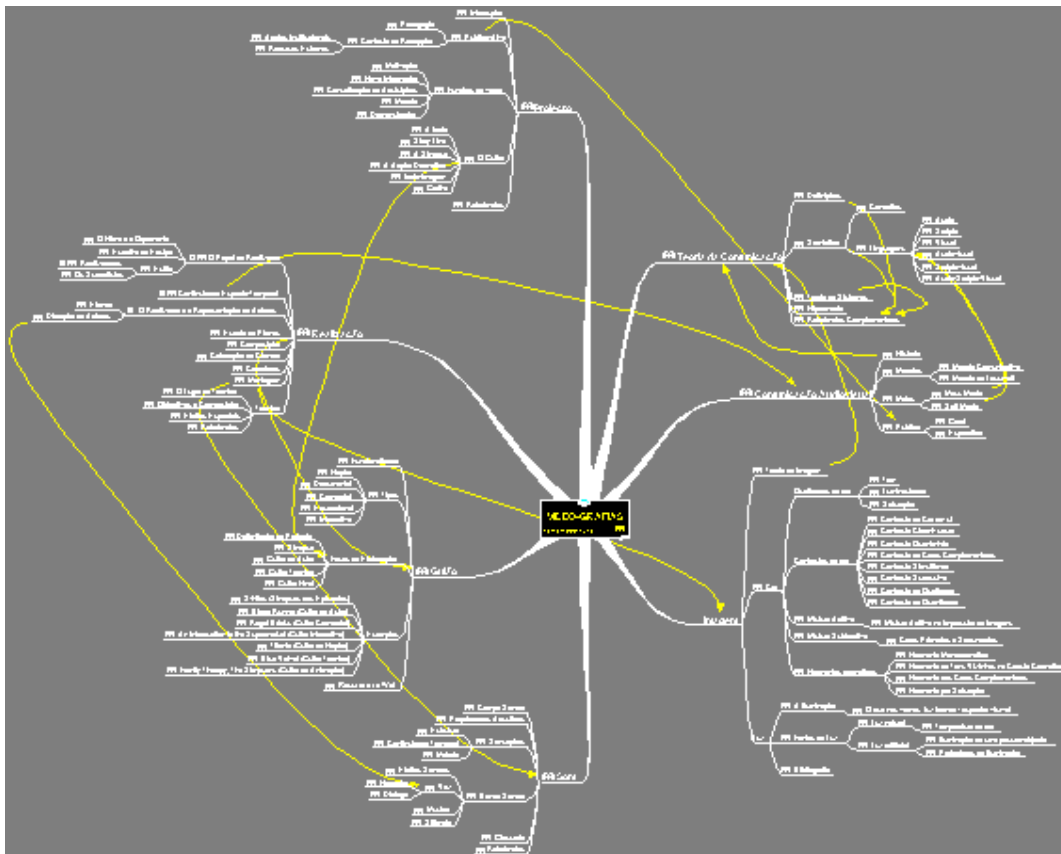
In our experiments at Universidade Aberta the construction of hyperscapes was achieved through knowledge mapping. This method follows the *Mind Mapping*® technique, invented (and copyrighted) by Tony Buzan in the UK. According to (Buzan, 1995): “a mind map consists of a central word or concept, around which you draw the 5 to 10 main ideas that relate to that word. You then take each of those child words and again draw the 5 to 10 main ideas that relate to each of those words.” Images, graphics and dynamic media elements (audio and video) may be added to the representation. The difference between a concept map and a mind map is that a mind map has only one main concept, while a concept map may have several. Hyperscapes can rely on both kinds of maps, depending on the objectives and strategies used for learning. For this study we relied on maps based on one central topic, created with *MindManager*™ software. This software also enables the production of Web pages with great ease.

This mapping technique was developed for representing knowledge in graphs that constitute tree-like structures. These consist of nodes and links, where nodes represent concepts and links represent the relations between concepts. Concepts, and sometimes links, are labelled and may be categorized. The developing patterns of association and branching create fractal structures. Like clouds or trees, they form physical structures that do not possess a defined form; still in fractal structures we can always describe other levels or scales of its structure where we always find the same basic elements (*self-similarity*). Fractal geometry establishes algorithms to describe/create fractal structures but these are not relevant at this time.

In the course of creating fractal hyperspaces on the Web, with integration of varied multimedia materials, the range of cognitive strategies used by students during the learning process became evident, both at individual and collective level, and learning

styles could be easily identified. Furthermore, by evaluating the structure of the knowledge in concept maps they created we could assess the range and depth of knowledge covered by the learners.

On the other hand, authoring with hypermedia tools is a rather difficult task for most people, as we were able to witness in our experiments. Content creation, whatever the form and technology used, is a huge challenge for the average person and this explains why we have professional Web designers, movie makers, writers and musicians. Nevertheless, we believe that future scientists will also be artists – they will go beyond the “exact words” to reverberate across the culture shared with their audience. By establishing the right context we may have more success in recreating each scientist’s own experience. The way to establish context, as we propose here, is through ecological thinking and the construction of **knowledge structures or hyperscapes** (Figure 1).



**Figure 1.** Visualization of a branched knowledge structure created with *MindManager™*.

## Future Learning Environments

We focused on the previous section on the creation of multimedia hyperscapes departing from an ecological thinking position but we did not mention how this is done. Ecological ideas are possible to apply only within a set environment with a specific group of people trying to solve relevant problems.

When we have a number of learners connected among themselves we can create activities based on **ecological principles**. Basically, these involve the evaluation of all

the relevant information and the combination of the best solutions to solve complex problems. Because the Web makes possible new modes of collaboration and interaction, groups of students may work together very effectively on such tasks as gathering information, designing Web pages, discussing relevant topics, organizing events, writing assignments, making multimedia presentations, among other.

The construction of knowledge is essentially a problem of conceptual development based on an evolutionary process with a rather unpredictable outcome. Implicit in this process are pro-active learning strategies, the collaboration with peers and other students and the adoption of a bold perspective concerning the problems to solve. In this context knowledge representations may take many forms. For instance, “chaotic” elements that enter the processes in creative activities (e.g. generation of ideas) have to be managed *ad hoc*, according to each learner’s path and progression, to arrive at a final conceptual representation that is valid. This does not mean that a less professional approach is applied but that a great deal of the “authority” usually attributed to the teacher is not possible today. This is a problematic notion that certainly points to a clear paradigm change in education.

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