

## Chapter 4.8

# Modes of Openness and Flexibility in Cognitive Flexibility Hypertext Learning Environments

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### INTRODUCTION

The words openness and flexibility—the latter is the topic of this volume—are joined in the title of this chapter. We see them as two sides of the same coin—structure and process, as well as antecedent and consequent. Closed structures of *presentation* (how instructional materials are organized in delivery systems) and of *representation* (how knowledge is structured and operated upon in the mind) produce rigidity of thought and action. The antithesis of this rigidity is a kind of “openness-based” flexibility necessary

for adaptive knowledge application, for transfer of knowledge to new situations, for situation-sensitive use of knowledge, and for the kind of world-fitting complexity of understanding that cognitive flexibility depends upon—and that the increasingly complex modern world of life and work needs now more than ever. Rigidity and oversimplification are rampant in learning and teaching (e.g., Feltovich, Coulson, & Spiro, 2001; Feltovich, Spiro, & Coulson, 1989, 1996; Spiro, Feltovich, & Coulson, 1996), but with the affordances of new media, we do not need to live complacently with this state of affairs (Spiro, in press).

The perspective of cognitive flexibility theory (CFT; Mishra, Spiro, & Feltovich, 1996; Spiro, Coulson, Feltovich, & Anderson, 1988, 2004; Spiro, Feltovich, Jacobson, & Coulson, 1992a, 1992b; Spiro & Jehng, 1990) enacts openness in many ways—in the theory itself and in the multimedia learning systems based on the theory (cognitive flexibility hypertext learning environments, CFHs). A recent overview of CFT can be found in Spiro, Collins, and Thota (2003).

### **A NON-EXHAUSTIVE CATALOGUE OF MODES OF OPENNESS AND FLEXIBILITY IN COGNITIVE FLEXIBILITY SYSTEMS**

Openness—and related flexibility—come into play in a wide variety of ways in learning systems based on CFT. Although we provide here the first *cataloguing* of a substantial sample of those ways that CFHs are characterized by forms of openness that promote flexibility, it is worth emphasizing that this is just a sample, that there are many more ways that each of the types listed below can be considered “open” and, in turn, create flexibility; and that there are more types than just these. It should also be noted that in this short chapter we will be talking only about characteristics of CFHs. We recognize that some of the features we discuss may be employed in other instructional design approaches in forms of varying similarity and difference to that used in CFHs.

Each of the following kinds of openness are found in *all* CFHs, with the exception of the ones that are specific to digital video cases, where the features are built into the subspecies of CFHs called EASEs (experience acceleration support environments). To see operative examples of many of the points that follow, see EASE-history (<http://www.easehistory.org/>), a system that uses presidential campaign ads, historical events, and core values to support the learning and teaching

of U.S. history (Collins, Ramchandran, & Spiro, in preparation).<sup>1</sup>

### **The Foundation: Complex, Open, and Flexible Habits of Mind**

Most important of all in fostering more flexible thinking is the establishment of appropriate habits of mind (ways of thinking, worldviews, mindsets, and so on that *prefigure* the *kinds* of knowledge that will be built by an individual). People too often adopt a knowledge stance that we have characterized as the reductive world view, made up of a number of Reductive Biases (Feltovich et al., 1989, 1996, 2001; Spiro et al., 1996, 1988, 2004). This is a tendency to see the world as made up of events and phenomena that are orderly, predictable, decomposable into additive elements, non-contingent, and well structured, and accordingly to have personal epistemologies that see learning as best accomplished by approaches that lead to representations that are simple and highly general (capturing a topic with a single schema, prototype example, set of general principles and definitions, etc.), compartmentalized or “chapterized,” and so on. When these habits of mind are prevalent, the result is structures of knowledge that are relatively more closed and, as a result, inflexible in operation.

The alternative—necessary in complex and more ill-structured arenas of knowledge—counters the tendencies just described with approaches that foster the building of knowledge characterized by multiple representation, interconnectedness, contingency (context-dependence, a tendency to recognize when it is appropriate to say “it depends” and to acknowledge that many situations are not “either/or,” but rather shades of gray in between). *All* of the kinds of openness built into CFHs, as outlined below, are intended to shift habits of mind from the relatively closed to the more open, as well as to build specific content knowledge that has various forms of openness.

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