Chapter VII
E²ML:
A Tool for Sketching Instructional Designs

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ABSTRACT

This chapter introduces E²ML, the educational environment modeling language. E²ML is a lightweight visual language for instructional design; suitable both for complex instructional design processes and simple paper and pencil sketches. E²ML can be used for visualizing the intermediate and final results of design, thus providing documentation in a shared language that can enhance team communication, improve design and contribute to the development of high-quality instruction. The language and its features and applications are presented through a case study, evaluation results are briefly reported, and critical issues are discussed.

INTRODUCTION

This handbook includes the presentation of a number of visual languages for ID, each with its specific features, sometimes with striking differences. Even a quick run through the chapters is enough to notice that they can be classified into two main groups.

Some languages were developed for creating a formal and unambiguous representation of instructional activities, eventually to be transformed into some sort of machine-readable code to auto- mate part of the delivery thanks to technologies such as a LMS. Each with its peculiar flavor, to this group belong IMS LD (Chapter XV), poEML (Chapter X), coUML (Chapter IX) and LDL (Chapter XII). The goal of these languages is *modeling*, i.e., describing an educational environment according to well-defined formal primitives—the vocabulary and grammar of the language—in order to generate unambiguous descriptions. In the framework presented by Botturi, Derntl, Boot and Figl (2006), they would be described as *finalist communicative* languages, i.e., they serve the

purpose of representing a complete instructional design for communicating it to others for implementation, reuse, or simply archival.

On the other hand, other languages were developed to let designers, instructors, tutors and other stakeholders think about the instruction they are designing, and to support its creation. The main idea behind them is that being able to express an idea, especially through a diagram or other sort of visualization, allows interested people to better analyze and understand it, and consequently to make better design decisions. What these kinds of diagrams allow is *representing*, i.e., they allow designers to *give shape* to their ideas, understandings, insights and design solutions so that they can externalize them, reflect on them, and eventually share them. In the terms of (Botturi, Derntl, Boot & Figl, 2006) these are generative reflective languages.

The educational environment modeling language (E²ML) presented in this chapter falls within the latter class: its emphasis is not on formal descriptions, but rather on the possibility of representing, expressing and sharing design ideas (an analysis of some of its features is also presented in Chapter XVII, using its first appearance in 2003 as reference point).

The best way to understand E²ML and to locate it within the wider current context of VIDL is to tell its story, why and how it was developed, which is the goal of the first section of this chapter. The second section presents a case study, which provides an applied presentation of the language and its use, for those who are interested in learning it. The third section goes over the language elements from a more analytical perspective, providing a sort of summary of the features that were before "scattered" all over the example. Section four provides a focus on flexibility, the main feature of E²ML. Finally, the fifth section introduces some elements for the evaluation of E²ML along with some critical considerations about costs.

THE ROOTS OF E²ML

This first section will briefly summarize the development history of E²ML. This short introduction about the author's research activity is not intended to be celebratory; rather, it is simply the best way to help readers understand the reasons behind E²ML's development, and its relationships with the other VIDL presented in this handbook.

The Need for E²ML

For my PhD research I was working on adaptive hypermedia systems, and I had the feeling that it would have been impossible to set up a sound study of their impact on teaching and learning without a clear understanding of the main features of the whole course or educational environment in which they were used. The same adaptive hypermedia system might be used with different content for example, for a course in programming languages and another in art history, representing two different stories, as the two instructors were likely to select different instructional strategies, and exploit adaptivity in different ways. In the end, because they are *very* different teachers, teaching very different courses, the results would show very different ways to use the same hypermedia technology.

E²ML was originally developed as a tentative visual language to represent the distinctive features of a single educational environment in a more coherent and comprehensible way than was possible with a textual narrative. After it was developed, it was natural to think that it could have been used the other way around: as a language to represent educational environment *before* it was implemented, i.e., for design.

As my native field of research is communication technologies, I labeled this a *modeling* language. At this time, in 2001, the educational modeling language (EML; De Vries, n.d.) was

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