Chapter 3.13

poEML:
A Separation of Concerns Proposal to Instructional Design

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ABSTRACT

This chapter introduces a new visual educational modeling language (EML) based on a separation-of-concerns approach, poEML: perspective-oriented EML. EMLs were proposed to support the modeling of educational units. These languages are related to ID, as they are intended to represent models of educational units. This chapter introduces the poEML separation of concerns and its graphic constructs. The main idea underlying poEML is to break down the modeling of educational units into separate parts that can be specified independently. poEML is mainly focused on supporting the computational execution of educational unit models. In addition, the separation of concerns allows us to approach the modeling of educational units in an incremental way, offering advantages in expressiveness, formality, adaptability and flexibility.

INTRODUCTION

As a design discipline, ID is devoted to produce effective educational units (e.g., a lesson, a course, a practice, a workshop). Botturi, Derntl, Boot and Figl (2006) show how modeling languages can contribute to ID by supporting the creation of visual models that facilitate the design, communication and execution of educational units. Specifically, some VIDLs are focused on supporting the creation of computational models of educational units that can be executed by customized LMSs. This is the

main goal of the ID language described in this chapter, while other goals are secondary (e.g., to facilitate the design and the communication).

The achievement of a VIDL that allows us to create computational models of educational units is a complex endeavor. These are some of the problems involved:

- **Expressiveness:** One main problem is how the VIDL will support the creation of models representing the broad variety of static and behavioral issues involved in educational units. Depending on the learning goals, pedagogical approach (e.g., behaviorism, constructivism, social-collaborative) or learning context (e.g., face-to-face, blended, Web-based), teaching and training requires different resources and procedures. Here are some examples: in a traditional face-to-face course a teacher gives lectures and proposes tasks to learners; in a Web-based course a learner accesses a Web site to get documents and to perform tests; in a tennis lesson a player repeats the same movements several times under the supervision of an instructor; in a primary school, children play games to learn numbers and letters. There is a large variety of elements, resources, procedures, and behaviors present in educational units and a VIDL should allow us to express them in models.
- **Formality:** Formality is necessary to support the computational execution of the models in customized LMSs. To be executed, models need to include an appropriate level of detail, and need to be arranged in accordance with clear and unambiguous constructs. Therefore, the intended VIDL should allow us to create models with precision and consistency.
- **Adaptability** and **flexibility:** Another problem for VIDLs is that educational models are not fixed. Educational units rarely work perfectly in accordance with a predefined plan. Usually, educational plans have to choose between several alternative paths, or they have to be changed to solve unexpected situations. Therefore, a VIDL should allow us to create adaptable and flexible models of educational units.

The proposed VIDL tries to solve these problems by following a *separation-of-concerns* approach. Separation of concerns is an important principle in other design domains (e.g., architecture and software design). For example, in architecture, building models or plans are divided into several parts. These include plans of the structure of the building, the layouts of floors, electrical installation, and plumbing installation. This separation of concerns facilitates the design task, as the designer's attention can be focused on one concern at a time. Similarly, the modeling of educational units can be approached from a separation-of-concerns approach as well. For example: the activity structure of educational units can be considered as one concern, and the order in which activities have to be performed as another. The proposed VIDL, developed with this separation-of-concerns principle, is called poEML: *perspective-oriented educational modeling language*.

The remainder of the chapter is organized as follows. The following section introduces the context of this proposal and its classification. The next section describes the main ideas of the language, together with the proposed separation of concerns. Then, the fourth section includes the description of the poEML elements and their graphical representations. This section only contains poEML elements that are most relevant to an ID point of view. Next the JPoEML graphical editor is introduced. In the sixth section, a simple course is modeled with poEML as a case study. The chapter ends with some conclusions.

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