From Socrates to PIAGET: Patterns for Distance Learning

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Abstract
Millenniums ago, Socrates established the basis for philosophy today, only by using criticism to set up concepts and rules discussing them with his disciples. This approach, named Socratic Method, has also proved to be a teaching-learning strategy. Nowadays, even though web-based, collaborative Distance Learning systems are becoming industry standards for representation and deployment of online content for courses, some features can be extracted from the Socratic Method in order to respond to recurrent questions about how technologies could be correctly applied for supporting different pedagogical strategies in order to provide massive, high-quality distance learning content. This paper shows a collection of patterns for developing fine granular, highly reusable learning objects over interactive tools like PIAGET.

1. Introduction

By using critical reasoning, fifth-century Athenian Socrates (469-399 BCE) set all the standards for subsequent Western philosophy. More than this, his dialectic method undoubtedly influenced the way people build knowledge by gathering pieces of conclusive information only through questioning. From Plato to Vygotsky, the acceptance of the notion that knowledge must be built instead of transmitted was early shaped by Socrates’ discussions with his disciples.

Centuries have passed since Socrates was given poison hemlock to drink, but several questions still remain from that era. Perhaps most of them can be summarized in a simpler one: how to achieve high-quality, massively-scalable education?

The present computer-assisted learning systems barely use Socratic-like methods, since they usually rely on instructional, teacher-centered, static content-based teaching approaches. Constructive methods, on the other hand, face knowledge as an entity that must be built, even though by means other than the question-and-answer Socratic strategies.

Three main features can be extracted from the Socratic Method [1]. First, the method is skeptical, in that it starts by assuming no previous specific knowledge on a certain subject. Second, it is a conversational strategy, since dialectics is used in order to gather knowledge by means of confronting people’s thoughts. Lastly, the Socratic Method aims to allow for empirical concept pursuing, since it criticizes proposed definitions for concepts by analyzing their particular instances.

The next item will detail these three points of the Socratic Method compared to web-based distance learning, simultaneously proposing some design patterns to achieve Socratic-like experiences in web-based courses.

2. Patterns for Distance Learning

According to Larman [2], a pattern is a reusable solution template that organizes proven solutions into categories, since they will probably recur in a different problem domain. Roughly speaking, a pattern is a solution for a given problem or a problem class. The problems emerging from the last section lead to some questions on how the Socratic Method could be applied in order to achieve more dialectic, adaptive, knowledge building-driven pedagogical strategies that would be able to go beyond expositive, static, purely instructional distance learning approaches. This section shows a set of four distance learning specific patterns that are being proposed as efficient solutions for the three Socratic statements.

First, Fine Granularity pattern is meant to solve the problem of developing high-reusable learning objects. This pattern states that learning objects must be fine-granular enough to represent an atomic piece of information. Otherwise, they can only be containers for other learning objects. Figure 1 shows an UML class diagram for this pattern.
In spite of the fact that it is not a completely skeptical approach, since it begins with small, discrete pieces of information, according to criticisms to it, new learning objects are proposed to the apprentice, which leads to adaptiveness problems.

The next problem is: how to select and present learning objects to apprentices that are adequate to their specific needs? This problem can be solved by adopting a second pattern, named Learner Adaptiveness. This pattern can be described by the following general rule: all learning objects must be created and structured so as to be adapted to students’ actual learning requirements. Figure 2 shows an UML class diagram for this pattern.

The next pattern is about how conversational strategies could replace expositive ones in distance learning courses. A possible solution for this is the Agent-Agent Interaction pattern, which states that interaction among apprentices and teachers - named learning agents- can allow learning objects to be shared among agents, thus decentralizing learning objects’ managing responsibilities. Figure 3 shows an UML Class Diagram which depicts such pattern.

The last problem to be discussed is as follows: how to ensure that students are able to deduce new concepts from previous ones? A possible solution to this is the Hybrid Authoring pattern, which allows them to build new learning objects through interaction among themselves, or among them and other learning objects. Figure 4 shows an UML class diagram that represents such pattern.

Distance learning environments like PIAGET (Platform-Independent, Adaptive Generic Environment for Teaching) [3][4] implement this pattern by including the ability of share learning objects, which gets closer to Socratic dialectics if agents are also allowed to create their own learning objects.

3. References