# Semantic Learning Narratives

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## ABSTRACT
In this paper we highlight the importance of an interpretation of the learning process from a narrative perspective and show how Semantic Web technologies, in particular ontologies, can serve to represent the key dimensions of this approach and to support an intelligent navigation of learning resources. Here we introduce our initial work in order to formalize the structure of these "learning narratives" in the domain of philosophy.

## Categories and Subject Descriptors
K.3.1 [Computer Uses in Education] - *Computer-assisted instruction (CAI), Computer-managed instruction (CMI), Distance learning*. H.5.4 [Information Interfaces and Presentation]: Hypertext/Hypermedia - *Architectures, Navigation, User issues.*

## Keywords
Educational Semantic Web, Learning Narratives.

## 1. INTRODUCTION
Although the utilization of Semantic Web (SW) technologies in the field of education (SWED) is a new research area, a number of authors have already proposed their vision of how an effective SWED could operate [4, 6, 13, 14]. More specifically, from our analysis [8] of the literature in the field, we have identified three different types of existing applications that actually employ these technologies to support learning. These applications aim at

a) Enhancing the learning objects reusability by linking them to an ontological description of the domain, or, more generally, describe relevant dimension of the educational process in an ontology.

a) Providing a comprehensive authoring system to retrieve and organize Web material into a learning course.

a) Constructing advanced strategies to present annotated resources to the user, in the form of browsing facilities, narrative generation and final rendering of a course.

In contrast with the approaches cited above, here we propose an approach that is modeled on *narrative studies* and on their transposition in the digital world. In the rest of the paper, we present the theoretical basis that inspires this approach, and show some examples that are guiding our implementation and testing of these ideas within the domain of philosophy.

## 2. NARRATIVES & LEARNING
*Narratology* is the name given to the critical and theoretical study of the numerous forms of narrative discourse. The basic idea of narratology is to *scrutinize* the internal relations of a narrative's component parts, and *dissect* how these relations are constructed in practically any given aspect of the narrative text. The text's structure can therefore be read as a system of meaning in its own right, which interacts with any apparent message the text contains. The concern of a narratological approach is not with *what* a narrative represents, but with *how* it represents it.

Referring to the work of Genette [5] and later of Chatman [3], we can sketch out the structure of a narrative as the union of a *Story* (what is told), a *Discourse* (the "how" of what is told, that is, the specific way in which the basic elements of a story are re-organized and conveyed to the listener, in order to create different effects) and the *Narration* itself (the unavoidable influence of the speaker on the final narrative's effect, since every narration is always in a context and therefore assumes some peculiar meanings from it). This theoretical model, firstly developed to describe "stories" in the classic sense (namely novels, romances, or any other work in literature), can be extended to any kind of media (theatre, film or hypermedia). More recently, it is worth noting the work done on this field by Scharfe, who has also formalized his results into an ontology [12].

The interest, for us, lies on a) the ways we can use narratives, when formalized through a computer language, and b) the intrinsic relationship narratives have with our normal learning activity.

The first point is clearly exemplified in [7], where tools based on narrative structures reach the aim of enabling communities to celebrate and explore regional heritage. This is achieved by letting people produce and exchange stories in electronic forums: these stories, if properly indexed through the use of ontologies, can be subsequently retrieved in novel manners, explored in a personalized way and compared using multiple viewpoints. All these processes become therefore instantiations of specific narratives. A detailed explanation of the processes involved in the creation of a digital narrative is also the one presented by Brooks[2]. The aim of his research, as stated, is to employ the computer to "generate multiple narratives quickly and

semi-autonomously" out of a pre-inserted "story" material. This general framework and methodology to digitally represent a narrative has been instantiated in different areas, including game studies and digital media.

The relationship between narratives and learning has been investigated by Schank [11]. In his opinion our knowledge scales down to the set of stories we are able to tell, so, for this reason, the most interesting question becomes how we manage to get from one story to the other, namely how we constantly index new stories and relate them to the corpus of stories we stored in the past. Within this approach, intelligence is defined as a "massive indexing and retrieval scheme" that brings out the linguistic representation of some latent conceptual structure. The process of learning, thus, becomes inherently linked to the capacity of creating the structures that connect different stories. From a narratology-centric viewpoint, these structures would correspond to the *discourses* that link the different items of a *story*. Within an educational scenario, these would correspond to the learning paths that assemble learning units into a coherent curriculum. In accordance with this approach, we characterize "learning narratives" as an educationally oriented discourse that organizes different resources according to a pre-built structure. This already happens in systems like [10] and [1], however, these systems do not realize the ideal separation between the resource level and the pedagogical description of them. Specifically, in these approaches the possible learning paths obtainable from the resources are not explicit – i.e., they are not formalized in an appropriate ontology.

To address this issue, in the PhiloSURFical project [9], we are looking at how to abstract the structure of these learning narratives in order to produce a high layer of semantics reusable within different domains. PhiloSURFical is an application that allows the semantic annotation of philosophical resources, with the aim of supporting the automatic creation of learning narratives through the inserted material. As part of this framework, we are building a domain ontology covering fundamental philosophical concepts. This ontology comprises information about material things such as *authors* and *publications*, and about theoretical things such as *theories*, *approaches*, *currents* and *problems*. The semantic relationships between these domain concepts will allow the formalization of specific learning narratives in a second ontology. So, for example, ways to browse this semantic space can be (at a high level) the *critical explanation* of a concept/theory (learning path that highlights the opposing theories, and the problems on which they are focused); the *contextualization* of a concept/theory (learning path that shows associated information about an author, or the historical period, or other contemporary important theories in different research areas); the *production* of an author (learning path that recollects all the activities and results of an author, and organizes them according to user's preferences); the *intellectual lineage* of a concept/theory (through a learning path that follows the influence of ideas across different areas and historical periods).

In a second phase, we will try to generalize these results and extend the framework to other subjects of educational courses, in order to define what are the abstract features of a learning narrative. We believe that these research directions should provide a better understanding of the application of computational narratives in eLearning, and lead to more intelligent mechanisms to reuse, navigate and present learning resources.

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