

Learning strategies and Learning Objects' structural models: how to classify them

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In e-learning context, teaching-learning strategies are carried out inside the different structural models of Learning Objects. The attempt to compose a taxonomic classification of those models, which structure is hierarchic, is possible but arbitrary, because its development is necessary founded on some parameters, and omits, or subordinates, other parameters. More interesting is the multidimensional classification, which places the different models on as many coordinates as the parameters, and intercross them, using adapted graphics modalities, obtaining forms of representation free from arbitrary choices on the parameters' importance levels. The more meaningful issue of this research on Learning Objects' classification is the possibility to use the obtained structure for the choice of the didactic strategy to apply in e-learning courses, related to learners' and learning context's characteristics and to methodological and technological issues and compatibilities.

Keywords learning strategies, Learning Objects

1. Introduction

The technologies of online communications within the context of e-learning are used in two basic directions: for the construction and use of Learning Objects on one side and the implementation and fruition of interactive functions on the other, the latter being further divided into the two macro-categories of organizational-administrative and teaching functions.

While the dividing line between organizational and learning interactions is fairly clear-cut thanks to their different goals (with the exception of those within the learning environment connected to certain aspects of activity tracking reporting), the same cannot be said of the dividing line between Learning Object management functions (design and realization environments, or Learning Object Management Systems and fruition and tracking environments on the basis of the SCORM protocol) and the functions aimed at sustaining the synchronous and asynchronous dialogue between process actors, collaborative activities, methods of learning assessment and process quality and, in general, all those functions that contribute to improving the learning process.

The study carried out by CARID of the University of Ferrara [1] regarding the taxonomization of Learning Objects gives further evidence of the existence and spread of structural models tinged by numerous learning strategies which cross the dividing line between a unique transmission of knowledge (transmission in which the informational flow is substantially one-way and interaction is limited to the options offered by navigation technologies implemented in HTML protocol), and two-way transfer of information and documents between the user and the structure, or between a community of users within the context of a collaborative fruition of the Learning Object (this is the case of Learning Objects afferent to Problem Solving, Simulation, Virtual Role Playing, Web Quest, and Collaborative Concept Map models).

Consequently, the rigorously hierarchical taxonomic structure proposed by the above-mentioned study and illustrated below, does not satisfy the needs for exhaustively indicating the relations between the various learning strategies and different Learning Object models. On the other hand, the very act of analysis takes into consideration awareness of this problem, making note that a precise and definite classification of structural reference models within the context of asynchronous e-learning is not possible for a number of reasons. On the one hand, the differences between certain models are not evident enough

to allow for clear attribution in the analysis of learning documents, and on the other the development of new models resulting from the evolution of online technologies, their progressive differentiation in derived structures and their fusion or interpolation in complex document contexts, impose continuous ontological revision in this regard.

LEARNING OBJECT STRUCTURAL MODELS

Models based on explicit transfer of content

Sequential structure models

Presentation

Story telling

Hierarchical structure models

Tutorial

Field trips

Grid structure models

Conceptual maps for navigation support

Information maps

Information Landscapes

Models based on interactive learning

Single user models

Sequential structure models

Interactive structure models: Drill & Practice

Single or collaborative use models

Explorative

Case-based learning

Problem solving

Play

Games

Simulations

Necessarily-collaborative models

Generative Learning

Web Quest

Role-playing

MUDs and Virtual Worlds

Collaboratively constructed conceptual maps

2. Beyond the taxonomy

How then must this taxonomic schema be structured, or restructured, taking into consideration the imprecision and flexibility of the boundaries between the various Learning Object models, and primarily in function of the arbitrariness of the definition of a hierarchical order between classification criteria?

The proposal that emerges from CARID research is founded on the need to reconsider the concept of taxonomy itself in light of the potential offered by communication technologies in representing knowledge. If taxonomy is interpreted as hierarchical organization of classification criteria, this imposes difficult choices not easy to maintain and susceptible to numerous criticisms depending on the way the problem is approached; vice versa if the criteria used for classification is interpreted from the standpoint of a multi-dimensional model based on the use of Cartesian space and the representation of objects and the relations between them, the possibility exists to compose a schema that is certainly dynamic and evolvable and certainly the object of discussion and negotiation, but not vitiated by basic choices that preclude sharing (figure 1).

One could hypothesize a different visualization mode in this particular context, based on the representation of analysis parameters using a system of Cartesian axes and graphing techniques that does not call for creating various levels of importance, and the resulting placement of the functions and tools through which they are concretized within this system.

Resulting from this is the potential for exhaustive expression of interpolation characters between the functions through their representation not as a point that intersects precise, unique values within the parameters, but in the form of a line or area that connects or circumscribes sets of values.

As an example, let's look at the identification of the Tutorial as a model for content transmission in which the level of learning interaction may range from a minimal level of sequential connection between topics, to an intermediate level of hierarchical representation or graph mapping of the cognitive environment involved, up to a high level marked by forms of interpolation with interactive functions such as learning assessment through tests and inclusion of additional content.

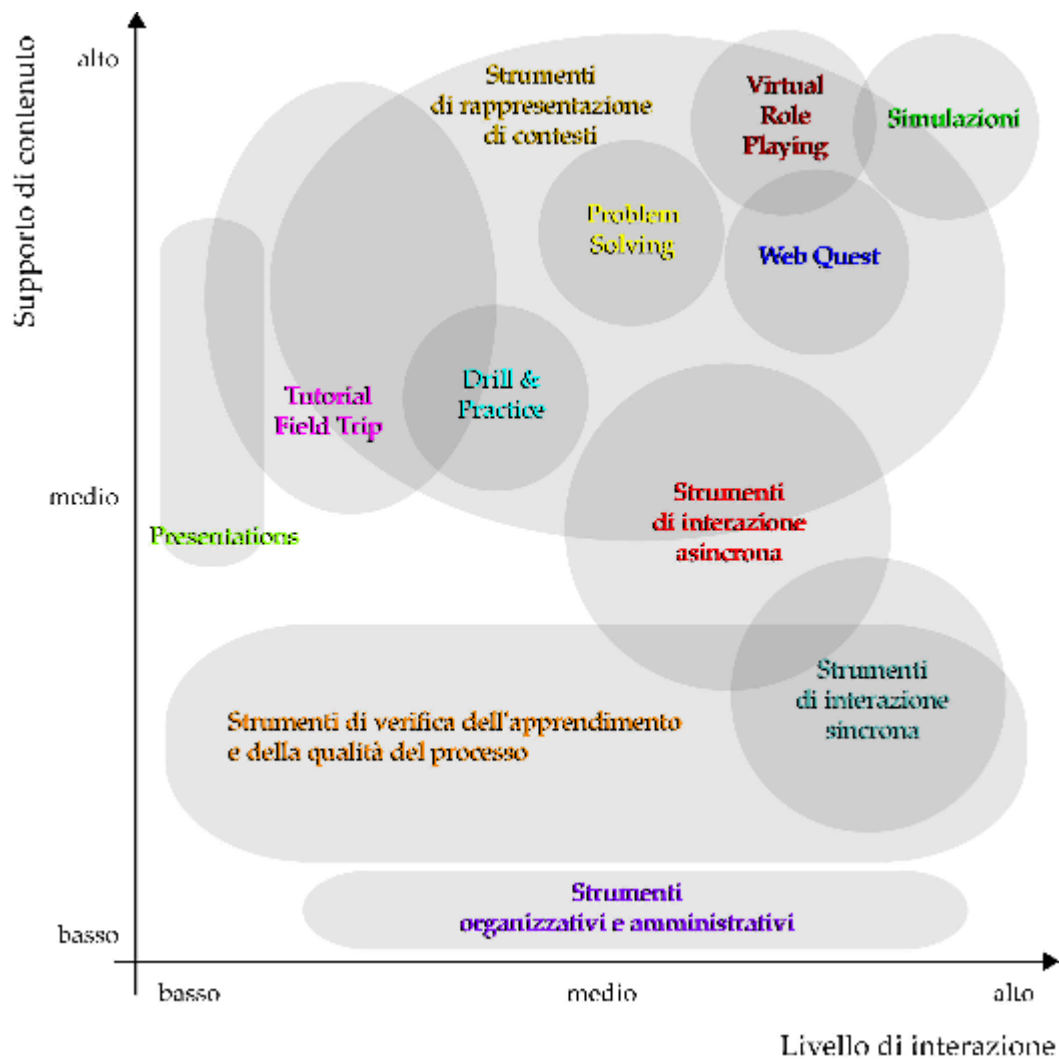


Fig. 1 representation in an x-y axis of Learning Object models and e-learning functions [2].

In other words, a division between Learning Objects, like that presented in the taxonomic diagram, based on the explicit transmission of content or active role of the user or community of users [1, 3],

reveals from even initial exploration its inelasticity or, more precisely, its inability to adequately support evolution and interpolation between a range of instruments, structural models and learning strategies. On the other hand, a Cartesian space defined by a system of axes corresponding to classification criteria, such as that shown in figure 1, easily meets the problems of adaptability to modified contexts, both through repositioning of objects within the schema, as well as through insertion of additional factors of criteria study.

The definition of independent parameters in the classification of Learning Object structural models is not limited to quantitative and qualitative levels of content transmission, but also includes other aspects, in particular process management and context description.

Within the functions, the process management axis measures the incidence of process monitoring and control actions. In Learning Objects, the development of these actions corresponds to the degree classification and tracking protocols are implemented (LOM, AICC, SCORM).

By “context description” we mean the ability of a function, through its use, to correctly and constantly transmit the perception of the cognitive context in which it operates. Those functions located on a high level of this axis are therefore, for example, Learning Object models based on the interactive use and representation of the context in tree or map form, or those interactive models which, in line with the needs of Knowledge Management, arrange knowledge contributions in a structured manner, i.e., Generative Learning.

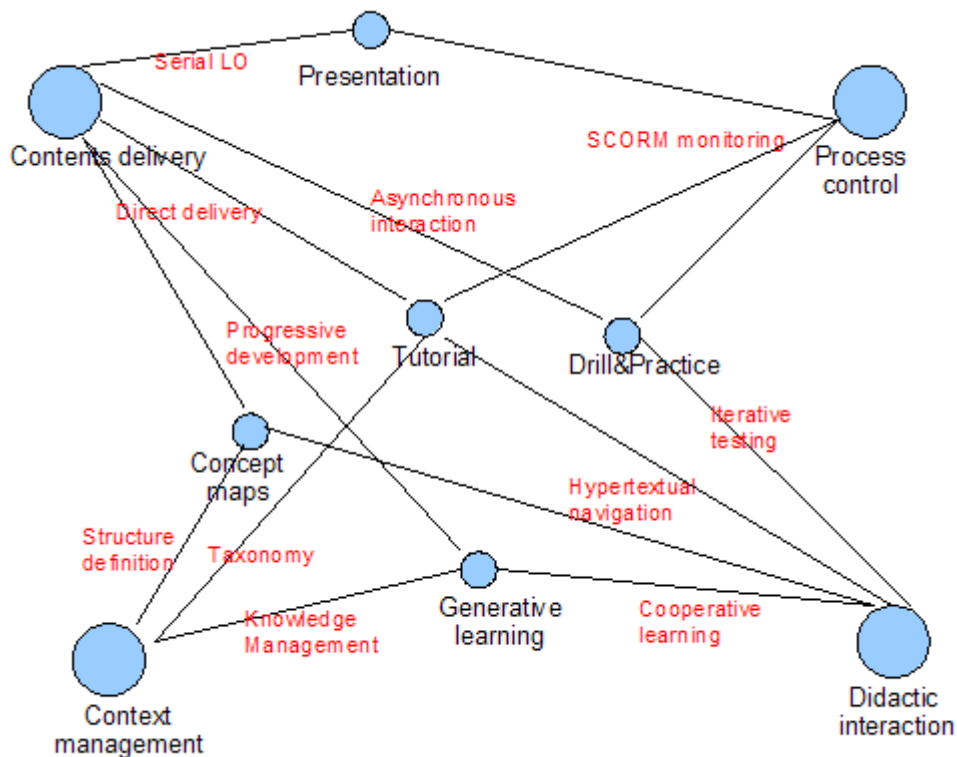


Fig. 2 conceptual map of a little number of Learning Object models [3].

3. Conclusion: the use of conceptual maps

The representation of function classification structure becomes more complex. To an initial schema that can be reduced in essence to parameters of content transmission and interaction – in other words a two-dimensional schema – two other axes are added that relate to process management and context description; the result is the impossibility of utilizing Cartesian space (whose representation, for obvious reasons, does not go beyond three-dimensions).

But other graphic solutions for representing parameters in different and alternative forms to orthogonal axes do exist. For example, maintaining the basic two-dimensional structure, the size or colour of the positioned objects may be configured as parametric measures or, alternately, putting aside completely Cartesian spaces or planes, Learning Object models and classification criteria may be inserted as nodes in grid structures in which relationships are expressed graphically and through the use of text labels, as defined in conceptual map theory in order to support both quantitative and qualitative aspects (for example, how a given object, for example a Learning Object, implements the actions of process management).

To conclude this study aimed at identifying the most effective tools for correct and thorough representation of the whole of Learning Object learning strategies and structural models, we note how conceptual maps through their adaptability in supporting the visualization of all E-R (entity-relation) type schemas present themselves as optimal tools for going beyond the structural limits of the taxonomies that exclusively involve hierarchical connections, as well as the intrinsic graphic limitations of other representational forms, thus also permitting and facilitating collaborative modes of research, analysis and development of this ontological context.

The comments offered to this point could be considered the prelude to a more in-depth look at the research activity already initiated by CARID at the University of Ferrara, the purpose of which is to construct a representational model that is both exhaustive and elastic within the context of Learning Object learning strategies and structural models, and therefore ontological activity founded on a mode of criteria study which is not aimed at consolidating a priori hierarchical relationships between various classification parameters.

References

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