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LEARNING OBJECTS AND SEMANTIC WEB IN EDUCATION: FROM STUDENTS’ ANALYSIS TO NEW PERSPECTIVES FOR THEIR USE
Learning Objects and Semantic Web in Education: From Students’ Analysis To New Perspectives For Their Use

Didactics and more generally pedagogy, always devoted their attention to three different elements in the teaching-learning process:

a) **topics** to be learned from students and how they had to be ordered and organized (cognitive, sense-motor and affective taxonomies)

b) **teaching process** and its phases (teaching planning and carrying out)

c) **subjects** (usually students) the teaching action is planned for (psycho-pedagogical theories).

**Misconceptions and mental schemes, motivation to learn, guidance etc. didn’t find a right place in the above list.**

**ICT introduced more complex scenarios.**
Preconceptions, misconceptions and Mental Schemes
Almost all scientific disciplines (including Computer Science and ICT more in general) clearly manifest the presence of wrong ideas. Can the ICT help teachers and students in overcoming wrong ideas? The integration of e-learning strategies in education showed (Cartelli, 2005):
a) students’ loss can be reduced and their performances can be improved (when used in CS basic course only 20% students didn’t pass ending examinations at the first attempt and 65% had high scores),
b) the use of ICT don’t eliminate the risk of wrong ideas (the analysis of students’ answers at a particular survey showed 43% among them still had misconceptions)
Learning styles and students’ performances

Kovacic and Green (2004) analyzed the students in a computer concepts class. They used the Felder-Silverman model for the detection of students’ learning styles and found relevant statistical differences in their performances. Students with reflective, sensing, verbal, and global learning preferences had the best performances both in in-course assessment and in final examination (i.e., the structure of didactical materials and the learning environment influenced students’ learning and results).

Kumar, Kumar & Smart (2004) used another model for the analysis of students’ learning styles (Grasha-Riechman Student Learning Styles Scale) and found relevant changes in the distribution of the learning styles before and after the course. For the authors the observed changes were due to the instructional strategies and to the technologies they adopted in the class (i.e., the use of collaborative projects and course management software increased the number of collaborative, participant, and independent learning styles among students).
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Students’ assessment and teaching evaluation

Knowledge society and lifelong learning require a more efficient evaluation of the knowledge and skill people develop due to the importance that non formal and informal education assumes. The portfolios and e-portfolios have assumed a great importance for the certification of students’ success. Love and Cooper (2004), while investigating the key factors for the design of information systems for online portfolio-based assessment identified four weaknesses: 1) design mostly omit key educational and administrative issues while focusing on technical aspects; 2) “online portfolios” are often made only of a single essay, a project report or presented as a Web-based electronic facsimile of a conventional document; 3) many designs for online portfolio are based on an over-narrow view of value distribution and do not take all stakeholders into account; and 4) designing of online portfolio assessment systems are often not well integrated with overall course design processes.
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TEACHING, LEARNING OBJECTS AND SEMANTIC WEB

- **Learning Objects (LOs)**, firstly introduced for their adaptation and reuse features, are nowadays experimenting great interest for their possible insertion in traditional teaching; new didactical proposals introduce teaching strategies in LOs’ structure (i.e., a learner centered teaching activity is hypothesized). In such a way LOs can be used in schools and university and not only in contexts of lifelong learning (Fini & Vanni, 2005).

- **Semantic Web** is even more seen as a valid instrument supporting teachers’ work and reducing everyday workload.

What role they can play?
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From LOs to UOLs

Recently the planning and using of LOs in constructivist and collaborative teaching-learning contexts has been hypothesized; in such a way the construction of learner-centered or community-centered environments strongly based on the use of LOs was hypothesized (Fini & Vanni, 2005).

The above transformation was performed by the inclusion into the LOs model of the planning strategies guiding their choice and use.

The theoretical change emerging from the above hypotheses induced R. Koper (2001) to propose a new language, called EML (Educational Modeling Language) and very similar to UML and XML, for the definition and description of teaching/learning environments. The EML language doesn’t manage LOs, its basic elements are called UOLs (Units of Learning), each UOL describing learning activities and all elements involved in the teaching/learning process (i.e., the actors such as teachers, students, tutors etc. and materials, learning environments etc.).
SEMANTIC WEB in EDUCATION

The basic idea of the semantic web, as stated from Tim Berners-Lee, is relatively straightforward: to create a layer on the existing web enabling advanced automatic processing of the web content, so that data can be shared and processed both by humans and software.

R. Koper (2001) refers to the process of the representation of a course in a formal, semantic way, in terms of 'Educational Modeling'. It can be useful for: development of flexible web-based courses (adaptable to learner features), preservation and sharing of knowledge on effective learning design, instantiation of e-learning courses in Learning Management Systems (LMSs), development of software agents supporting learners and staff in managing the workflow of activities, adaptation of didactical materials to individual learner’s features (automatically driven by the descriptions of the conditions for adaptation), sharing and re-use of (all or parts of) e-learning courses, creation of more advanced and complex (but consistent) learning design.
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**CONTENT**
- Content creation and organization on a scientific basis (discipline)
- e-learning counterpart
- creation of LO and use of the Semantic Web

**PROCESS**
- Planning and management of teaching
- e-learning counterpart
- creation of UOL and use of the Semantic Web

**STUDENT**
- Use of students’ features in teaching and in the monitoring of teaching-learning processes for the planning of feedback actions
  - (less or no e-learning counterpart)

**Successful teaching-learning process**
- Good students’ performances
  - (meaningful learning, good skills and competences)
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