EDITORIAL
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Focus on: e-Learning: requirement of the disciplines

In the second issue of 2013 Je-LKS intends to analyze the theme the requirements of e-learning technologies with respect to different scientific disciplines and teaching."*The Disciplinary Teaching is call to take into account both the size of student learning and symbolic-cultural systems of matter to teach*"(Frabboni, 1999, p. 20).

During the past twenty years researchers have made exciting progress in the science of learning (e.g, *how people learn*) and the science of instruction (e.g, how to help people learn) (Mayer & Alexander, 2011).

Although there are really many studies that demonstrate how the choice of effective of teaching method depends on several factors including the subject's culture the differences among academic disciplines and technologies enhanced education remain largely overlooked by researchers (Neumann *et al.*, 2002).

Since the compartmentalization of knowledge into disciplines in the late 19th century, there has been a continuing interest about how these differences makes in conceptions of the education process (Waggoner, 1994a). The vast majority of work in this field has used the Smart *et al.* (2000) theory of disciplinary classification and the Biglan (1973) model of disciplinary classification (Jones, 2011).

The Biglan (*op. cit.*) model has been used in examining differences among academic disciplines since 1996. The Biglan classification scheme is based on the idea that academic disciplines vary in their level of consensus (Braxton & Hargens, 1996). From Table 1 we note that, according to Biglan, the first dimension to classify different discipline is *hard versus soft*. This dimension it is based on the level of paradigmatic development within a field. *Disciplines with high paradigmatic development such as chemistry, physics, and engineering are classified as hard disciplines while disciplines with lower levels of paradigmatic development such as sociology, history, and educational administration are soft disciplines* (Jones, 2011 p. 16). It distinguishes disciplines with a clearly defined ordering of knowledge (such as physics or science) versus disciplines lacking such agreed ordering (such as sociology or psychology). The *pure* *versus applied* is the second dimension that distinguishes whether the content of the discipline involves intrinsically (such as engeneering or agronomy) or not (such as education) real-world.

Table 1
BIGLAN'S TAXONOMY OF ACADEMIC DISCIPLINES

	Hard	Soft
Pure	e.g: Natural Sciences (Content typically fixed and cumulative, and quantitative)	e.g: Social Sciences, Humanities (Non-linear, open and loose)
Applied	e.g: Engineering (Focus is on products and techniques. Knowledge is atomistic and cumulative, emphasizes factual understanding)	e.g: Nursing, Education (Concerned with the enhancement of professional practice. Knowledge is reiterative and holistic)

There is a further dimension *life or lon-life systems*: whether or not the discipline is concerned with living organisms. A representation of possible disciplinary affiliations is thus proposed in Figure 1 (Biglan, *op. cit.*)

	Hard		Soft	
	Non-Life	**Life**	**Non-Life**	**Life**
Pure	Astronomy Chemistry Geology Mathematics Physics	Botany Entomology Microbiology Physiology Zoology	English German History Philosophy Russian Communications	Anthropology Political science Psychology Sociology
Applied	Ceramic engineering Computer science Mech. engineering Civil engineering Nuclear engineering	Agronomy Dairy science Horticulture Ag. economics	Accounting Finance Economics	Ed. administration Secondary education Special education Vocational Education

Fig. 1 - Biglan's Classification of Academic Disciplines

Since 1996, only one other significant study to classify academic discipli-nes has been introduced by John Smart based on the Holland (1997) *Theory of Occupational Classification* (Smart *et al.*, 2000) a personality-based career development framework which proposes that *individuals at the time of their occupational choice have various skills and abilities due to their inherited characteristics and their environmental circumstances* (Jones, 2011, p. 11). Smart (Smart *et al., op. cit.*) used Holland's framework classifying academic disciplines with reference to *Educational Opportunities Finder* (Rosen *et al.*, 1994).

Table 2. provides the results of this classification.

Table 2
ACADEMIC DISCIPLINES BASED ON OPPORTUNITIES FINDER

Type	Academic Disciplines
INVESTIGATIVE	Biology and life sciences, economics, geography, math/statistics, physical sciences, finance, aeronautical engineering, civil engineering, chemical engineering, astronomy, earth science, pharmacy, anthropology, ethnic studies, geography, and sociology
ARTISTIC	Architecture, fine arts (art, drama, music), foreign languages, English, music, speech, theater, and environmental design
SOCIAL	Ethnic studies, home economics, humanities (history, philosophy, religion, rhetoric), library science, physical and health education, psychology, social sciences (anthropology, political science, social work), education.
ENTERPRISING	Business, communications, computer/information science, law, public affairs, journalism, marketing, industrial engineering.

A few researchers have noted specific disciplinary differences in the design of learning experience. A first important contribution more focused on instructional design reflection for specific discipline is provided by Neumann, Parry, and Becher (2002), that extend Biglan's taxonomy to describe differences in curriculum, teaching and assessment for each category. They identified ways in which teaching and the assimilation of knowledge is typically achieved. Subsequently and consistently with the need to understand how to draw various teaching experiences with the specific curriculum in e-learning setting, White and Liccardi (2006a; 2006b) taking in to consideration the Biglan's Taxonomy of Academic Disciplines (Biglan, *op. cit.*), surveyed students' perceptions of the usefulness of specific e-learning methods in different area of academic study in order to support the specific learning design.

However these studies not analyzed the *disciplinary's domain* as a factor that guide the instructors to approach learning design and to select innovative technologies in the digital era. Integrating educational technology into distance teaching process needs to include disciplinary distinctives that may come into play.

The sensitivity to this issue goes back to work (Waggoner, 1994b) on the theme of disciplines and technologies for teaching where its technology is the basis of a model aimed at supporting investigating disciplinary differences referring to teaching with technology in order to enable more effective integration of technology into the education curricula.

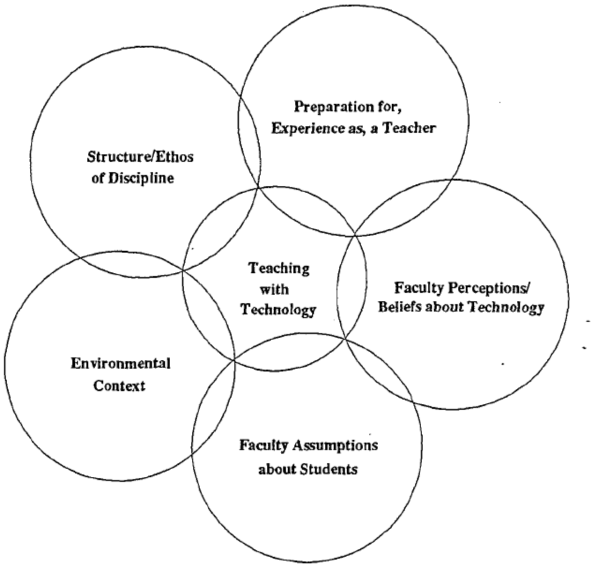

Fig. 2 - A model for examining disciplinary differences with technology

In more recent years have been examined different studies that have examining disciplinary differences and the use of Computer Mediated Communication in distance education and identifying disciplinary differences as an important factor affecting the use and appropriateness of different technologies to teach in specific domain area (Arbaugh, 2005; Lowenthal, 2009; Smith *et al.*, 2008).

Researchers in distance education field have not adequately investigated the differences among specific disciplines compared to new methods and technologies that can maximize their effectiveness in terms of learning processes and sustainable model of teaching that can be valued.

The disciplines have their own epistemological articulation which consists of object, language, hermeneutics, research methodology, transferability and principles. This means that the disciplines should be declined, through teaching mediation, in an appropriate training and that tools and methodologies be adapted to disciplinary structure, conceptual frame and specific purpose of each discipline.

The distance education research field need to understand how technology plays in different disciplines and how define specific educational setting to guide student in the transformative process. However, we cannot address the phenomenon as a whole, almost as if these “technological recipes” may be appropriate for all learning and training situations. A thorough knowledge of new technologies and their real educational power is needed, both for ensuring a stable ground on which to construct innovative forms of teaching and learning, and for choosing among the available technologies the best suited ones as for the peculiarities of a specific subject area. The technologies, in fact, may intervene on a specific curriculum to ensure educational and epistemic authenticity to disciplinary knowledge.

It is important to investigate and understand how the experiential relationship with technology, integrated into the teaching / learning process, may nowadays present itself as a new digital wisdom in the teaching of disciplines, rather than to identify *general purpose* technological applications.

This is the investigational aim of Je-LKS special issue, which can be better articulated in some methodological and technical-applicative questions:

- How can insight into disciplinary differences assist the selection of effective e-learning approaches?
- What are the technology affordances of e-learning which might best be used in specific domain areas?
- What cognitive, emotional, behavioral processes are to be supported when learning a specific discipline?
- What principles the e-learning forms must meet to be effective in a specific disciplinary context?
- What are, if any, the empirical evidences?

The objects of investigation, the descriptive language and methods to investigate them can be found in an e-learning approach that might maximize the educational principles and conditions for each specific and make teaching settings more effective.

Although isolated practitioners and researchers have discussed the differences across disciplines, e-learning researchers have not discussed about how the instructional design and technologies choices impact on learning and teaching different domains.

In particular, the issue presents a varied articulation of contributions that may be associated, even for a reading and streamlined classification, the taxonomy of Smart and allows you to understand the disciplinary specificity with respect to elements of *teaching* and *learning* and to guide the search to some solutions for educational environments which facilitate cognitive and didactic processes in specific domain.

In this issue we host representative several papers that refer to various disciplinary domains. In a completely arbitrary functional to give an order of presentation, we use the recent classification of J. Smart to define a simple association that represents the structure and the sequence of this special issue.

INVESTIGATIVE. In the paper " *Inquiry-based learning in Science Education. Why e-learning can make a difference*" of G. Agrusti taking as reference the complex domain of science education tries to provide a complete picture of what can be defined the *main theoretical assumptions beyond inquiry-based Science Education* (IBSE), its specific features in everyday teaching and how it can be enhanced by a systematic and proper use of a variety of e-learning solutions. Also in this category are the work of G. Albano and P. Ferrari "*Linguistic competence and mathematics learning: the tools of e-learning*" about mathematics education in e-learning platforms. What is the nature of the difficulties, frequently insurmountable, that many students have with comprehension of mathematics? What characterizes mathematical activity from a cognitive point of view? In the frame of discursive approach to mathematics learning, the authors focus the attention on multisemioticity and multivariety, as they characterize mathematical practice and students' linguistic competence seems to be strictly linked to their success in mathematics learning. The paper of M. Michelini "*Training teachers in educational innovative and vocational guidance in modern physics through e-learning in the IDIFO Master's Program*" focuses the attention on teaching of modern physics in high schools, subject of debate, although physics is included on the curricula of most OECD countries. The author, according to different studies that are demonstrate as there is need to build operative capacity, which integrates knowledge of specific subject areas with the expertise to overcome students' learning difficulties (Pedagogical Content Knowledge - PCK), presents a reconstruction of the interpretative framework of physic education and a debate on the various approaches to teaching / learning in this specific domains. A new framework is presented in the IDIFO Master's for the distance-training of high school teachers in teaching modern physics.

ARTISTIC. The paper "*Creating e-learning History of Art courses in Higher Education*", wrote by G. Marinesi and C. Matera, aims to identify the most used methodologies to teach History of Art in Higher Education and, based on these considerations, to describe a model to design History of Art e-learning courses for University. A. Baratè, M. G. Bergomi and L. A. Ludovico in “*Development of Serious Games for Music Education*” address a specific knowledge field, namely Music Education. According to the authors, and from research industry’s most innovative, serious games can be applied to this domain for a number of different purposes. For instance it is possible to teach the key concepts of music theory and instrumental practice through ad-hoc hardware and software frameworks. After showing a general approach to this issue, the work has focused a multilayer approach to music information, in order to get a rich and comprehensive description for a music piece and on adoption of the IEEE 1599 standard to enable a number of possible serious games oriented to music education. Also in this category we can associate the article of P. Di Tore, T. Discepolo and S. Di Tore “*Natural User Interfaces as a powerful tool for courseware design in Physical Education*” it is treated the theme of e-learning solutions to the field of Physical Education. Knowledge related to Physical Education is defined as enactive knowledge, codified in the form of motor responses and acquired in the action, not mediated by the iconic and symbolic plan. The article presents a theoretical and methodological approaches that underlying learning of motor skills and indicates the possible technological scenario, according to the type of interaction determined by the Natural Interfaces.

SOCIAL. Students of psychology as a minor subject often face the problem that they cannot attend psychology lectures as they coincide with courses in their major field of studies. In “*Lecture-Recordings: A solution for students of psychology as a minor subject*” T. Spaeth-Hilbert, T. Seufert and S. Wesner starting from the studies on learning differences between lecture-recordings and live-lectures, that show that students are convinced that the electronic delivery of learning materials facilitates their learning outcome, and present two field studies able to demonstrate whether low-effort lecture-recordings is recommendable for students of psychology according to students’ learning outcome, motivation and participation. The paper of G. R. Mangione, N. Capuano, F. Orciuoli e P. Ritrovato “*Disaster Education: a narrative-based approach to support learning, motivation and student’s engagement*” present a novel adaptive storytelling model defined in the context of ALICE project and its contextualization in the field of Disaster Education. The defined model aims at maximizing learner’s understanding and development of concepts fostering the “learning in action” and problem solving skills in natural disaster contexts by combining direct experience, observation, discovery and action. In particular the model arises motivation in the story and creatively engage learners in finding solutions to a problem and building personal responsibility. The experimentation results are encouraging and confirm that the storytelling offers higher engagement than the traditional practicing methods in the disaster education. The inclusion is a crucial part of the school at the base of the principle of equal opportunities. The paper of A. di Pace tackles the delicate issue of inclusive education, identifying those who should be the principles to teach teachers involved in the TFA course (Tirocinio Formativo Attivo – teachers in training) about Special Educational Needs and the role of technology in promoting inclusive learning. Education dedicated to Learning Disabilities promotes inclusive practices, starting from educational paths that require digital and innovative methodological-didactic expertise. The paper reasons about *the practical supports for teachers in classrooms to help them in use of ICT to promote inclusive education* and the analysis conducted allows the definition of important future actions to foster the training of teachers to an inclusive education.

ENTERPRISING. How can we support our students in the development of their Computer Science (CS) expertise, in the acquisition of new knowledge, skills, and meta-competencies? How can web technologies facilitate CS education? Starting from these questions M. Coccoli, G. Vercelli, G. Vivanet This paper discusses the use of a collaborative learning environment, specifically designed for computer science education. It is based on the use of semantic-wiki to support the sharing and acquiring of knowledge in this specific knowledge domain, enabling the application of basic pedagogical principles. This paper aims to stimulate the activity of reflection on the fundamental concepts of computer science teaching in reconstructing the setting of interpretive phenomenology and promoting the comparison of different proposals for teaching/learning.

Research confirms that "*although the action of the teacher there is a substantial unitariety, the supports for the action come from different disciplines and autonomous*" (Rossi, 2011, p. 63).

This special issue puts the current studies into a larger context of disciplinary education and provides some possible new theoretical directions (or endorses approaches already defined) for e-learning and technology enhanced learning and the practical implications for instructional designers suggesting logical directions for future sectorial studies.

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