

What learning theory behind the learning objects?

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Starting from the impression that e-learning implies a pedagogical involution rather than a widening of learning opportunities - notwithstanding the claims of many e-learning practitioners - the paper sets out to investigate a few basic issues arising both from the actual observation of some specific applications and the analysis of e-learning models. In particular the paper discusses the opportunity to distinguish between different e-learning models, according to specific requirements, and the need to rely on an explicit learning theory to suit those requirements.

Keywords: e-learning theories, learning objects, e-learning models

"Education is not the filling of a pail, but the lighting of a fire."
William Butler Yeats

"There are more things in heaven and earth, Horatio,
than are dreamt of in your philosophy"
Hamlet - Act I. Scene V

1. Introduction

Any time the fields of teaching/learning undergoes a major technological revolution there seems to be an involution at a pedagogical level. Is that so in the case of e-learning? This is the impression one gets when closely examining many e-learning environments, which seem at best to rely on a transmissive idea of learning. In fact the prevailing focus on the learning objects, meant as *small units of learning*, or "educational content broken down into small chunks that can be reused in various learning environments" [1] seems to stress their need to be standardised more than their learning value. Moreover, if it is true that some scholars investigated the instructional design underlying learning objects as early as 2000 - see for instance Whiley [2] - no many others have followed their lead.

The paper² sets out to answer this and a few more relevant questions, arising both from actual observation of some specific applications and from the analysis of e-learning models. It relies on three main assumptions:

- a) the need to have an explicit learning theory; since there is no neutral learning material/environment, we'd better have a learning theory which suits our requirements;
- b) the fact that, as often as not, the declared theory is not the applied one;
- c) the opportunity to distinguish between different models of e-learning, according both to the target and the objectives, in order to decide which one is best suited to both.

First of all a few practical examples will be considered. Then some classification of e-learning developments, featuring different learning models and their underlying learning theories, will be analysed: the first one outlined by Meyers and Freitas³ [3], the second one summarised by T. Campi [4], the last one

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² The ideas behind the paper mainly arose from presentations delivered at the in which the author took part as an associate.

³ The review provides an exhaustive discussion of e-learning models, applied in Higher and Further Education, against some well known learning theories and pedagogical frameworks.

devised Calvani, Ranieri [5] The first classifications features four partitions, according to the prevailing focus: *subject matter*, *individual tasks*, *discussion*, *communities of practices* while the last two comprise three slightly different models: *e-content*, *e-teaching*, *e-learning*; *content/support*, *wrap around*, *integrated/collaborative*, respectively.

2. Where did everything start?

While I was attending SLe-L (the Italian association of e-learning practitioners) 3rd Congress, held in Rome in July 2006, I realised that quite a few among the e-learning experiences presented sounded somewhat misplaced or unconvincing. On the one hand, the actual models being presented didn't seem to match the theoretical framework the presenters referred to - MAFALDA [6] the e-learning programme for Higher Education, set up by a consortiums of both private and academic partners, is quite a good example of this: being an honest specimen of content/plus support e-learning model, pretends to rely on a constructivist/collaborative pedagogical framework -. On the other hand, there didn't seem to be any reference to a pedagogical framework whatsoever in the implementation of practical models. The experiment referred to by Limongelli and Temperini [7] illustrates fairly well what I mean, in fact it discusses the design of a framework for the definition and management of personalized e-learning courses in a completely automated way.

In other words, practitioners seemed either to be completely unaware that any learning environment refers implicitly or explicitly to a learning theory, and is based upon a pedagogical framework, or they did not teach what they preached, as the saying goes. In addition to that, in quite a few cases, the use of technology didn't seem to offer any added value in comparison with traditional teaching, both in terms of learning outcomes and cost-effectiveness ratios. So I asked myself what was the use of setting up the whole conundrum at all. When I tried to figure out what all this could mean I soon realised that

- a. I had hit on a really relevant issue;
- b. I could in no way discuss this issue thoroughly and exhaustively, given the extensive literature and the far reaching implications it afforded.
- c. the original intention of making a distinction between learning theories and teaching/learning methodologies, focusing in particular on CLT - *Cognitive Load theory* - and its application to e-learning, would stretch the scope of the paper too far.

Moreover, while doing research for the paper, I came across JISC⁴ - Joint Information Systems Committee - a British ICT organisation, which has devised a special, public funded, e-learning programme to tackle the same issues I was investigating, thus confirming my all-subjective feeling, but also making my attempt absolutely amateurish in comparison with it.

3. Why do we need a learning theory?

We can state, with Myers and De Freitas [5] that e-learning is in no way different from learning too court, in fact "there are really no models of e-learning *per se* - only e-enhancements of models of learning." [5]. This means that e-learning design implies two separate sets of decisions: on one side it involves a set of principled decisions, based on a learning theory and articulated into a pedagogical framework, in order to "uncover the implicit assumptions about technology." [5]; on the other side it requires a set of pragmatic decisions, such as the ones related to *efficiency/effectiveness*, or *costs*, or *quality/assurance*, just to mention a few. Of course, these two sets of decisions may also be used to evaluate existing learning models and environments.

In other words, when planning e-learning developments, as well as making decisions at a pragmatic level we need to rely on a set of general principles combined in a meaningful pedagogical framework. In

⁴ The e-Learning Programme has four main areas of focus, reflected in four strands - e-Learning and Pedagogy, Frameworks and Tools (ELF), Distributed e-Learning and Innovations

order to do that, we need to agree on what we mean by **theories of learning, pedagogical framework and models of e-learning**. Myers and De Freitas propose the following definitions:

“**Theories of learning** provide empirically-based accounts of the variables which influence the learning process, and provide explanations of the ways in which that influence occurs. **Pedagogical frameworks** describe the broad principles through which theory is applied to learning and teaching practice. **Models of e-learning** describe where technology plays a specific role in supporting learning. These can be described both at the level of pedagogical principles and at the level of detailed practice in implementing those principles.” [5]

Though pragmatic issues may carry a considerable weight in planning e-learning development, they do not fall within the scope of this paper, which mainly focuses on pedagogical principles.

4. Learning theories

Pedagogical decisions on learning are usually made according to a well grounded and widely shared framework, that of **Curriculum Design (CD)**, which involves four main steps:

- a) selecting a set of learning outcomes suited to the target needs and requirements;
- b) devising teaching and learning activities (TLA) to achieve the selected objectives successfully;
- c) choosing assessment tools to measure the learning outcomes;
- d) evaluating both the achievement of outcomes and the alignment of stages.

It is within this framework that the most relevant learning theories are mapped. Of course, no thorough discussion of learning theories can be attempted in this context, but a brief outline of the main streams followed by educational research in the last decades or so will be provided in order to better focus our understanding of e-learning models. Meyers & Freitas [5] group learning theories into three broad perspectives:

- a) **associative** (learning as an activity) which encompasses the research tradition of behaviourism, associationism and connectivism; though widely dismissed as a serious theoretical basis for education, it is the most widely applied theory to pedagogical design, but seldom recognised as such; many of the methods currently labelled as constructivist could be safely included in the associationist tradition;
- b) **cognitive/constructivist** (learning as achieving understanding), which is made up of many sub-areas - among them schema theory, information processing, problem solving theories and meta-cognitive processes - it favours procedural rather than declarative learning and teams up with the idea that learning is achieved through an active process of creating hypotheses through activities;
- c) **situative** (learning as a social practice); in this perspective the focus shifts from the analyses of learning to the social context in which learning takes place and the pattern of successful practices; it's forked up into two sub-divisions: practice fields - which stresses a socio-psychological view; communities of practice - which stresses the individual's relationships with a group. It is the most often talked of learning theory, possibly the least applied one in actual learning developments.

If we consider the three perspectives as different levels of learning analyses. instead of opposing views we can better understand existing e-learning models - or design new ones, at that. In this view, describing learning from a behaviouristic perspective would imply an overt analysis of activities and their outcomes for the individual learner; at a cognitive level it would mean taking into consideration structures and processes underlying individual performance; while at a situative level it would involve describing systems of activities of groups of learners.

Examining learning outcomes in a pedagogical perspective means to design learning activities against a learning theory. In this respect

- a) the **associative perspective** provides a highly focused set of objectives defined in terms of learning competences;

- b) the **cognitive perspective** encourages the framing of learning outcomes in meta-cognitive terms (learning how to learn, becoming independent learners);
- c) the **situated perspective** focuses on learning outcomes dependent on learning relationships with peers and describes them in terms of disciplinary practices.

When mapping theory into practice, that is, when designing learning developments, we need to unpack learning theories into a detailed pedagogical approach. We can do that by asking “a set of questions [...] the answers to which reveal the underlying pedagogic and pragmatic assumptions”[5]. According to Meyers & Freitas the questions to be asked in order to plan, or assess, an e-learning development are the following:

- Is the model characterised by an analysis of the learning outcomes into subject matter units?
- Is the model characterised by active ownership of the learning and teaching activities by the learners, producing task outcomes for feedback from tutors or peers?
- Is the model characterised by active discussion across groups of learners?
- Is the model characterised by a focus on the development of real-world practice?

5. e- Learning classifications

From the answer to the above questions Meyers & Freitas derive a four-fold classification of e-learning which they use to map existing e-learning models for HE and FE (Further Education) (See Table 1)

- Subject matter focus (Associationist/ISD)
- Focus on individual-tasks, formative assessment and dialogue (Cognitive/constructivist)
- Focus on group tasks and discussion (Socially-mediated constructivist)
- Focus on building communities of practice

Campi [3] - who has a corporate rather than an academic affiliation - distinguishes between three e-learning systems and their underlying projects, and maps them according to different practical application. He maintains that “grasping the differences between these systems would allow organisations to make informed decisions, consistent with their cultural, technological and organisational features” as well as the “socio-cognitive characteristics of their customers”[3]. He distinguishes the way in which each system relates to knowledge. In his view, **e-content** systems mainly deal with the representation of knowledge, **e-teaching systems** rely on the transmission of knowledge, while **e-learning systems** are the only ones capable of creating new knowledge, operating in a community of practice setting, according to collaborative principles. (See Table 1)

If we mapped Campi’s classification according to Meyers & Freitas’s, we would notice that both **e-content** and **e-teaching** would fit into group 1, while **e-learning** would fit into group 4. Apparently this classification would not be able to cover e-learning developments featuring cognitive/constructivist theories. In fact this is not the case, since Campi combines both cognitive and situative perspectives in his **e-learning** system, as is often the case with Italian scholars.

No wonder the classification proposed by Calvani & Ranieri [4] closely matches that proposed by Myers & Freitas, considered they all come from an academic affiliation. They propose a three-fold subdivision **content/support**, **wrap around**, **integrated/collaborative**, in which content/support comprises a further sub-division into *Synchronous* and *asynchronous*, while the **wrap around** model combines Meyers & Freitas group 2 and 3.

According to Calvani & Ranieri **Content/support** comprises “the most widespread and comparatively less costly models of learning” [5] since it is “what common sense is induced to think of when imagining online learning”. It is based upon the transmission of structured content supported by basic forms of tutoring. It can be offered both synchronously and asynchronously but doesn’t involve any real interaction even though it may use highly sophisticated technology. **Wrap around** instead refers to the idea that learning is an active process in which the learner has a central role, so the focus shift from content to interaction aided by technology tools/environment and purposely trained tutors. According to Calvani & Ranieri this is the best solution at HE and FE levels. The **Integrated collaborative** model may include **wrap around** features even though it mainly focuses on collaboration and sharing in the most typical community of practice spirit. (See Table 1)

The authors of the three classification seem to agree on the fact that the models in their classifications are rarely found in a pure form, at a practical level. They also agree on a few common recommendations to e-learning decision makers, experts, planners and implementers - in a world any stakeholders – either planning new developments or assessing exiting ones. First of all they need to carefully analyze their target needs and requirements; then they have to consider those needs and requirements both in terms of learning principles and pragmatic issues: then they ought to map their chosen learning theory against a pedagogical framework; finally they need to assess the added value of technology in order to choose the technological environment and/or tools accordingly.

	Learning theory	Pedagogical design	e-learning approach	Technological tools/practical model
Meyers & Freitas	Associative	Analysis of domain into a hierarchy of small units Sequencing of units into a combination Design of an instructional approach for each unit	Subject matter focus	LCMS LO LO metadata and templates Multimedia e-training intelligent tutoring
	Cognitive/ constructivist	Interaction with material systems and concept	Focus on individual tasks	Dialogue models, ntelligent tutoring systems, IMS Learning Design.
		Interaction with peers to develop understanding and competence.	Focus on group task and discussion	CSILE, Salmon's e-tivities, DialogPlus
	Situative	Social authentic interaction	Focus on building communities of practice	The CSALT networked learning model
Campi	transmissive	Organization of knowledge	e-content	LCMS LO LO metadata and templates Multimedia
		Transmission of knowledge	e-teaching	Virtual classroom Digital conferencing e-content plus interaction tools web-base learning
	Constructivist/ collaborative	Creation of knowledge	e-learning	Learning activities Interaction tools Customized learning environments
Calvani & Ranieri	Transmissive	Oriented towards individual learning of structured content	Content/support	<i>Asynchronous mode</i> LO repositories Authoring tools Structured modules Multimedia Built-in assessment tools
				<i>Synchronous mode</i> Authoring tools Video/audio conferencing tools Streaming tools
	Cognitive/ constructivist	Learning as an active construction of open flexible content and structures	Wrap-around	Internet as resource repository Internet as a shared working space Web forum (Free) Interaction tools
	Situative	Active collaborative building of knowledge through practice and reflection	Interactive/ collaborative	Network collaboration tools CSCL Sophisticated VLE

Table 1 Synopsis of 3 classifications of e-learning, mapped against learning theories, pedagogical design, e-learning models and technological tools.

Conclusions

If it is true that “few current e-learning examples are pure derivative of a pedagogical theory” [5 – p23] it is undeniable that many of them seem to belong to the associative/instructional perspective, no matter which of the three classification we consider. Even though there are quite a few models matching the cognitive/constructivist paradigm, there seem to be very few occurrences of e-learning environments in the situated area. My considerations, based on empirical and rather limited observation of actual e-learning examples, closely match the conclusions reached by Meyers Frejtas [5] in their classification of HE/FE e-learning environments in the UK and those of Calvani & Ranieri.

Why is that so? Meyers & Frejtas suggest a possible explanation: “The persistence in practice of a transmission didactic mode of teaching, for which there is no real theoretical basis but rather a strong folk tradition that compelling explanation will lead to better learning.” [5]. In other words content based e-learning models rely on widely shared and deeply rooted ideas and practices on education the world over. This is not so surprising, since this paradigm is the theoretical basis for most formal education systems. So even when planning an e-learning development, it is only too easy to rely on a widely shared pedagogical model rather than risking new ones.

Campi, on the other hand, suggests that content-based e-learning development are prevailing due to the fact that for quite a long time the focus has been almost exclusively on technology features, thus over-emphasizing the importance of technological factors over pedagogical ones. Moreover the prevalence of practical considerations over pedagogical ones, not only at corporate level but also in academic settings, may account for many e-content base developments.

Whatever the case, both the classifications and the recommendations by the experts we have followed so far seem to point to a paradigm shift, which implies an in-depth analysis of needs and requirements along with some serious consideration of pedagogical principles in the planning of any e-learning developments. The more so, in case of extensive programmes.

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