

Multimedia: virtual instruction, real learning

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As IT structures gradually extend, we should consider the efficacy of using multimedia in learning processes. In particular, we might reflect on the concept of the virtual workshop.

The question of whether virtual instruction corresponds to real learning becomes significant above all when technology makes available increasingly sophisticated tools. The same question becomes even more important when instruction and learning are based on "learning by doing".

The growth in the quantity and quality of both IT and multimedia methods and technologies fuel questions not on how to create such tools, but on how to make them effective in the teaching context.

Software design tools can be simulated just as environments for using complex machinery can be simulated. The crucial question is how does this skill learning become the learning of expertise?

In this scenario it is interesting to look at the concept of ontology and web semantics for the construction of virtual workshops. In particular, use of languages like OWL, RDF, XML, SMIL and SVG, which not only make it possible to create interactive environments for learning by doing, but also enable the generation of conceptual maps [1] that allow the highlighting of the structure of knowledge and hands-on in workshops.

Consequently, not only learning but also knowledge can be simulated and this can be shared and enjoyed consistently with semantic criteria.

Keywords multimedia; learning objects; structured languages

1. Premise

The diffusion of tools and technologies is not, in itself, sufficient to provoke thought on their use or their effectiveness.

Nonetheless, when these technologies interact extensively with the communications sphere in the wider sense, and with educational communication in a narrower sense, running the risk of the "normal gap" being extended to include culture, a new sort of division arises, called "digital divide", and it is impossible to ignore all the issues and complications that IT has brought to the complexities of human relations.

In this brief essay, we shall not examine the intricacies that might be schematized in the **learning-IT** pair, but rather an interesting part of it that we can schematize equally well in the **learning-multimediality** pair.

Undeniably in this context we are interested in exploring the multimediality that tends to transform into hypermediality. This means we should no longer refer to places where media appear merely as part of the same context, not dissimilar to what happens on the page of a book where the image and the text coexist, but rather to browsable structures in manifold communication dimensions.

The hypermedia to which the multimediality concept really refers is assimilable to the hypertext concept introduced in 1964 by Ted Nelson, assonant with the mathematical concept of "more dimension" (hyperspace).

Thus, multimediality is communication that uses various media (for instance a lesson, an audio format, with images and text on slides), whereas the term "hypermedial" or "hypermediality" indicates the fusion of multimedia content in a hypertext structure.

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Multimediality brings two consequences with it: on one hand the risk that a spectacular use is made of it, a form of stylistic enhancement of text, and on the other hand the virtual concept that seems to raise serious doubts about the real efficacy of its use in instruction.

2. What sort of virtual?

Quite often it is useful, or even crucial, to discover the meaning of a term in order to configure its precise location within a cognitive context.

The term “virtual” derives from the Medieval Latin *virtuale*, originally from the Classical Latin *virtus*, *virtutis*, which means **virtue**, and if we continue along this linguistic itinerary *virtute* → strength, valour, deriving from *vir* → man.

A linguistic chain that already compels reflection, but which becomes important in the context under examination, if we pursue this analysis to observe the meanings of virtual and highlight the third:

1. that exists potentially but is not yet realized: virtual capacity; virtual reality;
2. in mathematics: which might exist (for instance a virtual entity);
3. in physics: which could be realized (for instance shifting, virtual work), whereas in this perspective acquires the meaning of fictitious, not real (virtual image).

If we are to apply these definitions, even just as an exercise in logic, for the use of multimediality in the teaching/learning process, we can say that the greatest potential lies precisely in the first definition, to enable representation, construction and interaction with something that “exists potentially but has not yet been realized”, to be the first step on the path that leads to materialization and realization of instruction, and that leads to concrete learning.

In this perspective the concept of real learning is not in conflict with virtual instruction to testify to the event of what would appear to be a miracle, almost like being soaking wet on a sunny day, but the logical consequence of this way of perceiving the virtual.

The other two definitions are no less paradigmatic: if analyzed on one hand they accredit virtual with enabling all those teaching actions that would otherwise be impossible, and on the other hand they warn against “superficial” use.

Basically, if we reflect on the meaning of virtual as defined in (2) or in the first part of definition (3), we will realize, for instance, that we can consider it as representing cause-effects relationships that are easily made the object of experience. This may be because they are dangerous (for instance chemical reactions), or objectively impossible (for instance the bonds in an atom), or excessively costly (for instance running a radio telescope), or representing that tacit knowledge that cannot be verbalised, except with graphics and “virtual”, and even interactive, illustrations of reality (for instance, communication of a manual ability).

Undoubtedly the diffusion of e-learning has highlighted this issue, as well as all methodologies and technologies related to it, and brought about a situation, above all, whereby these tools become drivers of the knowledge structure so it can be shared ([2, 3]).

3. Multimediality and technology

3.1 Technology and non technique

When we ponder on how to implement digital tools for communication, information and instruction, the concepts of multimediality and also IT in general, lead immediately to the need to define which knowledge structure we want to drive.

The force and perhaps the simultaneous factor of greatest resistance to approaching these technologies, lies precisely in the fact that they oblige us to state what we “know how to do” but which we are “unable to explain” (once again the difficulty or even the downright impossibility of making expressing tacit knowledge).

In point of fact, if this difficulty is evident, it also has the merit of forcing us to reflect on the cognitive structure we wish to drive and which we feel we absolutely dominate.

We are called upon to describe and not only when we are writing texts but also when we want to communicate with graphics, animation and virtual reality.

Technology, the way we intend it now, is once again described by its “*original*” definition (see Figure 1), deriving from the Greek word *technología*, composed of the terms *tèchnè* (art) and *logòs* (treatise). The term *logòs*, in turn derived from the root *lègò*, means **I speak, I say, I describe**.

In the concept of “I describe”, the importance of explanatory languages emerges, as they allow the demonstration of context relations, leaving utmost flexibility for the example. Multimediality and interactivity have important references in XML (eXtensible Markup Language), SMIL (Synchronized Multimedia Integration Language), SVG (Scalable Vector Graphics), RDF (Resource Description Framework) and OWL (Web Ontology Language): all languages that undertake to describe the structure of the cognitive procedure, further valorizing the virtual concept as “what exists as potential”.

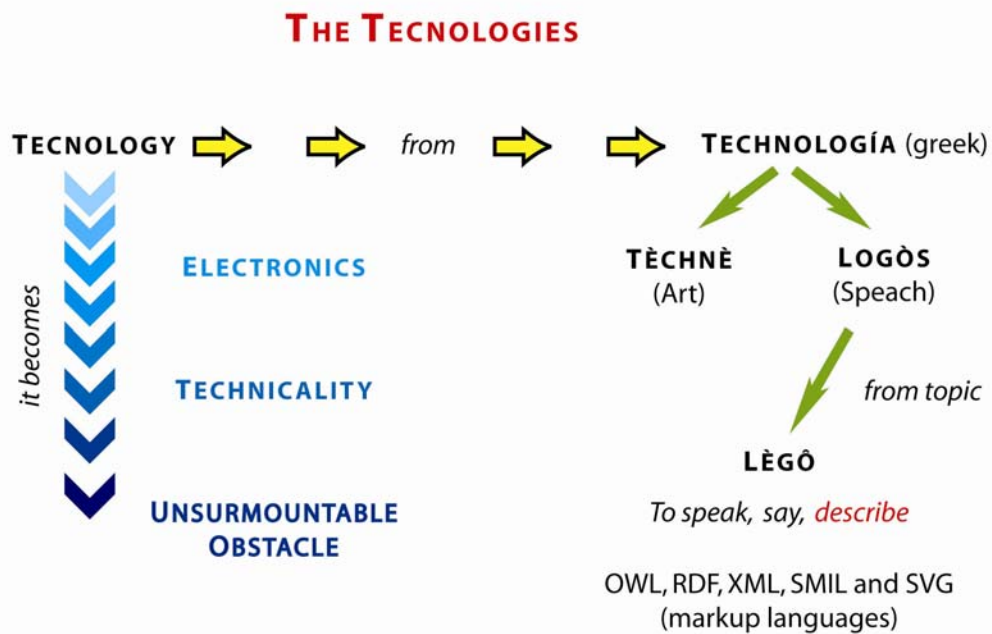


Fig. 1 Explanatory diagram of the term “technology”

The languages mentioned aim precisely at structuring, at the description of the structure of knowledge represented, in any case, so that the cultural resources of each component become the resource of a system, with the added value of expressing new relationships, and multimedia so consequently multi-accessible representation of knowledge.

In doing this, multimedia are attributed with the same potential as the hypertext as a key to accessing knowledge, in other words allows for a “multiplicity of accesses (different both in manner and in representation) and a multiplicity of expressive pathways and languages”.

Equally important is the use of languages like OWL, which flank this structuring because it brings forth the concept of “ontology” (*onto*+ *logòs*) as a science that “studies the concept and structure of the being in general and not of the phenomena in which it materialises and specifies”.

Learning this virtual is real, since it allows the surfacing, comprehension, acquisition and elaboration of the structure of knowledge, bringing to the fore, as now occurs in many places, the increasingly close connection between e-learning and knowledge management, which is what binds learning to knowledge, what makes us say that ours is a “society of information” that has transformed into a “society of knowledge”.

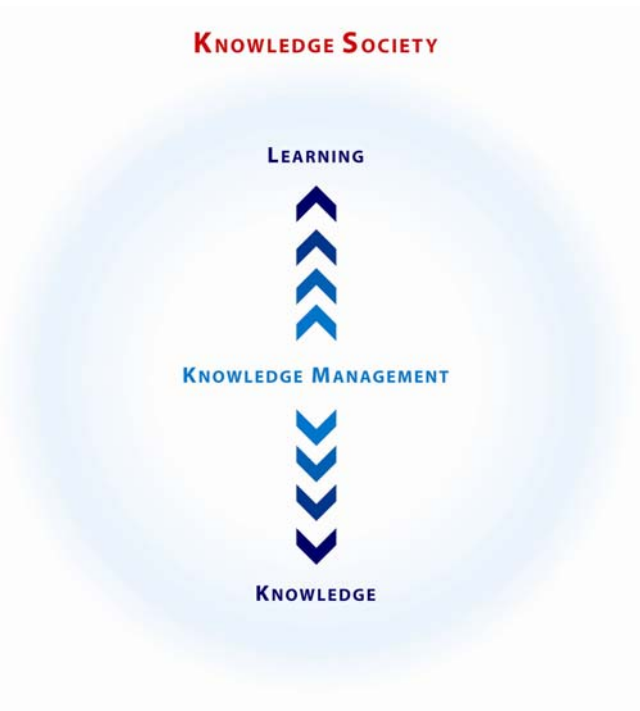


Fig. 2 Relationship between knowledge and learning

Therefore the society of knowledge feels the need to describe and multimedia are the response to this need, which generated “conceptual maps” (see Joseph Novak) supported by a logic of connectionistic series and “mental maps” (see Tony Buzan) upheld by a logic of associationistic series.

3.2 Description for technology

The word “describe” has been used as that which best expresses the work technology performs for realizing an effective multimedia reality for learning. But what does “describing” mean, independently of the languages and tools that we use?

Of course speaking of “description” with reference to “activating” tools highlights the great force and importance of this step, which in practice can be split up into:

1. *planning*
2. *formalising*
3. *communication*

Planning means defining objectives, targets and tools, and which are the required “knows” and “know hows”, and the targeted “knows” and “know hows” of the action.

Formalising means a series of perspective transformations:

1. from *languages* to *metalanguages*
2. from *format* to *representation* (with no explicit result but with an explicit meaning that is required to be represented)
3. from *datum* as a single element to *information* as a “recognisable and scientifically socialisable structure”.

Lastly, *communication*, which leads to the consideration that the means is not neutral, that it has its own specificity and that with the advent of evolved multimediality combined with strong interactivity, the means is “not just a means”, but becomes itself content.

Multimedia becomes a virtual place because there is not necessarily a “here and now”, but real enough to allow growth in synergy with expertise, a real where each new contribution enriches and transforms the system’s knowledge base [4].

4. Conclusions

I do not think it is possible or opportune to offer conclusions, as if a state of stability could exist if not as calm in a reflection on the use of multimedia and the virtual concept ensuing relative to the real benefits that can be had from instruction and learning processes.

It can be stated that the importance and extent of multimedia in this context do not derive from the sum of the expression and communication potential of each medium, but the real added value is that provided by the structuring of knowledge, which highlights “new know-hows” and “new ways of expressing” that cannot be expressed by the system’s individual components, a place that can foster “knowledge discovery” processes. Communication is of good quality if it meets or exceeds the needs of targets, if it produces “habit change”, if it gives answers to questions that cannot be expressed, and it can only do that through multimedia systems .

In conclusion to this brief commentary, perhaps readers might enjoy a quotation from Italian author Italo Calvino. “What are we if not a fusion of experiences, information, reading, fantasies? Each life an encyclopaedia, a library, an inventory of objects, an album of styles, where everything can be continuously remixed and sorted over in every possible way”.

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