# For a renewed academy industry research partnership

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# FOR A RENEWED ACADEMY INDUSTRY RESEARCH PARTNERSHIP

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## INTRODUCTION

The joint venture between the academic research on learning technology and industry along the past decade shares similarity with the gold rush: great effort for a too small outcome. From all the energy spent, "acadustry" has emerged; a chimerical community of practice, merging academic and industry objectives and traditions. The relevance and fruitfulness of this new community is questionable. This presentation will suggest revisiting the orientation of the eLearning research policy, taking into account the differences in nature between academic research, R&D and actual production and use. Among the priorities of policies to discuss, the following will be mentioned: (i) an incentive to reach a research consensus that complements the standardization effort; (ii) a strategic alliance between industry and research at a basic level for a common and enhanced understanding of differences and commonalities; (iii) a new balance between long lasting support to research, especially for pan-European initiatives in the context of ERA and in line with the current FP6 Networks of Excellence, and competitive calls focussing on specific actions. At a thematic level, this presentation will outline the lessons learned throughout the past decade and express a view on research priorities from a foundational and applied perspective.

## RESEARCH, A MAGIC WORD

The word "Research" evokes the fascination of knowledge as well as the expectation of the mastery of the unknown. Research outcomes are expected to be innovative by nature and reliable by construction. Every thing works as if being based on research, actions and decisions should be less risky than being based on any other grounds; namely, opinions and beliefs. Indeed, "opinion" is an intellectual category hazardous and anything but reliable, while "belief" is as contingent as opinion with the worse characteristic that facing failures it does not leave room for much revision.

The strength of research results lies in their justification, regulated argumentation (proof) or systematic empirical evidence, and their accessibility to revision under the pressure of refutation. Research results have the epistemic characteristic of knowledge; they are products of a human activity which transcend the historical and anecdotical context marking their origin. However, from a scientific perspective, a piece of knowledge is not a statement, but the complex "object" shaped by the relations between a statement, a proof and a theory—all framed by an accepted *problématique* that informs about the relevance of a question. The return of investment in research is the reliability, universality and openness of its outcomes, its cost is theory, proofs and dealing with refutations. This has two meanings: (i) research is not about the so called "reality", but phenomena identified through the lenses of a *problématique*; (ii) the dialectic of proofs and refutation is not empirical but of a theoretical nature, possibly addressing not a result but its rationale or even its underlying *problématique*.

Nothing new there, but something to bring back to the fore when we question the role and the contribution of research to the development of technology enhanced learning. Something which has been forgotten (or lost) with the emergence of "*acadustry*".

Along the past decades a remarkable progress has been made to develop the relationships between universities and industry in a sector where this relationship was almost absent: human learning, at all the levels, across all the sectors. This progress is essentially the result of the incentive of the European programs, requiring systematic cooperation between industry and universities within innovative R&D projects. *Innovation was the spirit, business plan was the rule*. This policy has proved its efficiency in several technical domains: an innovative idea backed by the theoretical and methodological robustness of academic research, and boosted by the dynamism and pragmatism of industry holds the potential of making a breakthrough and of opening the way to the best products or services. It is not clear that in the domain of technology enhanced learning this approach has been as successful as it might have been in other domains, although some success can surely be acknowledged. However, at least one impact should be mentioned, it is that of the method which has stimulated a new community of practice: "*acadustry*".

The history of technology for human learning is rather recent. It does not benefit from a strong and specific theoretical background, although educational psychology, pedagogy and educational sciences have already a long and significant history. Nor does it benefit from a large on-the-field experience. Then, instead of the transfer of research results, the strategy of most proposals was the constitution of an academy industry consortium around speculative ideas likely to be winning because of the intrinsic quality of the partners. The success depends first on the ability to be convincing about the idea and to be able to shape an organization of the work to be done with a rigorous organization of time and deliverables; just as if it were a task which is to be achieved and not an open problem which is to be solved—what in fact is often the case. *Acadustry* has emerged from this practice, resulting in the most significant partnership between academia and industry, but alienating itself from the academic world and with an effect on the market not that convincing. The academic alienation of acadustry comes from the fact that it develops itself from call to call, project to project with a very little chance to make a step back and learn from its success or failures—the priority is first to the new ideas and innovative approaches. The consortia themselves often evolve from call to call, and hence miss the benefit from what has been built along the projects life.

**ACADEMY INDUSTRY NEW ALLIANCE**

While *acadustry* has attracted most of the financing and of the expectations along the past decades, far less attention has been paid to the development of basic research on the specific concepts and methods needed to better understand and support learning technology innovation on both the technological and the human side. Such research is needed to enhance the design, the implementation and the use of environments that incorporate digital technologies in significant ways. Instead, basic research has developed in most of the European countries, based on the commitment of isolated groups of researchers, often limited in size with limited resources and without significant cross-disciplinary input that incorporates adequately the range of sociotechnical issues that need to be addressed to enhance learning. Typically, teams are organised to constitute communities of research, but without the means to maintain this collaboration at a level allowing significant breakthroughs. The challenge facing academic research lies in the multidisciplinary character of the research to be carried out, but also in the different understanding in Europe about what knowledge and learning means, how teaching and training should be organised, and a broader conceptualisation of what constitutes research in the domain of technologically-enhanced learning. It is this challenge that *Kaleidoscope*, a FP6 network of excellence in the field of Technology Enhanced Learning (TEL), has taken up.

A further tension is the one that exists between R&D driven by technological innovation, and R&D driven by learning needs. Dealing with this issue has strengthened awareness that the learner should always be seen as the centre of research on ICT-based learning. However, "the learner" is not a single entity: he or she learns at school, at the workplace, at home, etc. Indeed, the learner changes throughout his or her life. Hence, learning in the e-society demands a paradigm shift, which puts people and their communities at the centre of knowledge-construction within mobile and culturally diverse scenarios.

Research should overcome this complexity by addressing it directly in search of a common ground, a shared theoretical and methodological framework beyond disciplinary specificities, but clearly and firmly rooted in the disciplines. This is a first priority for the coming decade; the academic community has

to organize itself in order to fight against the fragmentation of knowledge deriving from the research carried out in the field of TEL. A second priority is to continuously ensure the communication between the academic community and the industry and users' group. Actually, one should be aware that if the transfer of academic results is not straightforward, symmetrically the needs of industry and users—or the difficulty they report—do not immediately translate into problems that research can be concerned with. A systematic work—not only ad hoc brainstorming—is needed, with a significant continuity, associating researchers, industry and all kind of users representatives, as well as policy makers.

Time and continuity are key conditions to implement such a policy. This does not mean providing a blind support to basic research, but a commitment to supporting a continuous effort to develop research and signicant links between research, industry and users. A significant change and a better effectiveness can be expected in the coming decade if research and industry can establish a new alliance ensuring:

- A *shared understanding of the academic research outcomes*, as well as their value and limits with respect to technology transfer and the deployment of use;
- A *consensus on the priorities of basic research in the context of the global competition*, and the way these priorities relate to industry and users needs and expectations;
- A *better balance between long term research and precompetitive R&D*.

**THE CORE COMPLEXITY OF (e)LEARNING: EMERGENCE**

The core complexity faced by research on learning is that meaning is the emergent property of a complex and interactive systems of which learners are one constituant. The competence and the understanding of human beings is the result of their efficient adaptation to a milieu—either social, material or symbolic—which in return changes as a result of this same adaptation. Here stands the origin of most of the problems we face in designing and implementing technology to enhance learning. An other dimension of this complexity is related to the explicit aim of education or training, which implies the capacity to "control" the learners progresses and the capacity to ensure the expected learning outcomes. There lies a fundamental tension, which is a tension between the autonomy of the learner that is necessary to ensure a genuine learning, and the needed supervision by a didactical entity (either an educational or a training institution). In short, considering learning through the lenses of eLearning, the freedom of the learner is bound by an institutional expectation.

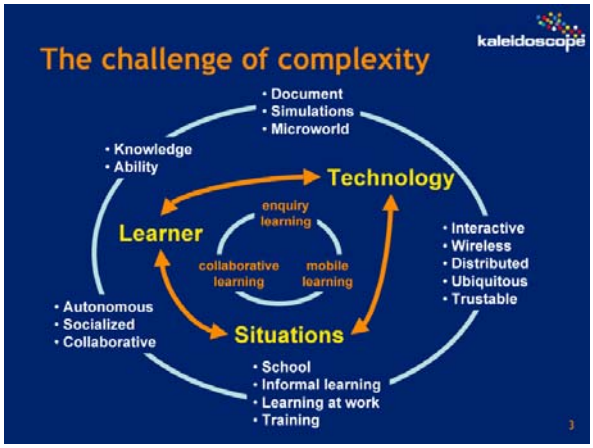
This constraint of a cognitive and institutional nature, interacts with an other constraint which comes from the intrinsic characteristics of the knowledge considered. Mathematics, music and surgery—just to mention a few—do not require the same strategies, nor the same technological resources in order to ensure an efficient learning. In all these cases, the balance between explicit and tacit knowledge, between symbolic and embodied representation, the way one can evaluate the solution of a problem or of the achievement of a task, is radically different. This *intrinsic specificity of knowledge* is related to the fact that, as a category of intellectual construct, knowledge is related to a claim for validity based on a rationale which is specific to its proper nature. This is a critical obstacle to every effort to find generic solutions at an epistemic level as well as at an educational level.

These characteristics of learning from an educational perspective (or a didactical perspective) impose themselves more and more, as we develop R&D approaches which put the learner at the core of the design and implementation processes. They have not been explored sufficiently yet; embarking them in our research *problématique* is now critical to reaching a stage at which eLearning will be viable and efficient enough to be convincing. The task is difficult, but the challenge is even higher with the recent technology development either of simulation technology in all domains, opening new avenues to vocational training, or of web services which enlarge the scope of what can be shared, or of mobile technologies and more powerful handheld devices, which has stimulated the expectation for more mobile and more distributed learning environments.

The following diagramme sketches the different layers at which this evolution impact research, and R&D as well. It demonstrates that what we need are concepts and models from almost all the different sectors of the learning sciences, and of computer sciences. But these concepts and models must be tightly related. We see then, that pluridisclinarity is

not a matter of collaboration between human-and-social sciences and technology, but that it is also a requirement within human and social sciences (e.g. between psychology, sociology and education), and within technology and computer sciences.

While the focus on the *learner* was the mark of the past decade, the focus on the *situation* is likely to be the mark of the coming decade; being pushed to the fore by the development of mobile technology and of research on ambient informatics.




Then, three *problématiques* are today at the core of research on TEL:

- *Computer supported collaborative learning*;
- *Computer supported inquiry learning*;
- *Mobile learning*.

All the three have developed at an international level with a rather strong input from the European research teams. The most recent development, which can be seen as a result of the better networking of research in Europe, is the increased awareness of the need for better integration of these research lines. The meeting points are on the one hand the search for *tools allowing to trace and understand the learner activity* (the outcomes from the use of such tools being used either by the technology or by human teachers or trainers, or by the learners themselves), and on the other hand the search for *scripts and scenari likely to make learning more productive* in such environments. Mobility, more than the development of the networks, opens new perspective to *informal learning* which is emerging as one of the research domain of a growing interest.

Yet, knowledge seems to be absent although it is the keystone of eLearning architectures and the driving force of learning in general. It is absent from the picture because it is a product of the interaction of the different components which are represented. Knowledge, as meaning or understanding, is a property of the interaction between learners and technology in learning situations. If it had to be represented somewhere, it is at the center of the picture with links with each of the other keywords. My main recommendation is to explore to which extent the specificity of the knowledge at stake binds our efforts to design efficient learning environments, and our efforts to implement and deploy them. From the point of view of their use, every thing starts and ends with the question: did they learn with this technology? What did they learn? Understanding the place of knowledge in our *problématique* is the only way to reach a valid answer to such questions. This issue becomes critical when one takes the responsibility of certifying what has been learned, either delivering a formal diploma or not.

It is commonly acknowledged that very little of the claimed potential of TEL is reflected in the practice of learning and teaching, and much remains to be done in terms of allowing European citizens of the Knowledge Society to take full advantage of the opportunities that these technologies offer to improve their quality of life. First, research has often failed to build on existing results, and to develop a cumulative framework which can inform future research priorities and develop research-based innovation. This failure is compounded by difficulties of cultural and linguistic diversity. Second - and relatedly - there has been a systematic failure to address the intrinsic complexity of research on learning in the context of technology-enhanced environments.

The research priorities, as a fundational level, in the coming decade should:

- Develop *a comprehensive and coherent theoretical framework* for research on collaborative learning, inquiry learning and the so-called “mobile learning”;
- Explore the *specifity of knowledge in all its aspects*, explicit and tacit, symbolic and in action, institutional and private (expert knowledge), and their consequences on the design and implementation of TEL;
- Specify the *design principles of trustable learning environment*, allowing a secure approach of online certification;

However, these priorities are still at the level of design and implementation. An important issue to be addressed, which is critical to further development, is the availability of structural and organizational models for integrating technology-enhanced learning into organizations. Such question must be explored in close collaboration with industry and all kind of organizations and institutions in charge of learning, education and training.

**CONCLUSION**

One expects from research the knowledge and the tools to invent and deploy novel computational solutions to technology-enhanced learning environments that are adaptive, knowledgeable, cognitively sensitive, pervasive, multi-modal and personalize. I borrow here the words we used to express the context of the challenge *Kaleidoscope* faces. This challenge, for basic research, is to coin strong and effective foundations in the cognitive and learning sciences, including a socio-cultural perspective, likely to strengthen the design and development of educational technologies. Not only will this approach ensure a better success at a technological level and the level of the deployment of the TEL, but it will also allow us to learn quicker and more efficiently from our failures.

A strategic move will have implications at the level of the definition of the research priorities, however, it will also have consequences at a structural level. Industry and academia must find a consensus on the way basic research can be supported in a sustainable way, and on the way its priorities are defined without necessarily targeting short term achievement on the field or on the market[1].

A characteristic of the organization of the European research on TEL is its fragmentation, and the often small size of the research teams. *Kaleidoscope* represents a collective effort to improve the situation by networking these teams, stimulating the emergence of a common scientific agenda and the building of a consensus at a content level. However, this characteristic can also be observed in the case of industry: the European producers and providers of eLearning and TEL resources are in most cases SMEs. These enterprises have often not the means to support the innovation and technology transfer they need, and any failure is for them even more risky than for big companies. The development of the academic network must be in synergy with the development of a network of SMEs so that they can share and make the best use of the research results. This must be especially easy at a basic level, where there is a long tradition of open access to knowledge.

For cultural and historical reasons, there are in Europe very different needs of users of eLearning and TEL environments, or expression of these needs. This is due to the diversity of the school systems, of their history, as well as of the training tradition. This is even more the case for life-long learning for which there very different cultural heritages. The grid of the research teams and SMEs is a characteristic of the European organization in the field of learning and technology. We must observe that it is quite appropriate to address the diversity of the demands and expectations; strengthening this grid by a renewed *Academy Industry Digital Alliance* must be our priority, an initiative which will be sustainable and scalable because of its pan-European nature.

[1] Actually, we do know that in the case of education and training the most important is not so much the direct economical return but the return to society—a return which takes time to be visible.