



**eLearning**

Contract No: **2002-4075/001-001 EDU-ELEARN**

Project Title: **DELPHI: European Observatory of e-Learning Practice**

Deliverable Type: **Public/Internal/Restricted**

Deliverable No: **3**

Work Package: **3**

Deliverable Title: **Report on New Methods to Learning in Technology-based Environments, and Related Policy Matters: IST and IHP projects related**

Version **DRAFT**

Date of report: **31/01/2004**

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## Introduction

The DELPHI Project, supported by the eLearning Action Plan, aims to synthesize the results of recently completed RTD projects in an attempt to shed light into the fundamental changes arisen at the level of methodologies and learning processes necessary to propose a future agenda on the innovative use of ICT in Education and for the benefit of the European citizenry's Lifelong Learning endeavours. In principle the DELPHI Project aims to give responses and on specify the trends to a series of transversal research questions, those being:

- 1) What are the new methodological approaches to learning in technology-based learning scenarios and what is their efficiency? What are the new co-operative learning processes, the cross-curricular skills and changes in teaching/learning, role changes configuring technology ICT-based learning innovations? How is effectiveness considered in the different innovations analysed?
- 2) What are the consequences for organisations when introducing these new ways of learning, including European cross-cultural issues involved in the process?
- 3) What are the contributions of ICT to lifelong learning in terms of access to education and training? Does the introduction of ICT stimulate the dual society and thus social exclusion?

In parallel the project intends to utilize the knowledge generated by its sub-activities in the context of an Internet-based observatory on learning innovation. The above aims are achieved by the implementation of various activities that range from thematic study reviews to expert group discussions and from the establishment of a project's monitoring system to the maintenance of an observatory.

This document constitutes the project's third deliverable and the intent behind its development is to report on the contribution of twelve EC funded projects to the understanding of new methods to learning in technology based environments, under an indicators of change perspective and the implications of such understanding for policy purposes. The projects reviewed in the frame of this workpackage were funded by the IHP and the IST Programmes. Four IHP cluster projects were selected and eight IST ones.

The structure of the report is as such so as to allow the reader to get acquainted with the case projects reviewed, analysed and synthesized in the frame of the project's third work package under an AREA perspective rather than a sectoral one. The areas discussed in the report are:

- Pedagogical
- Institutional
- Cross-cultural/socio-economic

The work reported here gives a particular focus to the identification of

- methodological trends
- issues related to learning scenarios
- gender perspectives to ICT Assisted Learning

- socio-economic variables affecting / affected by ICT Assisted Learning.

This focus areas are reflected on the discussion presented in the last section of this report.

The Chapter that follows presents a brief discussion on e-learning under the scope of ICT based innovation in learning. It is based on the project's first deliverable and brings into the discussion new issues for debate. The second chapter discusses the methodological approach followed in the attempt to depict key indicators of change. The third chapter discusses the findings of the case studies under the three area perspective outlined above while the fourth discusses the results obtained from the review and analysis of the cases in terms of indicators. The report concludes with a set of recommendations for policy on e-learning from a pedagogical, functional, institutional and socio-cultural points of views. This last section draws input from the findings of previously done work namely the review of 18 MINERVA projects.

As indicated above the review process reported here was undertaken in order to facilitate an analytical Theoretical Structure based on indicators of change. The project's next stage activity through a reflection process is to guide recommendations for key stakeholders in the area of e-learning. These are to be disseminated through the DELPHI Laboratory (discussion forum structure) and thereafter through the DELPHI Observatory.

## Chapter 1: e-learning trends

### *Background*

The project's first public deliverable: e-learning – State of the Art, identified and discussed the areas of key innovations that need to be considered in describing the state of the art in e-learning. These have been used as the bases for the review and analyses of the case projects by facilitating the formulation of a review template, details of which are presented in the chapter of methodology. The review of the state of the literature revealed that the various definitions on e-learning all imply “innovation” through the use of ICT to the learning / teaching process. In this respect the discussion in the second deliverable focused more on parameters and factors related to INNOVATION (under various perspectives), while in this report the focus is shifting to the area perspective: Pedagogical, Institutional, Socio-economic. This is in line with the eLearning Action Plan's objective for e-Learning, which aim to

- Help the individual to realize his or her full potential and lead a happy and fruitful life
- Reduce the disparities and inequalities between individuals or groups
- Ensure that the skills available meet the needs of business and employers

and in turn suggests that e-Learning is

- based on a reliable **technology** but is **pedagogy-oriented**
- a **social process** and should facilitate interaction and collaboration between people
- implies **organizational change** and teacher/tutor training.

### *E-learning trends: pedagogical, institutional and socio-economic issues*

DELPHI's first deliverable intended to provide an overview on the state of the art on e-learning and outlined several dimensions which have to be taken into account in considering the umbrella notion of e-learning, the most predominant ones being:

- Pedagogical / psychological view (e.g. learning concept, teaching techniques / instructional concept)
- Technological / functional view (e.g. platform requirements; features/tools)
- Organisational / economical view and
- Socio-cultural view.

As outlined in the first deliverable and expanded upon in the project's second deliverable (chapter 1) recent discussions and recently conducted reviews on e-learning suggest that while a clean definition on e-learning is far from being universally accepted from a conceptual point of view it is recognized that the concept refers to the “innovative practices in learning, mainly through the use of multimedia and the Internet (both in formal and informal settings). The role of technology in learning is to facilitate the reduction of dependencies in terms of space, time and pace of learning.

In the project's first deliverable e-learning was defined on the bases of Desmond Keegan's notion of distance education and is characterized as synonymous to on line education built on the features of

- the separation of teachers and learners which distinguishes it from face-to-face education
- the influence of an educational organization which distinguishes it from self-study and private tutoring
- the use of a computer network to present or distribute some educational content
- the provision of two-way communication via a computer network so that students may benefit from communication with each other, teachers, and staff

Similarly the ESIB policy Paper on e-learning defines e-learning as a form of formal or non-formal education aimed at attracting set learning goals, in which direct interaction between teachers and students as well as among student groups is facilitated by ICT (<http://www.esib.org/policies/e-learning.htm>). ESIB however, proceeds to report that the majority of e-learning courses are inspired by market driven forces, of which the cutting of costs and the provision by for-profit education institutions are the most important. Instead, ESIB considers that these reasons should not be decisive when providing e-learning. As for any other form education, self-development, the added value for society and individual, preparation for life as an active citizen in a democratic society etc. should be primarily taken into account.

The first Forum on the [elearningeuropa.info](http://elearningeuropa.info) portal on the discussion of the concept of e-learning, in which experts from around Europe participated, suggests that there is agreement on the need to change education and that e-learning happens to be “in the right place and in the right time”. There seems to be a coincidence between e-learning as a tool and the necessity to modify the traditional model of education. A concise version of the Discussion Forum is presented herebelow.

### ***What’s e-Learning: New Paradigm or New Toy?***

The first [Forum](#) on the [elearningeuropa.info](http://elearningeuropa.info) portal has inspired participation from experts around Europe. Many interesting opinions have been posted, highlighting the problems faced by educational institutions.

The purpose of the Forum was to discuss the concept of e-learning: its role, its potential and its definition. Two months after its inauguration, the Forum has sparked a vibrant debate.

From the comments posted, there appears to be unanimous agreement on the need to change education and that e-learning happens to be "in the right place and in the right time". There seems to be a coincidence between e-learning as a tool and the necessity to modify the traditional model of education.

### ***The essence of e-learning***

“As far back as 1985, **Neil Postman** posed the question: ‘Does television shape culture or merely reflect it?’ and concluded that ‘The question has largely disappeared as television has gradually become the culture’. Fast-forward to 2003 and pose the same question about e-learning and you might reasonably reach an analogous conclusion,” reasons **Jim Devine**, Director of the Institute of Art, Design and Technology Dun Laoghaire (Ireland), in a comment with the meaningful title “What’s

e-Learning: New Paradigm or New Toy?”. This question summarizes an important part of the Forum discussion.

**Chris O’Hagan**, from the University of Derby, provided an answer: e-learning “is not a paradigm shift. It may be heralding a shift of some kind, but the role of e-learning appears to be in exposing anomalies in the current educational systems”. According to his opinion, “there is very little new 'pedagogically' in e-learning. (...) Technology is used to mimic the pedagogies of traditional teaching - lecture, seminar discussion, objective testing etc. The methods are the same, though the delivery is notionally different”.

“What is the difference between learning and e-learning?”, asks **Karl Donert**, International Fellow and Senior Lecturer, Liverpool Hope University College. The possible answer should consider “that learning is learning whether or not is has an extra 'e' in it or not”. (...) “What concerns me is the continued hype about technology - it always seems to be moving forward without pause for reflection and consideration of the outcomes for learners. So we never really understand the processes taking place. Thus in e-learning I think we need to concentrate on the learning component rather than the 'e'.”

**Jim Devine** proposes that the question “might be more appropriately asked: 'What does e-learning enable?' (...) e-Learning, in terms of a set of methodological instruments, is by its very nature highly visible, public and democratic. That's the difference! But we must also ask the reciprocal question: 'What enables e-learning?' Can we be sure that the technological infrastructure is reliable and adequate, that the pedagogical and graphic design of the content is of high quality, that the level of interactivity is appropriate and, finally, that our students can reliably access the relevant portal on a regular, reliable and convenient basis?”.

### ***Does e-learning obscure learning?***

**Donert** identified other relevant questions: “we have perhaps lost the plot - what actually enables people to 'learn'? Do we actually understand what are the processes involved?”, and in conclusion “We need to analyse and evaluate the learners, understand their needs, requirements, preferences and actions before they e-learn. Far too much attention is concentrated in the technology, in hands of the e-community, rather than the learning communities”.

In a similar way, **Claude Almansi** from the Associazione di Diritto Informatico della Svizzera italiana, thinks that “the technology is made obtrusive and obnoxious instead of facilitating by the "e-community"(...), although “the "e" can simplify learning greatly - and make it much more interesting, and enhance the responsibility for learning.

Looking beyond the “hype on technology”, **Mike Sharples**, from the University of Birmingham shares an example in which technology and learning appeared to be harmoniously integrated: “Yesterday I visited a school (Ninestiles, in Olton near Birmingham UK) where all 800 children in the first years of the school have laptop computers, connected to a wireless network throughout the school. The children can also take their laptops home to work on school and personal projects. What struck me



is that in this school, there is no clear distinction between learning and e-learning. The separation between the technology and the education is beginning to disappear, the children use computers as a natural part of their classroom and home education, and the school will soon be starting to remove separate computer labs.”

### *Identifying the specific nature of e-learning*

**Alexandra Draxler**, Formerly Secretary to the International Commission on Education for the Twenty-first Century Initiative, summarizes the 4 elements one can examine to observe the differences between e-learning and face to face learning:

1. Information acquisition.  
e-Learning transforms the process of information acquisition into something more directly under the control and responsibility of the learner, where the mediator is either non-existent or in a role of counselor. It is also a process.
2. Transformation of information into knowledge.  
e-Learning liberates the learner into a world of almost infinite sources of information, and there is little to guide the learner. The traditional guides (judgement of teacher, choice of information to put into a library) are not operative, and the learner has a great deal of responsibility in choosing, sorting and evaluating that information. The transformation process is more open, more subject to individual choice and judgement, and therefore both promising and dangerous.
3. Mediation.  
The mediation process can to some extent be freed of human intervention. The human interchange is potentially more immediate, more intense, but also freer of constraints (one can walk away from a machine more easily than a person).
4. Validation.  
Here the difference between e-learning and other types is small: most of the same techniques and issues prevail. It might be useful to seek out what significant differences and opportunities exist.

**Mike Sharples's** observations on the integration of e-learning seems to illustrate perfectly Alexandra Draxler's description: The school he visited in Birmingham “is also moving towards a programme of more independent, resource based learning, with the children choosing their pattern of study. The teachers are enormously motivated, not only about the technology but also about the opportunities for student-centred learning”. Notably: “this change has not been brought about by the technology, but by the interaction between teachers and students, technology and learning.

Returning to the initial question posed by Jim Devine, **Ulla Gjørting**, from the Danish project ‘Pedagogical ICT Licence’, posted a comment that integrates many of the discussion themes: “e-Learning, the Internet, CAL or whatever technology that has hit education may speed up evolution but they are not the initial reasons for change. Educational debate has evolved around problem based learning, situated learning, process writing, differentiation, project based work etc for quite a long time now.

These signal words are part of the educational debate because ideas about teaching and learning are moving in that general direction - not because the Internet was invented. The Internet, e-learning and other e-tools are hand-in-glove as far as current educational ideas are concerned. Our task is to make sure that educationalists realise this and to make sure that they acquire sufficient competencies to fully utilise these excellent tools".

This first article summarizing the Forum aims to reflect the main discussion theme: the essence of e-learning, between technology and pedagogy... and beyond both (shortly we'll offer more articles summarizing other discussion themes, such as the role of e-learning within the University).

(**ABOUT E-LEARNING**, *Summarizing Our First Forum*, 2003-09-22, <http://www.elearningeuropa.info/>)

With respect to the DELPHI objectives the issues to be taken into account are dealing with the organisational (institutional), pedagogical and sociological/cross-cultural dimension of e-learning. The technological view is certainly another important dimension for investigation. However, a focus needs to be set to the views which are the most crucial ones for successful policy development. The DELPHI Consortium has identified the following issues as indicators for innovation which need to be matched to current e-learning practices and trends as these are reflected in the project's case studies.

**Table 1. Template for areas of key innovations in e-learning**

<b>Pedagogical issues</b>	<b>Organizational and institutional issues</b>	<b>Socio-economical issues</b>
Teaching and learning philosophy	Large scale operations	e-learning standards
Teaching techniques, methods, and devices	Cost effectiveness	LMS systems
Assessment	Incentives	Systems integration
Teacher workload	Flexibility	Globalization and competitiveness
Teacher training	Accessibility	Funding and commercialization
Teacher collaboration		Mobile learning
Bandwidth and rich media		
Other issues	Other issues	Other issues

Source: Del. 1: e-learning – The State of the Art, p.4

Reviewing the literature we observe that the term of “Innovation” is used on a very broad scale based on different definitions, ideas and perspectives presented in the discussion of introducing ICT to education. As more it is used, as more it is discussed what it really means and how to adapt the term adequately in the on-going debate of ICT innovations. An example of the “innovation“ debate can be found at <http://www.innovation.cc/articles/definition.htm> (“An Exchange on Definitions of Innovation from the Innovative Management Network”). Innovation can be classified into domain (e.g. industry, medicine, education) and scope. It can be remarked that

most of existing definitions are related to the industrial domain, where mostly technology (product) is seen to be the core of the definitions. But if applied to teaching and learning innovation can be process-oriented as well, describing progressive changes and goals in relation to the process of organisational change as well as the process and flow of knowledge. Tony Bates defines 4 different categories for innovation: organisation, administration, curriculum design and instruction (<http://cade.athabascau.ca/vol2.1/shale.html>). Focussing on the field of educational technology these perspectives are added to more technology-oriented approaches and even mixed, leading to a more general and abstract picture about the meaning of the term.

There are various aspects as to how information technology is used in education: as a platform for the development and delivery of products for teaching and learning and as a tool for the organisation of the learning contents and resources as well. This covers relevant aspects about environments **and** courses which cannot be analysed separately due to their inter-dependency. The question arises as to whether open and flexible learning environments built on information technology will lead us to qualitatively better, more effective and more efficient education and how these new educational models have to be brought about.

Since the Internet enables educational institutions to reach a diverse population and to provide telematics-based education, widespread activities take place in order to develop and provide education and training throughout Europe. The increasing impact of ICT on organisational structures and political decision making can be stated on several parameters like the increasing trend of cooperations in education. The US Oklahoma universities are a recent example of collaborative delivery of courses, based on an e-learning approach for joint education (<http://www.rose.cc.ok.us/>, <http://www.ucok.edu/>) The constitution of the (virtual) Phoenix university is another prominent case of joint activities in education based on the integration of ICT. But still concepts are needed directing towards organisational improvements on effective open flexible learning.

Education currently faces a period of transition in which old paradigm are opposed to new ones. Without going too deep into the history of education via computer and computer-networks it should be mentioned that there are different types of environments and courses varying in their approach to which extent they are attached to traditional methods of place-based or distance education or how far they are connected with new learning theories and their implementation. By analysing the projects funded by the European Community, all the different types of learning environment can be found. ICT is therefore not prone to support one particular type of learning environments. On the contrary, in the design of ICT-based educational innovations, the technology will have to be introduced in such a way as to create and support the learning environment desired. However, in practice we notice that the development of a virtual learning environment can be a result of a pragmatical decision at the institution too, as it was expressed in many cases. This can also be used as a step for introducing the evolutionary transition from traditional teaching environments towards settings related to ideas of social constructivism. The evolution of learning environment is a complicated process, where institutions cultural and historical situation with practical arrangements is often the critical factor, not the learning theory (see Bourdieu & Passeron 1977).

Instructional methods and the quality of courses within the different environments can hardly be compared, since it is the whole setting of the educational activities which must be considered too. Some environments are based on the virtual mode to a full extent, others are linked to traditional courses taking place on a local school/university campus. Some are taught to an international audience, others to a local community, some course topics need different pedagogical features than others and finally it is the applied hardware and software technology as well determining some of the key indicators of the context. This influences the structure of the virtual environment as well as the methods being applied.

In a typical setting these courses are based on written learning material available in an electronic and/or printed version, including questions, exercises and tests to be completed and maybe some discussions taking place “on-line” with a tutor from a remote place. Other similar, more telematic oriented applications consist of a more teacher-centred approach, where lectures are held in similar ways of instruction as in traditional education are applied. A typical adaptation of this concept by means of instructional technology is real-time two-way videoconferencing in order to simulate traditional classroom teaching. In general we observe that in practical teaching situations the methodology used in computer assisted instruction is moving more and more into ICT assisted knowledge construction, distributed expertise and collaborative learning. Hyper- and multimedia-based sources of knowledge have replaced in many cases traditional study books with electronic books. ICT and networking can make the learning environment more open in terms of knowledge acquisition in all phases of education. The rising acceptance of online courses hints to the fact that the people value the advantages of studying independently of time and place. Experience shows that they appreciate more communication-oriented approaches where participants have to be actively involved and are taken care of daily.

Whereas the old paradigm is based on the concept of knowledge transfer (knowledge from person A to be transmitted to person B) the new paradigm relies more on constructivist principles. According to these ideas, that learner construct their knowledge by their own and that a simple transfer is not possible, active learning must be encouraged. Contemporary learning theories emphasise problem solving in the learning process. They also take into account the social nature of learning and the complexity of students’ acquisition of knowledge. The learning process requires negotiation (Cennamo *et al*, 1996). Constructivist ideas of learning and knowledge underlying learning environments, open learning and project study are closely connected with considerations of the nature of knowledge in the teaching and learning process. The role of the teacher is changing to a large extent. Within the context of new educational paradigms the new functions can be characterised by the shift from acting as a content provider and “transmitter” towards a mentor guiding and supporting learners through the process of knowledge acquisition.

A reasonable conclusion of this is that there currently are a need for integrative concepts for the implementation of open and flexible learning via IT in education that can demonstrate a methodology of good practice for educational needs. Problems relating to this lack of a full and encompassing concept has to be seen from different perspectives and within different contexts of education. The implementation therefore

depends from pedagogical, sociological, legal, technological and organisational as well as other factors.

It is still not clear to what extent the use of ICT and virtual learning environments will affect daily life of teachers and learners. Since educational activities take place in a varying settings, it has to be analysed how far an organisational structure (e.g. of university education) has to be changed or adapted in order to allow effective teaching and learning. Presuming that pessimistic statements which refer to an incompatibility of ICT-use with traditional education, as articulated by Hoda (1997), are wrong there is still a consensus needed on how people learn in order to find sound strategies for ICT-implementation and for providing effective education in Virtual Learning Environment settings.

In their study about the evaluation of environments Britain and Liber (1999) define two crucial issues for the work with Virtual Learning environments:

- VLEs should provide opportunities to improve the quality and variety of teaching and learning that are not being achieved using current methods.
- VLEs should reduce the administrative burden on teachers, thus allowing them to manage their workload more efficiently and to be able to give more time to individual students educational needs.

Considering these requirements as one of the starting points for the study about teaching and learning it becomes obvious that the approach for analysing the process must reflect various other aspects too than just the discussion of pedagogical techniques within Virtual Learning Environments.

In an open learning environment, learning can be largely directed by the learners themselves. Therefore the meaning of mentoring and tutoring, a system for supporting learning and study guidance, gets special emphasis. Tutoring can mean support related to the learning process, study contents, tasks or technical problems. According to Daloz (1990) effective mentorship is akin to “guiding the student on a journey at the end of which the student is a different and more accomplished person. In a formal learning situation, mentoring functions can be understood as variously providing support, challenge and vision.” Tools for providing both tutoring and mentoring should therefore be adaptable for each purpose in Virtual Learning Environments.

Whatever kind of techniques is being used it becomes clear, that pedagogues need special training for online-education. They must especially be qualified in knowing

- how to decrease anonymity and to establish the atmosphere of a learning community
- how to motivate and keep the motivation of learners high; how to avoid student frustrations
- how to establish and maintain interaction among students, between teacher and students and between the user and the system,
- how to moderate discussions.

There is a set of tools and “tricks” which can be applied. Nevertheless this must be taught to the staff concerned to avoid any repetition of same mistakes, same explorations and even in order improve the applied methods in detail.

Activities are needed relating to research, implementation and training. In this respect Activity Theory appears to be gaining a predominant role in the shaping and evaluation of innovative learning processes. The speed of technological innovation forces policy to immediately react and to stimulate the speed of educational innovation as well for adequate application of ICT. It is not doubted that education is already changing with the increasing availability and implementation of ICT in educational settings (schools, universities, home, work place etc.). However, the current situation of using ICT for teaching and learning on the European level does appear to be at a not satisfactory level. Whereas the speed of technological innovations is increasing rapidly, adequate concepts are still needed for the educational use. Further research will contribute to a better integration of ICT in education and training supporting more effective learning. However, in order to avoid [...] future actions should be directed towards either solving focussed "problems" or improving the situation of traditional education (with ICT). Furthermore investigation is needed on the potentials of pedagogical concepts and technologies of new educational approaches, which might better contribute to meet the needs of current and future education. This includes the exploration of scenarios and experimentations in order to verify effects of different settings for learning.

With respect to new pedagogical approaches collaborative learning remains a crucial issue to be further on explored in the future from different perspectives, taking into account organisational aspects on co-operation and collaboration as well as pedagogical, including staff development and pedagogical work in networked educational settings. Experiences are needed demonstrating sustainable results and concepts of good practice, analysed in a multi-cultural/European educational settings and based on different technological approaches.

As many cases show, use of information technology in education and training can result in increased flexibility between working life and study by bringing learning opportunities to the work place and by bringing working life closer to school. A prerequisite of open learning systems is, however, that educational policy and stakeholders such as educational institutions, libraries and other information sources, as well as industry and commerce begin to perceive education from the viewpoint of lifelong learning. This requires collaboration and networking between the various parties.

The need for political measures had been recognised quite early in the discussion process of the implementation of ICT in education. Some countries started soon with investments and activities in ICT infrastructures and accompanying measures, others became late in developing an own strategy. Whereas the need never had been ignored it was mainly a question of national priorities and of available financial resources preventing or stimulating diverse national trends at a European level. The first European report on quality indicators of lifelong learning from July 2002 published the following table demonstrating the different national emphasis given to expenditures in education in European countries:

*Total public expenditure on education as a percentage of GDP*

*(p) <sup>1</sup>	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
EU	5,68 %	5,71 %	5,52 %	5,40 %	5,44 %	5,44 %	5,34 %	5,35 %	5,23 %	5,18 %	5,03 %
Belgium	:	:	:	:				5,19 %	5,64 %	:	:
Denmark	:	:	:	:	7,67 %	8,09 %	7,94 %	8,22 %	8,00 %	:	:
Germany	:	:	:	:	4,71 %	4,80 %	4,73 %	4,66 %	:	:	:
Greece	:	:	2,66 %	3,04 %	2,87 %	3,07 %	3,44 %	3,48 %	3,66 %	3,51 %	3,52 %
Spain	:	4,77 %	4,89 %	4,71 %	4,66 %	4,68 %	4,54 %	4,49 %	4,50 %	4,46 %	4,45 %
France	5,35 %	5,59 %	5,93 %	5,93 %	5,97 %	5,95 %	5,97 %	5,89 %	5,89 %	5,83 %	5,75 %
Ireland	5,95 %	5,97 %	6,10 %	6,13 %	5,74 %	5,92 %	5,74 %	5,29 %	5,00 %	4,78 %	:
Italy	5,38 %	5,39 %	5,43 %	5,04 %	4,87 %	4,86 %	4,57 %	4,55 %	4,55 %	4,62 %	4,49 %
Luxembourg	:	:	:	:	4,26 %	4,00 %	4,07 %	:	:	:	:
Netherlands	5,09 %	5,37 %	5,17 %	5,07 %	5,01 %	4,96 %	4,79 %	4,87 %	4,78 %	4,93 %	4,91 %
Austria	:	:	:	:	6,53 %	6,41 %	6,30 %	6,28 %	6,31 %	:	:
Portugal	:	:	:	:	5,37 %	5,53 %	5,59 %	5,60 %	5,73 %	:	:
Finland	7,26 %	7,29 %	6,88 %	6,73 %	6,87 %	6,96 %	6,47 %	6,24 %	6,19 %	5,97 %	:
Sweden	:	:	7,61 %	7,47 %	7,46 %	7,62 %	7,89 %	7,98 %	7,74 %	8,39 %	8,33 %
United Kingdom	4,96 %	5,16 %	5,21 %	5,16 %	5,04 %	4,84 %	4,66 %	4,58 %	4,60 %	4,86 %	4,76 %
Iceland	:	:	:	:	4,88 %	5,32 %	5,41 %	5,98 %	:	:	:
Norway	7,92 %	8,02 %	7,97 %	7,83 %	7,15 %	7,00 %	7,65 %	7,68 %	7,36 %	6,60 %	
Bulgaria	:	:	:	:	:	:	:	:	:	:	:
Czech Republic	:	:	:	:	:	:	:	:	4,4 % (p)	:	:
Estonia	:	:	:	:	:	:	:	:	7,4% (p)	:	:
Latvia	:	:	:	:	:	:	:	:	6,3% (p)	:	:
Lithuania	:	:	:	:	:	:	:	:	6,5%	:	:

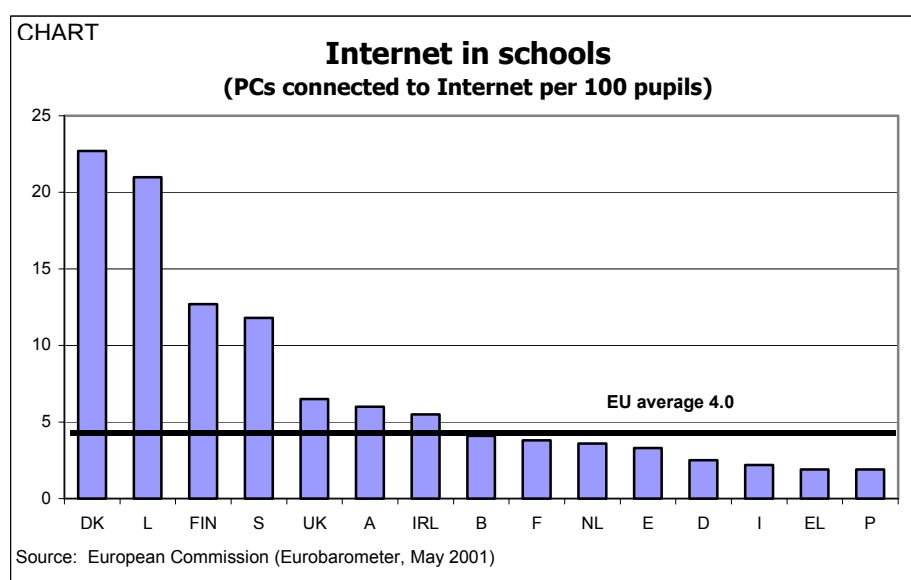
<sup>1</sup> (p) PROVISIONAL as the figures are still being validated

									(p)		
Hungary	:	:	:	:	:	:	:	:	6,5%	:	:
									(p)		
Poland	:	:	:	:	:	:	:	:	5,0%	:	:
									(p)		
Romania	:	:	:	:	:	:	:	:	3,4%	:	:
									(p)		
Slovenia	:	:	:	:	:	:	:	:	:	:	:
Slovakia	:	:	:	:	:	:	:	:	4,3%	:	:
									(p)		
Cyprus	:	:	:	:	:	:	:	:	5,7%	:	:
									(p)		
Malta	:	:	:	:	:	:	:	:	4,7%	:	:
									(p)		

Source:

[http://europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action.gettxt=gt&doc=IP/02/971|0|R APID&lg=EN&display](http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/02/971|0|R APID&lg=EN&display)

We can observe that public budgets for educational expenditures is varying in European countries and decreasing in most cases. Taking a closer look to the ICT infrastructure in European school education the assumption becomes more obvious that more investments might be needed. According to the results of another study relating to the Internet infrastructure in school education [eEurope Benchmarking Report eEurope 2002, [http://europa.eu.int/information\\_society/europe/news\\_library/new\\_documents/benchmarking/benchmarking\\_en.doc](http://europa.eu.int/information_society/europe/news_library/new_documents/benchmarking/benchmarking_en.doc)] - a quite unbalanced situation is to be remarked among the European countries:

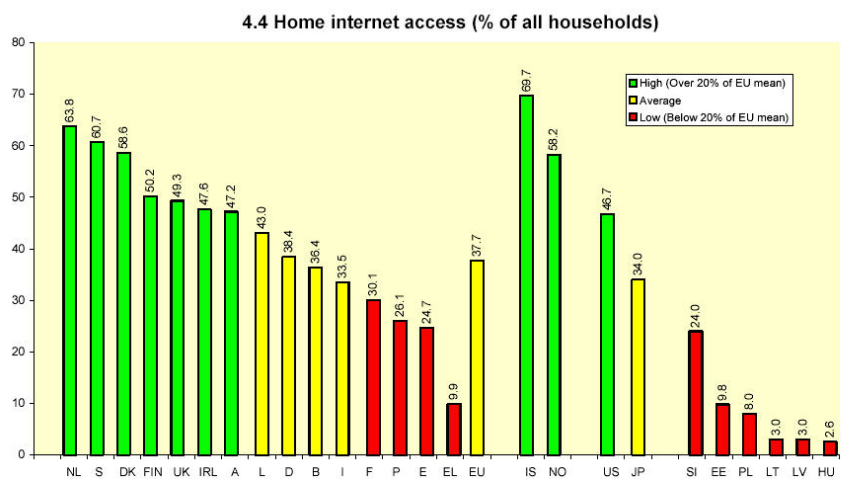


Furthermore the report states that”:



- On average, there are 12 pupils per off-line computer and 25 pupils per computer connected to the Internet. Half of these computers are less than three years old. However, there are considerable differences between Member States.
- Connectivity remains dominated by narrowband technologies: over two thirds of school connections are ISDN and the others mostly dial-up via a regular phone line. Broadband technologies are marginal, although ADSL and cable modem are now more widely used in a few countries.
- Whilst computers are now used by a majority of teachers, only a minority of them use the Internet for educational purposes. The main reasons given by teachers who do not use the Internet are poor levels of equipment and connectivity. Lack of familiarity does not seem to be a major problem. More than half of Europe's teachers have been trained in the use of computers and the Internet, around 90% of teachers use a computer at home and approximately 70% have an Internet connection at home.” [p. 7]

Taking a closer look at the ICT infrastructures and Internet available in private households we observe the same unbalanced situation.



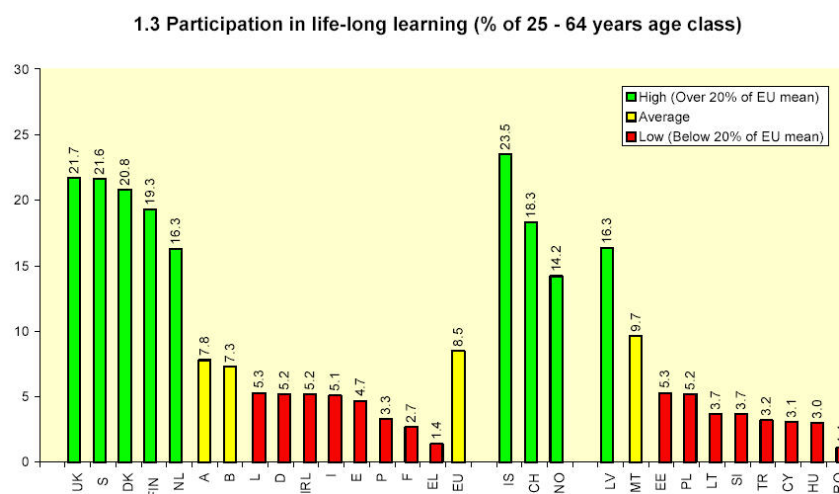
Sources: EUROSTAT/Eurobarometer; GSO survey for EE, HU and LV; years used: 2001 for all countries, except 2000 for JP, HU and LV.

In conclusion, there is a small group of pioneer countries that are ahead in terms of equipment, connectivity and usage. And there is a considerable number of Member States that are far behind. Although improvements are to be remarked concerning the “digital divide”, there is still a gap between the haves’ and the have nots’ as one reason for diverse starting points of educational policy. As J. Devine<sup>2</sup> recently stated in his article on e-learning “surely e-learning is no more than a manifestation of e-living. However, while in some countries poor ICT infrastructures are accompanied by certain other bottlenecks in education; it does at least not prevent national research centres from participating in European research activities.

<sup>2</sup> e-learning europa

This situation impacts the participation in lifelong learning activities, as we can observe from the benchmarking report on “Lifelong Learning for Innovation” []

### Participation in Lifelong Learning (25 – 64 years old)



Sources: EUROSTAT, Labour Force Survey; GSO survey for CH, LV, MT and TR; years used: 2001 for all countries, except 2000 for CY, 1999 for CH, 1997 for A and IRL, and 1996 for TR.

According to the ideas of the Maastricht treaty, the declaration of Bologna and the conclusion from Lisbon special attention is given to the equal access and use of ICT in European education, contributing as well to more harmonisation of educational systems in Europe. As a consequence of the aim to modernise European economy some of these ideas were formulated within the eEurope Action plan 2002 (presented in June 2000, Feira, Portugal) contributing the 2 subsequent Calls for Proposals within the eLearning Action plan. The aim of the eLearning initiative of the European Commission is to mobilise educational and cultural communities, as well as the economic and social players in Europe “in order to speed up changes in the education and training systems for Europe's move to a knowledge-based society”. This key objective as presented on the web-site of the European Commission (<http://www.europa.eu.int/comm/education/elearning/index.html>). It furthermore introduces to key measures supported by the Elearning Action plan, such as: key measures relating to infrastructure and equipment; key measures on training; key measures on services and content; key measures to strengthen cooperation and dialogue.

Since European projects differ from in goals, contents and methodology, it is difficult to generalise their impact in regard to certain relevant aspects connected with technology, education and learning. Even when the objectives and outcomes are similar from a point of view that it would allow more general conclusions, there is a lack of initiatives and structures synthesising relevant outcomes in order to generate new information concerning the research connected with applying ICT in education.

The content that follows is but an attempt to concert existing practices and knowledge in meaning-making for a policy articulation tool.

## Chapter 2: Methodology

DELPHI is a project of a meta-evaluation and reflective nature. The aim is, through a critical review of the outputs of the recent research projects of similar thematic orientation (Innovation in ICT-Assisted Learning), to propose a dialogue agenda between the "projects" (project outputs) and policy makers.

The review of different sets of projects is undertaken in order to identify similarities/differences and trends of organizational, socio-economic and pedagogical nature which will facilitate the formulation of indicators for the assessment and evaluation of on-going projects. A critical analysis aims to define the specific pedagogical and socio-economic parameters for the discussion between the investigated projects and policy making.

The project set as a starting point a set of transversal research questions, those being

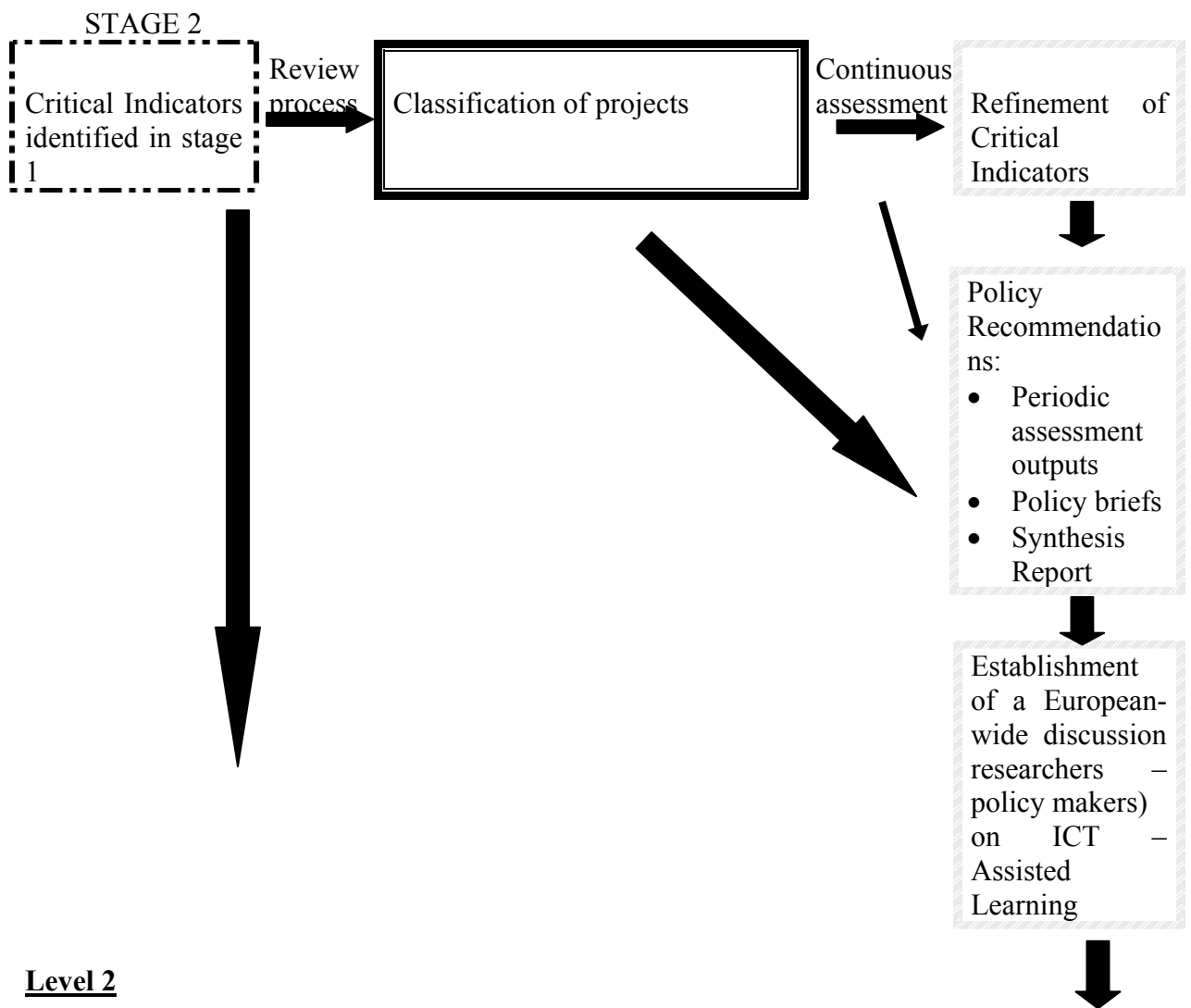
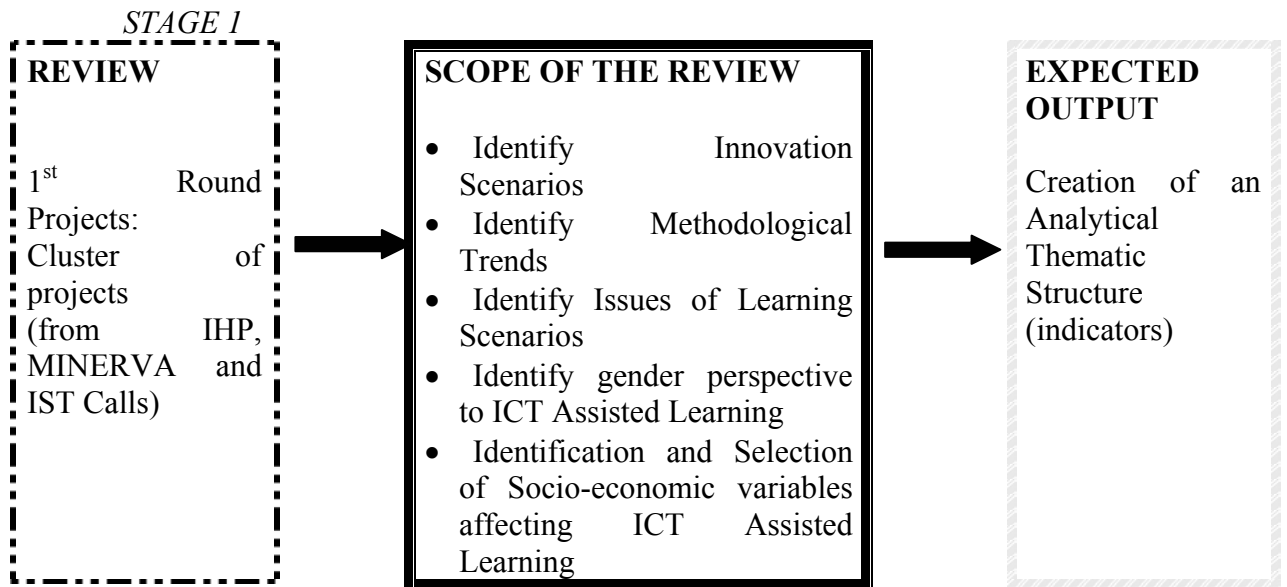
- what are the new methods and technologies (supporting these methods) and what is their efficiency? What are the changes in teacher-pupil roles, and in the whole learning environment?
- what are the new learning processes, the new cross-curricular and communication skills, the market-oriented issues, and , specifically, the new collaborative learning methodologies involved?
- what are the components of cost-effectiveness and cost-benefit analysis in these respective projects, and what are the results included in the final reports (taking into consideration how cost/effectiveness and cost/benefit is defined in the projects)?
- what are the contributions of ICT to lifelong learning in terms of access to education and training? Does the introduction of ICT stimulate the dual society and thus social exclusion?

While the project does not claim to seek for answers to all of the issues implied above, it explores into those issues that appear to affect the implementation of innovation in learning environments.

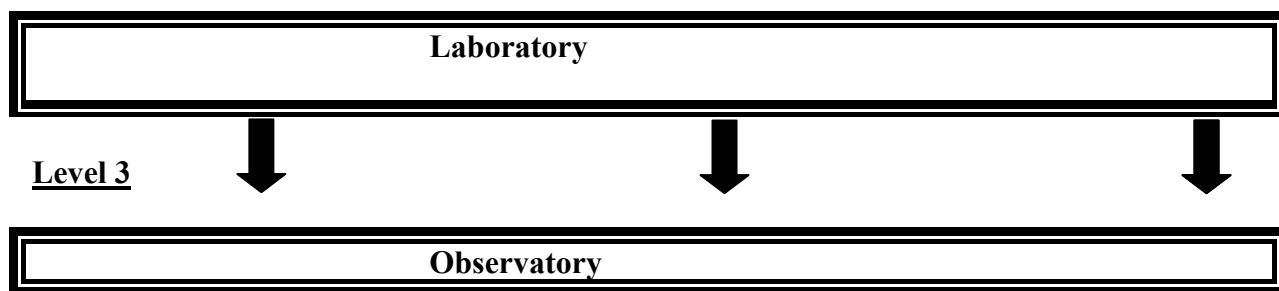
The project's first stage activity is operationalised at several levels through a 2-phase approach where the first constitutes a reflective meta-evaluation process of work carried out with the support of the Calls of IST, IHP and MINERVA and the second consists of a summative assessment of the outputs of the on-going projects or projects recently having reached the completion stage. The Context/Input/Process/Product Evaluation Model constitutes a frame of reference for the organization of the work undertaken. The Model has been selected amongst others due to its strength to identify policy implications at various levels of project activity and contexts.

The project's strategy approach towards the identification of critical indicators of change is presented below.

**Level 1**



**Level 2**



The work reported in this document concerns part of stage 1 activity and more specifically the review of Information Society Technologies (IST) and Improving the Human Potential and Socio-economic Knowledge Base (IHP) supported research and development projects. The activities undertaken include:

- selection of projects
- refinement of review parameters
- refinement of the review instrumentation
- negotiation with projects
- review of project documentation
- drafting of case project reports
- synthesis of case project reports

under the scope of identifying critical indicators of change in the areas of pedagogy, organization and socio-economics aspects. The work undertaken was influenced by the pre-selected dimensions and associated review parameters, as those are defined at the level of the proposal and enhanced with contributions from the project's review into the state-of-the-art on e-learning and the review of MINERVA supported projects.

The initial template designed for the review of the MINERVA projects (WP2) was slightly changed as the experience of the review suggested that such a change was needed in order to draw more inputs from the reviewed projects. The revised instrument is more open-ended in nature and includes parameters that were not taken into account in the initial design. It should be noted here that DELPHI reviewed/analysed MINERVA projects prior to the IHP and IST Programme projects as those, due to the nature of the Programme itself are more pedagogical oriented, principle concern in ICT-based learning. Such an orientation facilitated the identification of pedagogically-driven/related indicators of change and the concern over organizational and socio-economic issues are reviewed more in-depth in the frame of the IST and IHP projects.

The instrument used for the analysis of projects is presented in Annex I.

The twelve case-studies that are analysed in the frame of DELPHI's third workpackage were selected amongst the set of all recently completed (or nearly completion) IST and IHP projects/studies. In the selection of the eight IST projects consideration was given to the coverage of the Programme's Application Areas, which are: Open Platform and Tools for Personalized Learning, European Youth in the Digital Age, The Flexible University, Advanced Training Systems, The Learning Citizen, Pioneering Research for the Future of Learning, Consensus Building for Education and Training and Preparing for Future Research Activities. The specific aims for these Application Areas are given in \_\_\_\_\_. Upon a close consultation with an

IST Programme Official and brief review of the existing documentation the Workpackage Coordinator selected and proposed to the consortium the following subset of case projects:

- TimeToLearn (Area: Preparing for Future Research)
- Mobillearn (The Learning Citizen)
- K2 (Consensus Building for Education and Training)
- KITS (Advance Training Systems)
- CUBER (Flerxible University)
- Weblabs (Pioneering Research for the Future of Learning)
- 3DE (Open Platforms and Tools for Personalized Learning)
- ITCOLE (European Youth in the Digital Age)

This subset comprises of one project from each of the Programme's Application Areas, ensuring the representation of all key aspects reflected in the Programme design. The selection of the IHP projects was facilitated by the review of the "Briefing Papers" prepared for all IHP projects (<http://www.pjb.co.uk/npl/#Briefing%20Papers>). Selected were four cluster projects representing the Programme's four principle cluster areas (Research on Higher Education, Research on school-to-work transitions, Research on new governance models for education and training, Research on the use of information and communications (ICT) in learning and Research on education, inequalities and social exclusion)

The corresponding cluster projects include: Education, equity and social exclusion, Education and Labour Market Change, Towards the Learning Economy and SYPREDEM. The partnership reached agreement on the selection of projects and the distribution of the workload during its second project meeting (Innsbruck, October 13 and 14<sup>th</sup>, 2003). The workload was distributed amongst the partners in a manner that reflects their individual expertise and research interests. Each undertook the review of two projects. Specifically the distribution was made as following:

- University of Barcelona: 1 IST (TimeToLearn), 1 IHP (Cluster 5: Towards the Learning Economy + LCCN)
- MMU: 1 IST (Mobillearn), 1 IHP (Cluster 1: Education and Labour Market Change: The Dynamics of Education to Work Transitions in Europe)
- MCI: 2 IST (K2, KITS)
- NKI Nettskolen: 1 IST (CUBER), 1 IHP (Cluster 2: Education, Equity and Social exclusion)
- Universität des Saarlandes, Institut für Rechtsinformatik: 2 IST (Weblabs, 3DE)
- FORTH/IACM: 1 IST (ITCOLE), 1 IHP (Cluster 4: Synergy between Practitioners' needs and opportunities, Research orientations and Decision Making on the usage of ICT in primary and secondary education).

As primary source of information on the case projects used were:

- a. the project's final report and the most relevant deliverables
- b. content available in the project's web site
- c. in some cases academic articles, and books presented by the projects' partnerships

Following the review of publicly available documentation on the project cases the research teams attempted contact with the projects' contractors. This action resulted in the gathering of additional information on the projects and their activities and or clarification on project objectives, findings and conclusions. It should be noted here that there were instances where the response level was high –as in the case of the cluster project Social Exclusion and Equality in Education, but also instances where there was but a little interest to collaborate.

Information on the case projects was classified on the bases of the parameters implied by the template used and was thereafter documented in case reports that are available in DELPHI's "Observatory site / Laboratory". Similarly the information gathered from the 12 case reports was synthesized under the scope of documenting indicators of change for the three principle areas of DELPHI's research interests. The section that follows describes the case projects reviewed followed by the identified indicators of change and their implications to policy articulation.

### Chapter 3. Description of cases

#### 3.1 Methodological Approaches to ICT-based Learning in ICT and IHP projects

##### *Introduction*

Wilson (1996) has described the relationship between the ideas of knowledge and the consequences for the nature of the learning environment (author's comments in parentheses):

<b>Metaphor about knowledge, knowing</b>	<b>Consequence for the learning environment</b>
Knowledge is a quantity or packet of content waiting to be transmitted	Products that can be distributed via different methods, media. (Electronic self-study materials)
Knowledge is a cognitive state as reflected in a person's schema and procedural skills.	Combination of teaching strategies, goals and means to change the schemes of thought in the individual. (Teaching programme)
Knowledge is a person's meanings constructed in interaction with one's environment	The student acting and working in an environment with plenty of resources and stimuli. (Collection of tools and resources)
Knowledge is enculturation or adoption of a group's ways of seeing and acting.	Participation in the everyday life and activities of the community. (Collaborative working environment; can also include the above-mentioned items)

*Table 1. Relationship between the ideas of knowledge and the nature of the learning environment (Wilson, 1996)*

By analysing the concepts of environments and courses where information is given on the Internet, all the mentioned types of learning environment can be found. ICT is therefore not prone to support one particular type of learning environments. On the contrary, in the design of ICT-based educational innovations, the technology will

have to be introduced in such a way as to create and support the learning environment desired. However, in practice we notice that the development of a virtual learning environment can be a result of a pragmatical decision at the institution too, as it was expressed in some of the cases. This can also be used as a step for introducing the evolutionary transition from traditional teaching environments towards settings related to ideas of social constructivism. The evolution of learning environment is a complicated process, where institutions cultural and historical situation with practical arrangements is often the critical factor, not the learning theory (see Bourdieu & Passeron 1977).

Taking a closer look on the courses internationally given in Virtual Learning Environments we observe that in practical teaching situations the methodology used in computer assisted instruction is moving more and more into ICT assisted knowledge construction, distributed expertise and collaborative learning. Hyper- and multimedia-based sources of knowledge have replaced in many cases traditional study books with electronic books. ICT and networking can make the learning environment more open in terms of knowledge acquisition in all phases of education. It is not doubted that education is already changing with the increasing availability and implementation of ICT in educational settings (schools, universities, home, work place etc.). However, the current situation of using ICT for teaching and learning on the European level is not satisfying many actors involved. Whereas the speed of technological innovations is increasing rapidly, adequate concepts are still needed for the educational use. Further research will hopefully contribute one day to a firm integration of ICT in education and training supporting more effective learning.

### *Synthesis of pedagogical aspects*

In the DELPHI cases analysed pedagogical innovations are identified and addressed only to a limited extent. Due to different orientations (given by objectives) in general, IHP cluster projects provide little insight to the pedagogical dimensions of ICT-supported learning. Cluster 1 (Education and Labour Market Change: the Dynamics of Education to Work Transitions in Europe) only refers to some results from the DELILAH project and the definition of “learning patrimonies” (series of prevailing socio-institutional and educational practices, educational practices, relations and a set of values, dispositions, attitudes and expectations in regard to educational and training) as a new conceptual/methodological approach. IHP cluster 2 projects (Education, Equity and Social exclusion) reports that “the area of pedagogical innovations is the least developed one and focuses mainly on curricular issues (instead of real pedagogical issues)”. Basic requirements need to be taken into account in order to allow pedagogical innovations to take place with introducing ICT as a complementary not as a replacing tool in classroom education. Finding the right balance between student-centred and teacher-centred pedagogical approaches remains is mentioned as an area which needs to be furthermore explored. In cluster 2 projects (Towards a learning economy) the need to look at “competence building” issues in organisations and institutions are stressed. Pedagogical innovation is partly addressed from a learner-centred view, looking at the potentials of technologies to support effective learning and the development of new competences. Interactive approaches are considered to be very effective in these terms. Communities of practice ensure collaboration among teachers for the pedagogical design and the focus on organisation related outcomes. Finally, cluster 4 project SYPREDEM (Synergy



between Practitioner's needs and opportunities, research orientations and decision making on the usage of ICT in primary and secondary education) did not study any pedagogical innovation in terms of techniques, methods or devices. Innovations are mainly identified as experiential and R&D based approaches (focussing on teacher and R&D communities and the relation to the implementation of innovation) but with no direct indications on pedagogical consequences.

IST projects with little contribution to the pedagogical dimension of innovation are K2, TRIAL SOLUTIONS and CUBER. K2 as a supporting cluster of eLearning projects was not yet at the stage to present the results from the projects and will need further consideration at a later phase. Although not taken into consideration due to a high amount of interpretation needed, pedagogical implications can be identified from the TRIAL SOLUTIONS project. Although not directly addressed (the project followed a more learning content-centred approach), developed tools fit well in the CSCL agenda, supporting learning processes by personalising learning units (material) and enabling students to individually share structured and annotated materials. KITS is focussing on knowledge management issues. Pedagogical innovation is addressed by investigating on adequate concepts for "teaching" conceptual knowledge based on knowledge management and discovery learning. Techniques, methods are devices are introduced by a game (KN Quest™) where learners interact in a simulated company and learn to "run" the business by introducing them to knowledge management procedures and possibilities for interventions. However, simulation as such, as a tool for innovative pedagogical approaches has not been addressed. The project TIMETO LEARN suggests that a "mix and match" of learning methods can lead to more effective learning but some methods will need further investigations since they have been considered yet at a very limited level. Methods where little insight is given so far are identified for argumentation tools, virtual reality and active worlds. Exploratory, collaborative, simulation based, drill and practice and self-guided learning approaches have been analysed. Some of the methods have been identified as more applicable, others as less applicable. However, documents analysed do not represent yet the stage where clear indications are given for innovation in pedagogy. Needs analysis is mainly based on identifying strengths and weaknesses of technologies in the company context of learning. Although given identified methods no analysis was made on the adequateness of such methods in relation to improving learning.

More consideration of pedagogical innovation was given from the ITCOLE project and its focus on computer-supported collaborative learning (CSCL). Since there is no unifying theoretical framework, there is a wide range of methodological approaches in this field as a consequence, which is also influenced by cultural diversity. The progressive inquiry model (new knowledge is not simply assimilated but constructed through solving problems of understanding) is introduced as a model for children who can be guided to engage in extended processes of question- and explanation-driven inquiry and extended collaboration which may facilitate advancement of inquiry. Although positive experiences made in diverse country groups with applying concepts of collaboration, new challenges for teachers were identified as well which mainly relate to the efforts needed to moderate/facilitate the process of learning. Collaborative approaches were identified as well successful for sharing ideas and experiences among teachers, which also implies new approaches suggested for teacher training.

WEBLABS is focussing as well on collaborative approaches. In order to design educationally powerful activities through which students aged 10-14 years explore diverse knowledge domains a pedagogical setting has been designed in order to introduce and test various IT tools supporting interaction in groups. Experiences justifying an innovative way of teaching and learning are not published yet and will need further consideration in the near future. The project is about to finish in 2005. The same applies to the MOBILLEARN project which is about to finish in the end of 2004. Emphasis is given here on rapid communications and access to resources and to promote a just-in-time learning approach. Here, the innovative dimension can be defined (a) by the degree to which the contents are adequate to support the learning process and (b) by the pedagogical models to be designed (or adapted) and applied to integration of mobile devices into the educational setting. The success still needs to be evaluated, but good potentials are identified for diverse target groups such as users from the corporate sector with little time availability for attending training measures and the need for immediate problem solving in flexible settings.

In general, with respect to new pedagogical approaches collaborative learning remains a crucial issue to be further on explored in the future from different perspectives, taking into account organisational aspects on co-operation and collaboration as well as pedagogical, including staff development and pedagogical work in networked educational settings. Experiences are needed demonstrating sustainable results and concepts of good practice, analysed in a multi-cultural/European educational settings and based on different technological approaches. As some cases show, use of information technology in education and training can result in increased flexibility between working life and study by bringing learning opportunities to the work place and by bringing working life closer to school. A prerequisite of open learning systems is, however, that various educational institutions, libraries and other information sources, as well as industry and commerce begin to perceive education from the viewpoint of lifelong learning. This requires collaboration and networking between the various parties.

### **3.2. Synthesis of Institutional/organisational changes as a result of ICT and e-Learning implementation**

#### ***Institutional/organisational changes as a result of ICT and e-Learning implementation***

The adoption of innovations in consisting institutions is not escalating because of a trend, but rather for the new possibilities and requests, the marketplace is offering. If institutions are willing or not to implement ICT depends on the constructive effects it can offer to the organisation. As stated in the analysis of the ICT and IHP projects, these effects have a wide range and significant consequences on the operational frameworks of the single institutions. Not to mention, that the introduction of innovations always comes along with changes and correspondently with risks. Anyhow, the passage toward a “learning organisation” is vital for every sustainable institution. More than ever, in the actual stage, extensive learning abilities are required, because of the increasing globalisation, spreading interconnections, the rising flexibility and the incessant innovations. These factors are all linked to the tangible knowledge-based economy and mirrored in the “learning organisation”, such as in the innovative behaviours of productive organisations and of governments and public bodies at European, national, regional, and local levels. Indisputable is, that the transformation of the European economy requires increasing abilities to innovate, to adapt and to change, so as a wide re-thinking of institutions and organisations that constitute the knowledge infrastructure. There will be no one single type of organisational adaptability; rather, competence-building strategies will be increasingly diverse.

Research indicates that in the emerging economic context, the best-placed organisations will be those able to adopt the learning organisation vision at different levels. A close relationship between firms and other organisations is shown to be very important. The European model of learning organisation is seen as rooted in a system of intense learning interconnections among all the actors of the new economic context. Citizens, students and workers must be able to collaborate and share knowledge.

The main institutional changes that occurred within the analysed projects confirmed, that innovation is a culturally driven process, with the need for change in people but also within the whole learning structure. The direct effects on the work spaces concerned the reduction of the ‘time to performance’, enabling workers to be more effective, adaptable and employable, by reducing the time needed for their training without compromising on the effectiveness and quality of training. A further purpose that appeared clearly was the enhancement of the capacity in handling knowledge as the reduction of expenses of knowledge administration. The altering of the whole cost structure of the activity that takes place in the work spaces is a process optimisation and one of the most essential innovations returned by implementation of the new medias.

#### ***Staff training***

There has been a transfer control of services and resources from the professionals of education to managers from the business field. This has involved a major restructuring of the professional culture, working practices, college management styles and conditions of service, including the employment conditions of the teaching

staff. In order to take advantage of the existing technologies, skilled users are required to adopt them correctly, but other than the most common ICT skills which are mostly self trained or learned from colleagues, the implementation of platforms or distinctive hard- and software, necessitates, according to the requirements, an intensive training of the lecturers and staff members. Unfortunately, in the majority of cases, the Universities and their executives, so as the most companies' staff, do not have enough personal experience with this new technologies and the use of this technologies in teaching. Mostly it is not enough to just electronically display materials, but it requires a didactical scenario and setting where E-Learning is used. Therefore, teachers and professors moreover need the appropriate skills and competences to plan these scenarios.

The new teaching approach comes together with a compulsory course redesign or enrichment while staff training is facing a process of pedagogical and didactical re-engineering. Teaching increasingly inclines toward coaching with the expectations of motivating and encouraging students, preparing and giving feedbacks, listening to problems and hinting solutions. Traditional lecturing will always remain important, but for sure teaching will become less standardised and more individualised.

This claim can be supplied only by bringing lectures and teachers back to learning what on the other part requires a personal belief in the new applications.

Lecturers who teach in the front line depends from their knowledge, but also on the infrastructure, given that new technical facilities have to be installed etc. This also means that for the lecturer the element of uncertainty through technical devices and new technologies is growing. Consequently a carefully integration of the technologies in an array of existing didactic tools is as important as the sensibly induction of new information.

### ***Main actors, adopters and resisters***

From the analysed projects resulted, that the interested persons are more likely adopters of innovations than resisters. But it is definitive, that the staff and the students, besides being the most common and fervent adopters of innovations, can be as well potential resisters. When habits are heavily changed, the initial enthusiasm often tends to disappear, and especially for students, who are accustomed to traditional methods it results difficult to change their learning practices. So it comes, that teachers often have the role of agents of change, with the prerequisite of the support of all educational actors, including that of the policy makers.

Especially in the case of educational institutions the support of the policy makers is often a main resistor to the innovations, as there is an overemphasis on instrumentalism and notions of "market readiness". An insufficient attention to wide general education and deficits to the particular personal/social development needs at educational and social level, could guide to a damage of the learning audience.

A new political economy of schooling, based on competition, is leading to increase class and sectoral inequalities as funding arrangements change in some systems to be more school competitive and market sensitive. Such modern technological aids as IT and autonomous learning become increasingly important within educational sectors without compensating resource allocation spread equitably.

Resisting factors to innovation are factors that are intrinsic to the educational traditions – practices, assessment and accreditation, but a missing believe in the benefit of this technologies, coming along with the lack of experience, is the driving force for a fraction of the target group to refuse the adoptions. Unfortunately this

distrust is confirmed in one of the analysed projects as researcher made the tangible hypothesis, that institutions that want to compete in a increasingly competitive international market prefer that potential students visit the institutions web-site rather than a general portal in which all courses are supposed to attract equal visibility. Consequently, the most competitive institutions will pay less attention to open portals than to their own

Enclosed, a good overview, owe to the analysis of the “Syppedem” cluster, about the major resistors in introducing innovation in schools:

- *School culture:* Schools often do not consider ICTs-related teaching/learning innovations as an important part of their mission or an important requirement of the teachers’ profession.
- *School curriculum and timetable:* Regular curriculum demands tend to be inflexible and leave little room for innovation and change. The schools’ timetables often leave little time for experiments that diverge from the mainstream instruction.
- *Schools’ classroom arrangements:* Traditional classrooms which encourage frontal teaching, the placing of all the available ICTs in a separate computer lab and the lack of informal learning spaces in schools are all conditions that may become barriers to innovative efforts.
- *Schools’ administration:* The administration of the schools, although initially enthusiastic, didn’t take practical measures to relieve the teachers’ involved from regular everyday school tasks and to engage the whole school community into the innovations introduced.
- *School staff roles:* The staff of schools often does not include teachers who are responsible for departments or who can manage activities for the whole school community. The formal rules for appointing teachers to co-ordinating roles within the school are very strict and school participation in an experimental project (even if approved by the school authorities) is not a sufficient condition.
- *Colleagues:* The review of the SYPREDEM cluster projects’ documentation and the Workshop indicates that the teachers who were involved in innovation did not receive much help form less motivated colleagues in the implementation of innovation activities and the dissemination of their results within the local school community.
- *Parents:* Reported in the clustered projects were instances where parents opposed to the innovation introduced exactly because it was novel (i.e. to what they assumed their children were supposed to do and learn in the school that the teachers who were involved in innovation did not receive much help form less motivated colleagues in the implementation of innovation activities and the dissemination of their results within the local school community.

### ***Organisational conditions***

A qualitative research made in the course of one of the analysed projects, indicated the difficulties and the different dynamics of change and of innovation in different institutional systems. The relationship of the State to schools – in for example, the increase in school autonomy that has occurred in some systems (e.g., the UK) making them more responsive to both state (in effectiveness audits) and market pressures. School autonomy is by the way an institutional condition that appears to be rather supportive to innovation. Organisational inflexibility and lack of vision are among the conditions that prevent the rapid adaptability that is considered necessary in the learning society / learning economy. Moreover, a high level of knowledge exchanges cannot be maintained in a purely competitive economy, nor one focused only on technology rather than the people who engage in, participate in, and constitute technologies and economies.

At the same time increasing managerial control within the school reduces the autonomy of the professional role of teachers, creating countervailing pressures. This dominant school ethos towards collaborative learning and collaboration among colleagues (which are closely related to institutional as well as organisational practices) also appears to be a crucial factor.

Needless to say, lack of ICT infrastructure is fundamentally limiting the prospects for ICT based innovation to diffuse in schools.

Organisations, that already have an existing learning system and a substantial database of information in various forms, already have the ideal foil for modify from a centre of Learning to a “learning organisation”.

### ***Cost effectiveness***

Educational effectiveness is fundamental, but since it takes many different resources to implement the new standards, the financial aspect often constrains the wanted objective. As mentioned, the educational and as well profit institutions, are moving toward a more cost-effective policy due to the increasing competition and the missing funds on the part of the higher bodies. The return of investment is gaining importance and synchronously getting harder to reach because of the high initial capital invested in the new technologies.

A needs assessment study, encountered in one of the analysed projects, reports that about one-third of companies do not think ICT based training is appropriate for them; however, almost all say they will probably invest in it in the future. There is high interest in reducing the cost of the initial investment in technological applications. In general, the price of ICT based learning compares favourably with traditional training, and many organisations believe their training budgets will increase in the future as part of global trends. The study shows that organisations highly value flexibility and consider it an important factor for investing in ICT.

Together with the implementation comes up the need of modifying or creating enhanced or new study programs. Universities and other educational institutions could save cost by sharing and re-use courses material and documentation. This option is often bounded by the high competition.

An interesting cost reductive approach has been developed by the “Trial-Solution” project in reference on existing high-quality materials. “It can be cost efficient by performing the structuring of the material only to such an extent as is necessary to

achieve the intended added value for the customer. Given the actual financial constraints, this implies that the parts of a document that are likely to be re-used by others will be fine structured, whereas little effort will be spent on structuring the parts that are of less value. This flexibility gives the possibility to handle several books within a single project”.

The return of assets often has a medium to long-term character and is often difficult to quantify and therefore requires an accurate strategic planning.

### ***Flexibility***

Flexibility is a keyword for the whole ICT development and requires not only developed tools for a more flexible use of pre-arranged materials, but also supported flexibility on the institutional level. Students are no longer restricted to analogue materials in their libraries but additionally have access to the same information through online licenses. Students may structure their learning process according to their individual needs. Materials are more easily accessible to both teachers and students, which leads to high flexibility

A more flexible model of operation has to be well thought-out, with flexibility staying for flexibility in the access to learning experiences, both in terms of time and space, but also flexibility in terms of the variety of learning activities, of approaches to evaluation, and of learning context.

The majority of the analysed projects fulfilled the expectations of flexibility, since they have not just been accomplished, but because the outcomes are still active, continuously updated and shared. In order to maintain the high level of disposition cluster projects as DELPHI emerged.

### ***Accessibility***

ICT has innovated our daily live in respect of access to knowledge, outstandingly considering the web accessibility. The Internet, with its capacity to obtain information independently from location and time revolutionized every aspect in our existence allowing a huge step forward in view of globalisation. Considering education it is now possible to get in touch with different teaching approaches even from different cultures and sharing information is no more a frontier. An auxiliary effect of globalisation and the cultural changes taking place is the growing economic profit aspect for both, private and public sector. In the first instance, the educational institutions are undergoing a phase of reformation, comprehending an essential course redesign or enrichment while the staff training is facing a process of pedagogical and didactical re-engineering. Due to the high cost of this reorganisation and to the growing competition in between the various institutions, the will to let other organisations partake the expensively acquired knowledge is consequently decreasing and so is their accessibility.

The incorrect arranging of the existing and emerging knowledge is leading to an torrent of badly manageable information with more and more people working on the same “construction site”. Fortunately a great extent of clusters and pools is emerging with the ambition of collecting and sharing knowledge

### 3.3 Socio-economic aspects of the innovations in European Projects

#### *Socio-economical issues*

The analyses reveal that there is a strong concern regarding our ability to handle the new knowledge society and the fact that digital and mobile technologies are transforming the ways knowledge is constructed and utilized. This concern is explicitly addressed in the analyses of ITCOLE, IHP3, WEBLABS and MOBILEARN:

According to the ITCOLE project, a widely experienced concern in western societies is how it is possible to prepare future generations to cope with cognitive, social, and motivational challenges of the emerging knowledge based society. An educational challenge emerging from the knowledge society is the need to train citizens to use tools such as computers, information networks, multimedia, and virtual reality applications that constitute the most concretely visible part of the knowledge society. The skills of using the new technology and searching of new information (i.e., basic information skills) are not enough; people need more advanced skills for acquiring knowledge, and using it meaningfully in different contexts. The latter are more general in nature and are closely related to collaboration, information processing, and communication. [ITCOLE]

This project grows out of the assumption that the learning economy / learning society theory will become the leading idea for the European economy / society and, therefore, new ideas about learning will be needed. An overall learning imperative for Europe has been identified by European researchers in the last few years. The vast set of research studies coordinated by B.A. Lundvall, within EC-sponsored TSER and Fifth Framework programmes, provides a solid theoretical framework for positioning the learning organisation concepts and tools in the dynamics of the learning economy. This project attempts to analyse and synthesise the available research focusing primarily on the concepts of the learning organisation, knowledge and competencies, and the role of ICT with an aim of identifying needed priorities, strategies, policies, and areas for further action and research. [IHP3]

WEBLABS is predicated on the belief that digital technologies are transforming the ways knowledge is constructed, how it is represented and how it is shared. New communities are formed during the project run, in which the firm distinctions between learners and teachers, between the knowledgeable and the ignorant, are blurred. The following points are major important factors in the project:

- learners are challenged to think about how systems operate
- digital technologies are exploited for the acquisition of personally engaging knowledge
- the potential of the web is harnessed for collaborative construction. [WEBLABS]



MOBILearn asserts international relevance through the conception, population, experimentation and exploitation of new models of learning and information use via next generation mobile networks through:

- a) creation of **pedagogical paradigms** to support learning in mobile environments – collaborative learning, organisational learning, dynamic knowledge creation in a group.
- b) **new architectural layouts** to support creation brokerage, tracking et al of learning and information contents on the mobile network thus extending existing systems
- c) selection & **adaptation of existing eLearning contents** for mobile devices enabling automatic multi channel and multi device versioning
- d) realisation of **new business models** based in existing success cases (DoCoMO, iMode) for self sustainability & deployment of the conceived solutions beyond the research timeframe within Europe's Knowledge Society framework for the third Millennium.

All the above are considered to imply flexibility applicable within diverse global, national and regional environments. [MOBILEARN]

But the IHP analysis points out that innovation in education is a complex issue and that its potential influence on a socio-economic level depends on numerous factors:

The project takes the position that there is not a linear relationship between changes in the socio-economic level, the development of new ICTs, or the development of new scientific knowledge and the transformation of the above into innovative educational services, processes or products. “The process of innovation in education and training is complex not only in terms of what factors may trigger such innovations but also in terms of the diversity of requirements (resources, institutional and organisational arrangements, people, school culture etc) that are needed to be met for educational innovation to take place and diffuse. Important aspects of these factors and requirements are affected by national educational policies against the background of national educational patrimonies in Europe.” (p. 27) [IHP4]

According to the Time2Learn analysis there is a trend towards integrated solutions that provide courses with value added services such as needs assessment, online mentoring and performance support. The analysis also indicates that content is becoming more important and that collaboration among partners could improve quality.

What is evident in both Europe and North America is the realization of what is needed on the eLearning front and their effort to accommodate these demands. The learner is moving away from stand-alone courses and is now demanding integrated eLearning solutions with value added services like needs assessment, online mentoring, performance support, etc. The use of brokering platforms is now more evident as the web enables the delivery of information, performance support, knowledge bases and record keeping. Content is becoming more and more important, thus many companies are cooperating with producers, vendors and portals, and this ensures high quality. More and more companies cooperate

and consult on how to make the most of the new media options and how to implement the solutions most effectively. Delivery of off-the-shelf content to linking content to organizational competencies tries to answer to the question of how to move from a course-delivery model to matching learning and information-support objects to career competencies and performance-management systems. [Time2learn]

***E-learning standards: consequences decisions problems reflections***

The importance of the e-merging e-learning standards is addressed by several of the projects. The analysis of the MOBILEARN project especially focuses on e-standards. The project includes comprehensive information about the most common standards and standardization bodies. The following quotes show that the project aligns itself to recommendations for standardization, but that there is a need for definitions and clarifications of concepts and terminology.

This MOBILEARN very clearly aligns itself to recommendations for standardization coming from a variety of sources and which include the following international standards and interoperability specifications organisations: ISO/IEC JTC1/SC36: ADL SCORM: CEN/ISSS WSLT: IEEE LTSC: IMS Global Learning Consortium: W3C: ITU: DCMI Education Working Group: Consensus creation fora. The project identified the following technologies and standards as key: XML, DVB-MHP, 3GPP and SIP. Great detail is given of the entities MOBILEARN identifies with as this seems a significant "innovative" aspect of the project in addition to extended PDA use in education and training environments. [MOBILEARN]

Recent growth of products for learning, education and training based on information technology in different countries leads to the use of different names for the same or similar concepts. This problem is exacerbated by the use of the same name being utilized as term for different concepts and their definitions. The need for interoperability and interchange for the products and components for learning, education and training requires a unified way for specifying, identifying and referencing these concepts and products, their features and components, by means of using a common terminology (ref: European Committee for Standardisation) [MOBILEARN]

The analysis of the MOBILEARN project also points out the entities that are involved in standardization are massive users of e-learning. From this one may infer that these entities have realized that they may benefit from the standards.

The institutions and organizations involved in the standardization of E-learning technologies are typically North American or European entities, both public and private, that massively use software products, and specifically educational software. [MOBILEARN]

The TRIAL and CUBER analyses reveal a focus on standardization of learning objects. The TRIAL project emphasizes that learning objects are reusable across national and subject borders and that this also encourages cooperation. The CUBER project has even developed a detailed description model for learning objects.

By supporting the re-use of learning objects across national and subject boundaries, the new technology helps learners to appreciate values produced within other settings. It promotes a new way of thinking that views the learner's subject and activity embedded in an environment of related fields and individuals. This will not only enable synergetic effects but also encourage cooperation and tolerance. The project will accelerate the emergence of new media in learning and education. It will take up and support the demand of user-friendliness for the information society, especially in the field of learning and education materials, in a new way. The project will provide new tools and services for high-quality learning and education materials in several scientific disciplines (cf. PW). [TRIAL]

The Trial-Solution project is not restricted to geographical regions, although national and regional aspects (e.g. languages) have been included in the project. The project will contribute significantly to a standardisation and uniformity of the description of semantic modules of documents. This will guarantee the interoperability and the openness of the learning and teaching materials that have been developed within the project (cf. PW). [TRIAL]

E-learning standards, especially the LOM standard, is essential for the CUBER-project and its description model. In the paper "Enabling Virtual Student Mobility through CUBER", Krämer explains it this way:

CUBER's description model consists of a *conceptual model* and a *meta ontology* (Pelto-Aho et al., 2002). The conceptual model defines the essential concepts of the subject domain together with their attributes and relationships. The most important concepts in the conceptual model are the central elements in the CUBER system, *programme*, *package*, *course* and *material*. As an example, some of the main concepts and their relationships are depicted in Fig. 2 (all attributes have been omitted for the sake of clarity).

The meta ontology captures the definition of all the concepts in the conceptual model. This ontology is an application profile of LOM (IEEE, 2002) suitable for describing a range of educational objects including study materials, courses, course packages, and study programs. The pedagogical features of an educational object, its contents, special target groups, timing and location constraints, technical requirements of e-learning courses and other features can be described with the help of the CUBER metadata schema. (Krämer, Enabling Virtual Student Mobility through CUBER) [CUBER]

The ITCOLE project did not directly target e-learning standards, but the analysis included an interesting statement maintaining that the open-source movement has the potential to contribute significantly to the establishment of standards.

The ITCOLE project did not directly target to the development of e-learning standards in the strict sense of the term. However, it offers valuable insights in the design, development and validation of CSCL environments. Synergeia and particularly FLE3 are offering good examples of CSCL environments and because they are offered for free and also are open-source they have the potential to contribute greatly to the establishment of standards in the field. [ITCOLE]

However, the KITS analysis maintains that there also are negative experiences and missing initiatives in standardization of areas such as simulation and games. Further, MOBILEARN points out that there are language and cultural diversity that should be taken into the standards considerations.

A simulation game as an e-learning method is far from being standardized. Negative experiences in the past and missing initiatives have made, that this sort of implementations are still at the beginning. As positive experiences will surface, the methodology could easily develop into a standard tool for further education. [KITS]

Localisation and internationalisation initiatives aim to ensure that standards consider language and cultural diversity in order to improve provision of technology based learning experiences. [MOBILEARN]

The K2, IHP2 and IHP4 analyzes did not provide further information about standardization issues:

No relevant information found on this issue. [IHP2]

Not suitable. [K2]

No reference is made [IHP4]

### ***Globalization: consequences decisions problems reflections and actions***

The analyses recognize the importance of globalization and address it in several ways. The IHP3 analysis recognizes globalization as one of the key factors driving the new European learning economy and the CUBER-project claims to be based on the spirit of the Bologna Declaration's objectives regarding educational mobility and cooperation between European universities:

Globalization is one of the key factors driving the new European learning economy / learning society. In the "globalising learning economy" approach, guidelines for a new "integrated competence building" system are needed; competences will be conceived from the viewpoint of their exchange value and also their use value. [IHP3]

The CUBER-project is based on the spirit of the Bologna Declaration's objectives regarding educational mobility and cooperation between European universities. The CUBER Search Engine is freely available on the Internet, and it provides information about 518 courses: 4 in Dutch, 23 in English, 39 in Finnish, 142 in French, 274 in German, and 36 in Spanish. [CUBER]

The Bologna Declaration, globalization and international harmonization of education influence standardization and course brokering. [CUBER]

However, the analyses seem to indicate that the projects focus mostly on issues such as access to global information and cultural exchange. One may argue that these issues are important and ubiquitous. However, except from the fact that all projects are organized and funded as European projects, few of the analyses really show

strategic commitment or heavy involvement in globalization. Globalization was most often discussed in general terms as shown in the analyses of K2 and KITS:

As customary for globalisation, K2 favours a faster, cheaper, and more ubiquitous connection to information by clustering and forwarding the outcomes of a large number of e-learning projects. This social process, in which the geographical on social and cultural arrangements retreat, is essential for the collaboration, on a particular subject, by different nations, especially in between the European Union. [K2]

Knowledge and cultural exchange as part of the phenomenon of globalisation is an essential subject for organizations. Since the barriers among countries are declining, to get in touch with the management approaches from different cultures, is nearly imperative. One of KITS concern was not to focus on a particular national thinking, but to assemble the necessary information from and for different nationalities. [KITS]

The WEBLABS, Time2learn and MOBILEARN projects are concerned with Europe's competitiveness and the North American leading edge. The analyses suggests that it is necessary to provide Europeans with the skills to compete in a global economy, to disseminate project findings, and provide content in several European languages:

The project mentions the brain drain to the United States as one reason for their efforts. The project team thinks that it is necessary to provide young Europeans (who are also willing to stay in Europe) with the necessary skills to compete in a globalised economy. Furthermore WEBLABS takes into account the need for a broad dissemination approach and intends to disseminate project deliverables to the US as well: Two members of the coordinating partner will visit the USA approximately once per year in order to present the results of the project to an international (including US) audience at the annual AERA conference. [WEBLABS]

America has gained ground compared to Europe and this due to common cooperation between the states and businesses. One advantage America has over Europe is the language. Europe is divided among 11 main languages, thus any content should be developed accordingly, while America surpasses all language barriers and can concentrate on the development of eLearning applications. [Time2learn]

MOBILearn is a clearly intended as a high-impact European-wide project in terms of the partnership, that is international (partners coming from nine EU countries and countries outside EU, including the USA and Australia) and multi-sector (mobile operators of four countries, leading European software production companies, world-class mobile devices manufacturers, market analysis consultants, publishers and content providers). MOBILearn views its role as assisting Europe to retain its leadership, because, operating in new emerging fields/markets (post PCs), it builds on sectors where Europe is also well positioned (that is in rich content and service provisioning and Mobile and Wireless technologies). [MOBILEARN]

The ITCOLE analysis revealed that there are important differences among European countries and institutions with regard to issues such as educational systems, available infrastructures, learning processes, and socio-technical contexts. These differences may introduce many challenges for international collaboration:

According to the ITCOLE project differences in the education systems among the participating countries, as well as differences in available infrastructure and teachers' and students' background on collaborative learning and technology influenced, directly or indirectly, the learning processes during the project. The first two phases provided very valuable and interesting information concerning implementation of ITCOLE software in diverse cultural and socio-technological contexts. In Finland, the technical possibilities and the teachers' initial level of expertise were more advanced. Also, the training and support of the teachers in Finland got a great deal of resources, because the training organisation of Helsinki City was also a partner in ITCOLE project, and this was seen in the teachers' advancement in their pedagogical thinking and practices. In all of the other test sites, the researchers collaborated with the teachers directly, and the teachers reported that they would have needed more training and more collaboration with the pedagogical researchers. In Italy, the teachers were also quite experienced, but the technical infrastructure was relatively weak. In Greece and the Netherlands, the teachers were much more novices both in terms of pedagogical expertise and skills and practices of using ICT. Consequently, the researchers reported substantial difficulties in finding the common theoretical ground for the pedagogical approach in Greece. In the Netherlands, the researchers were unsuccessful to motivate teachers to participate to the ITCOLE testing. [ITCOLE]

There are also other barriers towards globalization of e-learning. The Time2Learn project identifies the following European barriers: language barriers, privacy laws and privacy regulations:

Europe's main challenge is the language barrier that call for native-language content development for local companies unwilling to adopt English. Another issue, which involves privacy law, is how countries can exchange information on an international level. Europe has strong labor laws that can interfere with sharing employee skills data across borders. American developed LMS systems in Germany have had to disable learner-skills tracking functions to conform to German laws. Furthermore, the European Union has privacy regulations that could hinder implementation of LMS systems. What has been identified as the most important characteristic of eLearning and what countries should focus upon are access to information, quality of content and in the delivery systems, assessment capabilities and certification opportunities. The most important focus though will be on knowledge, skills and training. The new learner is a "consumer" of knowledge available worldwide, anytime and anywhere. [Time2learn]

The WEBLABS project handled the language barrier by implementing an integrated mechanism in the ToonTalk platform, which changes the text language to match the language in which ToonTalk is running:

WEBLABS identifies different languages of project partners as a major barrier. Therefore the project team designs and implements a mechanism (which itself is inspectable) integrated into the ToonTalk platform, which changes the language in which a text is displayed to match the language in which ToonTalk is running. This enables readability across countries of a) mechanisms which are built from pre-built pieces (each of which has its own mechanism) and b) new mechanisms which have been translated (perhaps by teachers). WEBLABS uses text-to-speech translation to allow the descriptions to be spoken as well as translated. [WEBLABS]

Further, the ITCOLE project points out the necessity to contextualize solutions to national learning patrimonies:

Although CSCL is an issue which attracts the international interest, the ITCOLE project research reveals that CSCL solutions need to be contextualized within the national learning patrimonies. This is because across countries there is a great variation in the “maturity” of supportive systemic conditions and factors which affect the way CSCL is conceptualized and implemented. [ITCOLE]

The analyzes of IHP2 and IHP4 did not provide further information about globalization issues:

No relevant information found on this issue. [IHP2]

N.A. (yet implied by the discussion on socio-cultural change and its implication to educational sphere. Please refer to the section on socio-economic aspects). [IHP4]

### ***Funding and commercialization***

All analyzed projects have been funded by EU, and this funding seems to be crucial to the analyzed projects.

The K2 project is part-funded by the EU. [K2]

The fact that this cluster project included 16 projects with EU-funding shows that funding is available for support of educational ICT projects related to equity and social exclusion. The Delphi researcher hypothesize though, that it is hard to commercialize initiatives that is targeting social exclusion since the target groups often are minorities with little purchasing power. [IHP2]

The analyses were not able to identify any successful commercialization of the projects. On the contrary, they show that the projects seem to be rather vague regarding commercialization. Typical statements used are: aiming at establishing, not founded any organization yet, struggling to get additional funding, additional information about commercialization is not described, expects that it will be possible for the commercial partner to exploit the home market, consider launching etc.

Funding: It is presented as an obstacle to the effective implementation of ICT-based innovation. Commercialization: N.A. [IHP4]

According to Dr. Krämer, the project is aiming at establishing a CUBER consortium. They have however not founded any organisation yet. They are still struggling to get additional funding for a CUBE trial project. [CUBER]

The KITS project is part-funded by the EU. In order to support the further development of KM Quest™ the partners decided to commercialise the product. Additional information about the commercialisation of the game, as the ones mentioned in chapter 3.7, are not described. [KITS]

The commercial partner of WEBLABS is involved throughout the project, but at the beginning of month 24, will begin to ensure that the evolution of the project in its final year proceeds in such a way as to maximise effective exploitation. The project does not want to restrict exploitation plans to schools alone: the project team expects that it will be possible for the commercial partner to exploit the home market to a considerable extent. Furthermore the partners consider launching a consultancy and advice service based on the results of WEBLABS to support the further dissemination and exploitation of the Commission's investment. [WEBLABS]

According to the project's Final Report the technology is ready for application in various fields, which may, however, require adaptation and downsizing of the available tools for more specific purposes. Moreover it is assumed that further progress requires applications in cooperation with experts in other domains and the further exploration of various business models which must be tailored to the specific market situation. [TRIAL]

But, it is also interesting, and potentially beneficial for EU, to observe that some of the projects intend to provide free products and services. ITCOLE and WEBLABS especially mention free online environments, free collection of web activities, tasks, and case studies, as well as free runtime version of all software:

The issue of commercialization of the Synergeia and FLE3 are non relevant as both on-line environments are offered for free. [ITCOLE]

During the final year of the project, it is planned, that the commercial partner of WEBLABS will begin to shape the outcomes of the project, in terms of ensuring that deliverables are in a suitable form for subsequent commercial exploitation. Therefore WEBLABS intends to make a collection of web activities, tasks, case studies available freely on the web, and to package the full set with the platform which will be required to modify and extend the deliverables. This means that a free runtime version of all software and subsets of supporting documentation will be available. In order to obtain full functionality for the materials users will need to purchase the platform. Thus the WEBLABS materials will add value to an existing commercial product, in ways which will improve its commercial and educational potential. [WEBLABS]

The TRIAL project maintains that the non-existence of generally accepted online micro-payment systems is a major obstacle for the commercial exploitation. The project also advocates individual and campus licenses for online access to electronic books.



The further development of XML technology, E-learning and electronic micro-payment systems are the factors which are most likely to facilitate the future exploitation of the results of the Trial-Solution Project (D15). [TRIAL]

Trial-Solution is a project funded by the EU as part of its Information Society Technologies Programme (IST), which is a major theme of research and technological development within the EU's Fifth RTD Framework Programme (cf. PW).

A major obstacle for the commercial exploitation of the technology is the non-existence of generally accepted online micro-payment systems. Such systems would be necessary for a pay-per-use business model.

According to the Final Report (D15) it seems currently most promising however to market campus licenses, eventually with the option to convert a certain number of campus licenses into full licenses. This model was also used in the Trial-Solution evaluation phase. It is in-line with the preference expressed by the students of paying for the service through the university, eventually as part of a tuition fee.

In this license model, currently established by Deutsch and SIT for the Gellrich series, the printed books are sold independently of the online versions and contain a one-page advert pointing readers to the server containing the sliced versions (currently at SIT: <http://www.slicing-infotech.de/en/index.php>). Users can purchase individual or campus licenses for online access to the sliced books for one year. The price of the licenses should be well below the price of the printed book in order to stimulate interest. Such costs should be attractive to those who, in the course of their studies, need perhaps only part of the book content and for only a particular period of time. The benefits to the users are those of having the complete content of the book in electronic form without having to purchase the printed product. So the user can search through the text and select the parts currently required, making use of the complete knowledge management system bound within the delivery tool. In addition, users have the chance to expand the offer by combining the Gellrich books with others on offer via SIT.

The main benefit for the publisher is the further marketing opportunity in addition to that of the printed book. The publisher has the chance to use the same content to win a new, younger target audience, who may not be able to purchase the print item. The hosting service also has an advantage here in that they function as an agent and receive payment for their services preparation and hosting of the data, license sales, and so on. This payment could take the form of a share of the license sales (D15). [TRIAL]

### ***Implications for LLL***

In the analysis of IH3 it is succinctly stated that Life Long Learning plays a key role in the formation of a new European learning society. The TRIAL analysis emphasizes the constant need for change in people's work and general life.

The definition of the learning economy / learning society implies that all aspects of society and culture will have a learning component. Consequently, Life Long Learning plays a key role in the formation of a new European learning economy / learning society because the need for constant rapid adaptation is making it necessary to learn throughout life in many scenarios outside traditional formal education. [IHP3]

Life long learning is a concept which takes into account the constant changes challenging our working life and life in general. The Trial-Solution project can be seen as supportive to this concept because the tools developed may help to gather and select information which is relevant according to the personal situation. Individual aspects may be easily highlighted and focused on, while at the same time irrelevant or already studied knowledge can be neglected. [TRIAL]

Regarding training of older workers, the final IHP2 report claims that ICT could provide strong learning incentives for both younger and older workers, but that older workers could face particular problems in the area. ICT can create stimulating and motivating opportunities for learning, but it can have a negative impact on workers who may feel that the technology deprives them of control:

The introduction of new information and communication technologies (ICT) provides the strongest learning incentives. This holds for both younger and older workers (Tikkanen et al., 2001). Though older workers could face particular problems in this area, given that they have not become acquainted with these technologies during their initial education and training and that their own work experience might be less relevant for this area, the results of the WORKTOW project show a differentiated picture in this area as well. First, the actual use of ICT in daily work is not that much related to age, but to economic sector, organisational restructuring and educational background of workers (with the higher educated making more use of ICT). Secondly, irrespective of age, ICT can create stimulating and motivating opportunities for learning, though as indicated before, it can have a negative impact as well in the case it deprives workers of the feeling of being in control of their own work. Thirdly, the findings indicate that overall older workers appeared to manage the ICT challenges quite well, acquiring the necessary ICT skills while working. In this context, Tikkanen et al. (2001) conclude that the fear that older workers will be disadvantaged by the rapid introduction of new ICT might appear to be overestimated within a period of five to ten years, certainly if learning methods are developed that better match the learning skills and styles of older workers. This expectation appears to be corroborated by the conclusion of Van der Sanden et al., (2002) that there is no longer evidence for the feared 'digital divide' in relation to age. In addition to this, the WORKTOW project found evidence that workers 'share' ICT competences, in the sense that they try to plan and disperse work activities in such a way, that those workers that are good in particular tasks (e.g. using particular software) take these on board, while others take care of work tasks they are good in. (Page 103-104) [IHP2]

Other issues related to Life Long Learning are flexibility for learners, virtual mobility, development of communities of learners, collaborative knowledge-building, and teachers' professional development schemes:

Learners have to be able to decide on learning needs and to choose a preferred way of teaching themselves. Gaming combined with a subjective support is a new option and depending on the results, it could betimes become standard in many organisations. [KITS]

Provision of European course portals and acceptance of Learning Object Metadata will support virtual mobility of students since they more easy can find information about study options available to them. [CUBER]

The wider involvement of teachers in the ITCOLE project and the training they received, as well as the design and implementation of school-based projects offered them the opportunity for professional development. The innovations introduced have many implications for the development of life-long-learning practices among teachers, particularly through the development of communities of learners and collaborative knowledge-building. [ITCOLE]

The issue was not dealt with in any systematic way. However it is implied that appropriately structured approaches to the introduction/integration of ICT-based innovation in schools requires appropriate teachers' professional development schemes which in turn affect their implementation for LLL. Implied is also that teachers professional development is a LLL process. [IHP4]

The K2 and WEBLAB analyzes did not provide further information about the implications for Life Long Learning:

Not mentioned. [K2]

Not applicable. [WEBLAB]

## **Chapter 5: Conclusions and Recommendations**

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