E-learning for teachers and trainers

Innovative practices, skills and competences

EN

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Preface

Since the Lisbon Summit in March 2000, the European Union has embarked upon the ambitious challenge of making Europe into the world's most competitive economy within the first decade of this new century.

The economic, technological and social challenges, combined with an ageing workforce and an emerging European labour market constantly requiring new skills to sustain and promote economic growth, ultimately make new and unprecedented demands on national education and training systems. Technology supported learning is seen as having a major role to play in confronting such challenges, encouraging upskilling and a true culture of lifelong learning.

The benefits of learner-centric, as opposed to teacher-centric, learning, of training adapted to the style and needs of the individual learner, coupled with the possibilities of any-time, any-place learning, are well recognised, yet research into many areas of e-learning is still in its infancy. This applies equally to pedagogic approaches, interface design and the optimal balance between face-to-face and technology supported learning.

This report, the result of two years of work within the Pan European Teachers and Trainers Network - TTnet - managed by the European Centre for the Development of Vocational Training (Cedefop), has aimed to focus on the all-important and changing roles of the teacher and trainer in the delivery of technology supported learning. Research and surveys carried out by Cedefop over the past two years into the impact of e-learning on the teaching and training profession pointed towards a general cause for concern. The lack of formal accreditation for e-trainers and the dearth of information on what makes for good e-learning strategies are but two of the issues which emerged.

Through looking at innovative practice in seven EU countries, the report aims to contribute to answering some of the questions relating to training policy and provision for the profession. The report raises issues, tackles several priority topics in regard to the competences required in the e-learning environment and points to areas where further research is urgently needed.

Johan van Rens
Director

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Executive summary

Since 1999 the European TTnet network (Cedefop) has adopted as one of its core themes training teachers and trainers to master ICTs. The European Commission's *e*Learning Action Plan (March 2001) stresses the role of teachers and trainers in the emergence of a genuine 'digital culture'.

Within the framework of the guidelines laid down by the Commission, in Spring 2001 the TTnet network put in place a tool to support the 'teachers and trainers' strand of the *e*Learning Action Plan, which comprises three working groups. Each group included experts in training teachers and trainers and a TTnet national network coordinator with the task of piloting the groups' work in liaison with Cedefop and the other members of the TTnet network.

The current report summarises the research work undertaken by TTnet in 2002-03 to analyse examples of innovative practices in training teachers and trainers using e-learning and to identify the range of activities, competences and roles involved in such practices.

The study was accomplished by a partnership of professional e-learning practitioners, developers, training experts and university researchers from seven European countries: Belgium, Spain, France, Italy, the Netherlands, Austria and the United Kingdom.

This partnership allowed for data to be collected on a transnational basis and for the analysis of comparative trends across Member States. The overarching outcome of the project was to produce findings on innovative practices in e-learning that could be of value to professional practitioners (such as educationalists, web designers and instructional designers), policy-makers (both nationally and European-wide) and to researchers.

A key finding of the study is that different learning goals and organisational contexts require different solutions. Even in the world of training and education, there exist circumstances where straightforward knowledge transmission schemes are entirely appropriate. In particular, this approach may be an optimal solution for projects with relatively simple learning goals, very large, geographically dispersed target audiences, and strong time and cost constraints.

There are many different ways of implementing 'negotiated learning'. The majority of the projects investigated adopt a blended learning strategy, in which various forms of distance learning are mixed with more traditional

classroom training. It is important to realise, however, that teacher-driven training is no panacea. Rather, it belongs to a set of possible strategies, where no single approach can respond to all possible goals in all possible situations.

In all modern e-learning projects, whether teacher or content-driven, a key role is played by the tutor, who acts as a facilitator, helping students to resolve the conceptual, personal and technical difficulties they encounter during the learning process. However, the concrete activities carried out by tutors differ widely. In teacher-driven projects, trainers or tutors play a key role in guiding learners. Learning activities (e.g. reading, writing, analysis of cases) are in many ways similar to those they would carry out in a traditional classroom; digital content is viewed, primarily, as a support to these activities. In content-driven projects, on the other hand, the role of the trainer/tutor, though still extremely important, is primarily to provide user support.

Virtually all projects investigated by the study have invested substantially in tutoring. It is important to realise, however, that, in practice, the term 'tutoring' covers a range of very different activities; some of these are present in all projects, while others have a more restricted scope.

In many cases the focus is the training of trainers in the state rather than the private sector, for example, trainers working for regional or state training agencies. There was also a bias in the sample towards the training of teachers in, or for, the higher education sector. Future research may need to focus on trainers working and training in the private sector, both SME and corporate.

Above all, the major conclusion lies in the limited number of available accreditation procedures. Only about 25 % of the cases refer to accredited training programmes for e-tutors.

Two elements relating to the design of e-learning that did not emerge from the study were accessibility and the human-computer interface (HCI). In the case of the latter, perhaps general web and multi-media design principles are now so embedded in either the software that is employed or part of the tacit knowledge/skill-base of developers that it does not warrant a mention. However, poorly designed interfaces, web pages and media artefacts can be a barrier to learning.

The issue of accessibility is perhaps more problematic as only one project actually made specific reference to inclusivity as an aspect of e-learning environment design. Legislation in Australia, Canada, the United Kingdom and USA and makes it mandatory for organisations to take all reasonable steps to ensure that any web-based materials are accessible to all including those with specific disabilities. While there have been no test cases, and

such legislation does not yet apply Europe-wide, we should be mindful of the needs of all potential users if we are to be truly global in our attempts at delivering high quality training using e-learning.

This is one aspect that would need further investigation before an overall judgement on the effectiveness of e-learning could be made.

The overriding consideration should be that the technology is still in its infancy and developing at an unprecedented pace. Features that are commonplace today would have been unthinkable some five years ago. It is not feasible to predict accurately what the technologies of the future may enable us to do but enhanced utilisation and experimentation will inevitably bring about greater awareness and understanding.

Introduction

The rapid and extensive introduction of information and communication technologies (ICTs) into daily life, education and training has had a profound effect on the role of teachers and trainers, promoting improvements in their skills and competences. In the *e*Learning Action Plan adopted in March 2001, the European Commission made this issue a priority for the development of a Europe of knowledge.

Since 1999 Cedefop's TTnet network ([1]) has adopted as one of its core themes training teachers and trainers to master ICTs. This convergence between a Commission priority and the work of the TTnet network provided the theme of the 4th TTnet Annual Conference, which brought together the coordinators and experts of the national networks in Thessaloniki in December 2001 ([2]).

Ensuring that everyone has access to and uses ICTs is a European Union priority. In this context, e-learning appears to be particularly suited, especially among young people, to developing the skills and knowledge necessary to succeed in this new economy. However, surveys conducted by Cedefop have highlighted a need for more collaborative work amongst teachers and trainers in this field.

The work done by the TTnet network since 1999 identified a number of themes that are common to the various Member States. These included:

(a) key role of individuals and organisation in managing the changes in relation to ICTs (new work organisation, new distribution of tasks);
(b) need for a specific design and development function for open and distance learning schemes;
(c) importance of the political and strategic context for the choice of training schemes and their implementation;
(d) emergence of a competence framework for e–learning trainers.

At the same time, the European Commission's *e*Learning Action Plan (March 2001) stresses the role of teachers and trainers in the emergence of

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([1]) TTnet website: http://www.trainingvillage.gr/etv/Projects_Networks/TTNet/

([2]) See *4th Annual Conference of the TTnet network, outcomes of the proceedings*. Thessaloniki: Cedefop 2001. Available from Internet: http://www.trainingvillage.gr/etv/Upload/Projects_Networks/TTnet/workshopConferences/AnnualConferences/Synthese%20Conf%20An%202001%20-%20EN.pdf [cited 16.09.2003].

a genuine 'digital culture'. The action plan accordingly proposes a number of concerted key measures including:

(a) an inventory of projects and an analysis of models relating to initial and continuing training for teachers and trainers in the new skills required;
(b) taking stock of existing e-learning resources;
(c) an analysis of the skills and qualifications needed by tomorrow's teachers and trainers.

Within the framework of the guidelines laid down by the Commission, in Spring 2001 the TTnet network put in place a tool to support the 'teachers and trainers' strand of the *e*Learning Action Plan, which comprises three working groups ('project groups'):

(a) group 1, with the task of analysing innovative experiences in the training of teachers and trainers;
(b) group 2, with the task of identifying the skills of teachers and trainers involved in e-learning schemes;
(c) group 3, with the task of preparing a guide to online resources and services.

Since the beginning of its investigations, TTnet has aimed not so much to document current trends in e-learning as to provide guidance to practitioners and policy-makers, facilitating the dissemination of innovative practices in teacher and trainer training.

In line with these goals, TTnet has based its research on innovative practices, designed to provide 'thick descriptions' of the challenges facing practitioners in the field and of the way in which they have responded.

In the period from 1999 to 2003, TTnet organised three series of cases studies, with each series building on the results of its predecessors:

(a) six pilot studies on trends in the competences of teachers and trainers working in e-learning (France, Luxembourg and Portugal; 2000-01) ([3]);
(b) six small-scale case studies on innovative practices and competences in e-learning (Belgium, Denmark, France, Ireland, Portugal, United Kingdom; 2001);
(c) 25 in-depth studies on the same themes (Belgium, Spain, France, Italy, the Netherlands, Austria, United Kingdom; 2002-03).

The current report summarises the research work undertaken by TTnet to analyse the last of these studies.

([3]) The final results of this activity are presented in a synthesis report. See De Blignières, Anne; Deret, Evelyne. *Developing trainers' skills using open and distance learning systems. Synthesis Report*. Thessaloniki: Cedefop, 2003. TTnet – European Training Village. Available from Internet: http://www.trainingvillage.gr/etv/Upload/Projects_Networks/TTnet/Rapport_Final_etude_FOAD_EN_format.pdf [cited 5.01.2004].

The research objectives were specified as:

(a) objective 1: identify examples of innovative practice for the training of trainers/teachers with specific reference to e-learning;
(b) objective 2: describe the approaches to the management of innovative projects;
(c) objective 3: identify the kind of pedagogic principles and models of learning (whether tacit or overt) underpinning effective design;
(d) objective 4: describe and analyse the originating circumstances (by which is meant the context, specific learning or organisational needs) threats and opportunities that have driven the innovation;
(e) objective 5: identify the types and scale of output;
(f) objective 6: present an impact analysis arising from the examples of innovative practice (and the potential for transferability and scalability);
(g) objective 7: identify and describe the activities, competences and roles involved in innovative practices;
(h) objective 8: identify and describe the evolution of competences of trainers, their professionalisation and work environment.

The research was divided into two sub-projects. A total of 25 case studies were chosen for the innovations research (focusing on objectives 1 to 6). Subsequently, 17 of these cases were revisited for detailed interviews conducted for the activities and competences research (focusing on objectives 7 and 8).

The research team consisted of:

(a) transnational consultants, one from France, two from Italy, and two from the United Kingdom, whose responsibility was to formulate the project research methodology, to design research tools, to select the case studies for inclusion in the research, to analyse the resulting data and to produce the final project report (this document);
(b) TTnet network leaders and leaders of the associated networks whose role was to identify appropriate case study sites in their own countries, to select national experts (field researchers) and to issue the purpose-designed research tools to the national experts;
(c) A coordination committee led by Cedefop's project manager Mara Brugia, with the collaboration of Anne de Blignières-Légeraud (University of Paris IX - Dauphine).

The study was undertaken by a partnership of seven countries comprising Belgium, Spain, France, Italy, the Netherlands, Austria and the United Kingdom. This partnership allowed for data to be collected on a transnational basis and for the analysis of comparative trends across Member States. The project also offered another opportunity for collaborative research by a partnership of practitioners, e-learning developers, educationalists and university researchers.

The overarching outcome of the project was to produce findings on innovative practice in e-learning that could be of value to practitioners (such as educationalists, web designers and instructional designers), policy-makers (at both Member State and Commission level) and researchers. In essence, the outcomes are meant to inform both *policy* and *practice*.

The research findings are reported in three chapters: Chapter 3, research findings; Chapter 4, innovative practices; and Chapter 5, activities and competences.

Chapter 1 provides a theoretical background to the project and Chapter 2 describes the research methodology. Chapter 7 summarises the study's recommendations for practitioners and policy-makers, both nationally and Europea-wide. Chapter 6 provides an overview of the project and some of its key findings.

CHAPTER 1

Theoretical approach

1.1. Background

E-learning is now big business, although figures as to its scale and future prospects vary widely. One US-based management consultancy predicts that, within education, the annual spend on e-learning will rise from $ 5.3 billion in 2000 to $ 13.6 billion in 2004 ([4]). Another source put the spending by the US corporate sector at $ 2.2 in 2000, which was expected to more than quadruple in four years ([5]). Overall, corporate training delivery using the Internet rose from 16 % of all training in 2000 to 24 % in 2001, with the use of e-learning courses only second (although a long way behind) instructor-led courses in terms of popularity. By the end of 2004, more than 90 % of US publicly funded universities and colleges are expected to offer online courses ([6]). Given the subsequent downturn in the global economy, these figures may be overly optimistic, but they nevertheless represent strong projected growth for the e-learning sector.

Strong optimism for the growth of e-learning (often from providers), however, contrasts sharply with some of the experiences of those on the receiving end. Massy ([7]) (2003), for example, reports on the results of a European survey conducted by Cedefop in 2002, which found that 61 % of respondents rated the quality of e-learning negatively, as 'fair' or 'poor', while a mere one per cent rated what they had seen as 'excellent' and only 5 % 'very good'. Another survey reports that, in terms of the development of e-learning 'early on we witnessed a series of claims that e-learning was the ultimate panacea, but many commentators are suggesting that this early optimism was grossly misplaced' ([8]). The report suggests that the growth of e-learning in corporations, for example, has reached a plateau due to a variety of implementation problems. The introduction of e-learning is

([4]) Barlas, Demir. E-learning poised for growth. *Line56*, 03 July 2002. Available from Internet: http://www.line56.com/articles/default.asp?ArticleID=3811 [cited 16.09.2003].

([5]) Clark, Donald. *Growth of e-learning,* Nwlink, 2002. Available from Internet: http://www.nwlink.com/~donclark/hrd/elearning/growth.html [cited 16.09.2003].

([6]) *E-learning: going the distance*. Jones International University, 2002.

([7]) Massy, Jane. *Quality and e-learning in Europe: summary report 2002*. Reading: Bizmedia, 2003.

([8]) *E-Learning: the learning curve.* Chartered Institute of Personnel and Development. London: CIPD, 2003.

complex, requiring a cultural shift ([9]) in which the change management process needs to be handled sensitively and strategically if it is to have any chance of being successful.

1.2. The progression of e-learning

E-learning has progressed through a number of stages and transformations over the last twenty or thirty years. In the 1970s and 1980s, for example, it was referred to by terms such as computer assisted learning, computer based training or technology based training, to name but three. In terms of pedagogic style, programmes often involved electronic page turning and were didactic in approach. Gaimster and Gray ([10]), characterise this as transmitted knowledge.

Siegel ([11]) distinguishes between three generations in the development and sophistication of these kinds of e-learning programmes. In the first generation, web sites consisted largely of text-based pages with hypertext links to other text pages. The second generation saw the inclusion of graphics and video, but with no clear sense of an integrated learning experience within the site as a whole. Siegel denotes this as 'thin multimedia'. In the third generation, however, the visual, auditory and textual material flow, interact and enhance each other in a coherent, holistic fashion.

By the 1990s, however, this form of learning was beginning to be supplemented by the use of other media, particularly the introduction of e-mail, listservs and discussion groups, often referred to as computer mediated communication (CMC). Although courseware continued to be used, this was now often accompanied by a discussion forum through which participants could read and post messages, and become involved in mutual support and debate. Mason ([12]) (1997), Kaye (1994) ([13]) and Laurillard (1994) ([14]) suggest

([9]) Ryan, M.; Hall, L. E-learning, teaching and training: a first look at principles, issues and implications. *ED-MEDIA and ED-TELECOM 2001 proceedings, Tampere, Finland*. Norfolk: AACE, 2001.

([10]) Gaimster, J.; Gray, D. *From transmitted knowledge to constructed knowledge - e-learning as independent inquiry*. European conference on educational research, 11-14 September 2002, Lisbon: Portugal.

([11]) Sensiper, S. Making the case online: Harvard Business School multimedia. *Information, Communication & Society*, 2000, 3 (4), p. 616-621.

([12]) Mason, Robin. Models of on-line courses. *Networked Lifelong Learning: Innovative Approaches to Education and training through the Internet*. Sheffield: University of Sheffield, 1998. Available from Internet: http://www.aln.org/publications/magazine/v2n2/mason.asp [cited 5.01.2004].

([13]) Kaye, A. *Collaborative learning through computer conferencing: The Najaden papers*. Heidelberg: Springer-Verlag, 1992.

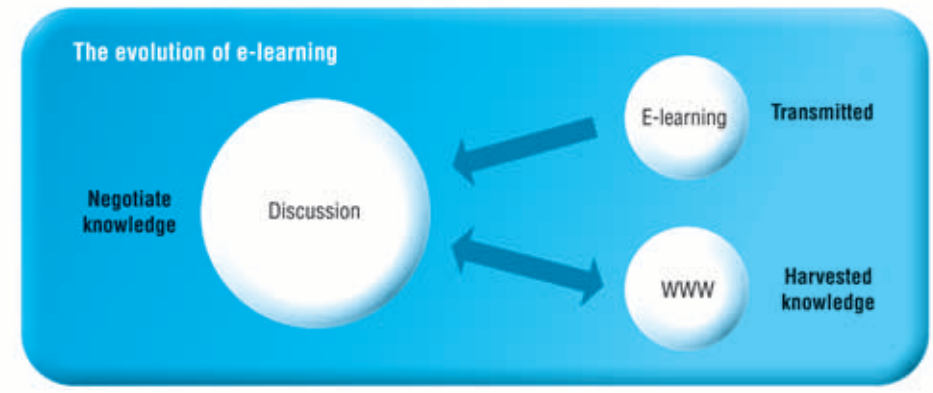
([14]) Laurillard, D. *Rethinking university teaching: a framework for the effective use of educational technology*. London: Routledge, 1994.

that the appropriate use of CMC facilitated a more discursive approach to learning which in turn heralded a new paradigm, focused on critical thinking and reflection resulting in deeper level learning ([15]). The construction of new knowledge was often associated with the use of CMC, particularly within programmes of study designed to promote continuing professional development ([16]). In a sense, this could be seen as negotiated knowledge (Gaimster and Gray, 2002). Today, systems such as virtual or managed learning environments comprise facilities for the dissemination of courses and discussion groups alongside a range of communication and administration tools.

Looking forward, there are some important changes taking place in web development that could have a significant impact on the way in which we use the web for teaching and learning. The web itself is growing exponentially and now includes not only millions of pages and sites but also archives, portals and databases. It is the largest repository of knowledge known to human kind.

In the future, we may be moving away from using the web to deliver knowledge, and developing in people the research skills and capabilities for searching the web for what they want to know. This has been characterised by Gaimster and Gray (2002) as harvested knowledge.

Figure 1: The evolution of e-learning from transmitted to negotiated and harvested knowledge (Gaimster and Gray, 2002)



([15]) Jordan, G.J.; Ryan, M. Designing a distance curriculum to harness the potential of asynchronous computer conferencing: an example from a Masters programme in Continuing Professional Development. *ED-MEDIA and ED-TELECOM 98 Proceedings, Seattle, USA*. Norfolk: AACE, 1999.

([16]) Ryan, Malcolm. Exploiting groupware reveals an enhanced distance paradigm. *ED-MEDIA and ED-TELECOM 97 Proceedings, Calgary, Canada*. Norfolk: AACE, 1997.

With reference to the impact of technology on learning, teaching and training it is possible to articulate some emerging models of e-learning. When gathering data for the case studies that formed the focus of this project, the following set of models was used.

1.3. Models of e-learning

1.3.1. Virtual classroom

According to M. Turoff ([17]) (1995), the virtual classroom is a teaching and learning environment located within a computer-mediated communication system. The objectives of a virtual classroom are to improve access to advanced educational experiences by allowing students and instructors to participate in remote learning communities using personal computers at home or at work; and to improve the quality and effectiveness of education by using the computer to support a collaborative learning process. It can be either didactic or more student-centred dependent upon the approach adopted by the designer or teacher/trainer.

1.3.2. Tele-teaching

Tele-teaching ([18]) denotes the spatial distribution of teachers and students who are connected via fast computer networks and who communicate synchronously or asynchronously for learning purposes. It can be more teacher/trainer centred than other forms of learning relying on the technology to deliver content in a didactic manner; in essence it can be considered as remote teaching.

1.3.3. Blended learning

The integration of Internet resources and tools into teaching and learning in order to exploit the potential of information and communication technologies alongside traditional face-to-face (f2f) teaching. Citing epic learning ([19]) it is, 'the synergy of live instructor-led classes and live online coaching with proven self-study programmes, hands-on labs, and a network of outside resources'. Essentially, it is the blending of technology in all its forms (not just the Internet) with traditional learning, teaching and training practices.

([17]) http://www.njit.edu/njIT/Department/CCCC/VC/Papers/Design.html
([18]) http://www.informatik.uni-mannheim.de/informatik/pi4/projects/teleTeaching/description.html (2002)
([19]) http://www.epiclearning.com/BL_approach.htm (2002)

1.3.4. Collaborative learning

In collaborative and cooperative learning ([20]) students usually work together in groups of two or more in some way to aid their learning. These are usually face-to-face groups but, with the rapid expansion and availability of information and communication technologies such as e-mail, chat rooms and discussion groups, this can also be done effectively at a distance. The technology is important only insofar as it facilitates the collaborative process. Groups may be tasked with achieving certain outcomes (products) or may be engaged in a process-oriented task, the objective of which is simply to work effectively in a group or team.

1.3.5. Supported self-learning

This can extend from the drawing up of a contract between a tutor/trainer and learner, in which the parties agree what and how learning will be achieved, to an individual accessing a wide range of resources in order to meet very individual learning/training needs. These resources may be both physical and electronic in the form of learning objects, web sites, structured learning programmes, etc. The all-important characterising element of this model is the nature of the support. It may be in the form of a person (e.g. mentor, coach, tutor) or a set of materials, perhaps containing a set of suggested activities or targets or some form of 'scaffolding' to support the learner in achieving the desired outcomes.

These five models of e-learning were articulated in gathering data on innovative practice in the training of trainers and teachers. It was recognised that other approaches to e-learning might be operating within training organisations. If none of the given models applied, national experts were asked to identify and describe the characteristics of e-learning employed within the local context.

1.4. The current study

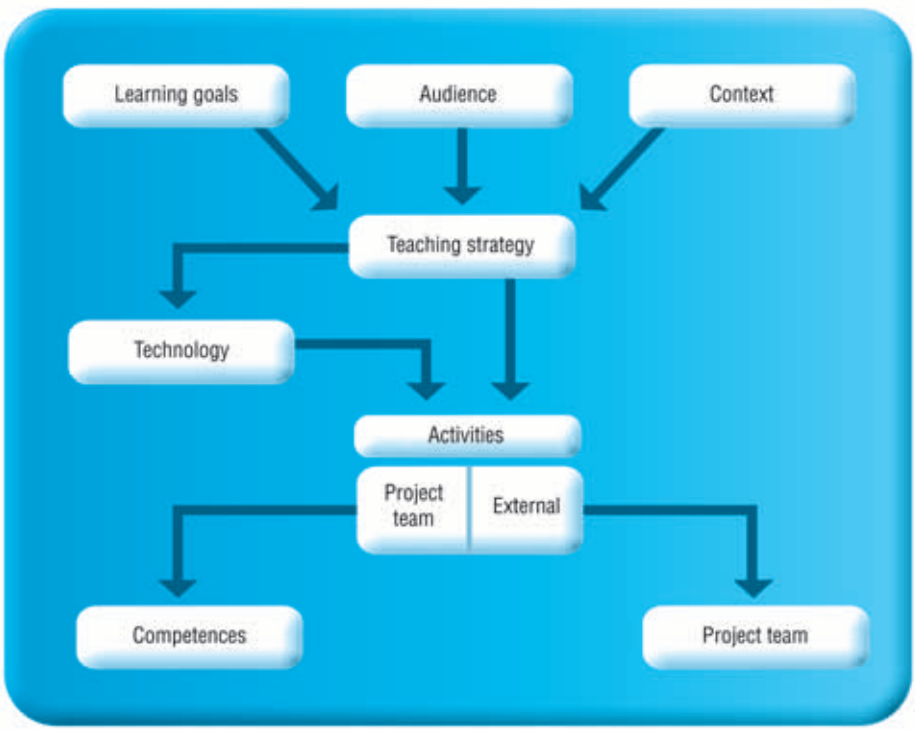
This study explores some of these changes in e-learning design and implementation, with particular reference to innovation in the training of trainers across Europe.

In planning the investigation, the TTnet team began with a simple model of the relationship between innovative practice and competence. The main features of the model (see Figure 2) can be summarised as follows:

([20]) http://www.lgu.ac.uk/deliberations/collab.learning/ (2002)

(a) every e-learning project is characterised by a set of learning goals, relating to a specific target audience, in an organisational context characterised by a specific culture and specific constraints;
(b) project goals, the characteristics of the target audience and the broader organisational context determine the choice of teaching strategy for the project;
(c) teaching strategies determine the choice of the technologies required to implement the project;
(d) the choice of learning strategies and technologies define the activities necessary to bring a project to successful completion, some of which will be conducted by the project team while others may be outsourced to third party suppliers;
(e) the set of activities to be conducted by the project team defines the competences required by the team.

Figure 2: Factors determining competence requirements and team organisation in e-learning projects



CHAPTER 2

Research methodology

European training organisations are gradually increasing their use of e-learning and are using e-learning to educate their own teaching and training staff. Ever increasing numbers of successful initiatives address new subject areas, new target audiences, applying new teaching strategies, new technologies and new ways of using them. One of the aims of this project was to discover examples of these innovative practices and to see whether or how these initiatives could yield lessons that can be transferred and disseminated more generally. These innovative practices require - and contribute to - the development of new skills and competences and new ways of putting them to work. We therefore describe an investigation into the relationship between different kinds of innovative practice, the skills and competences on which they are based and the different ways in which these skills and competences can be organised in a project team.

For this research, innovative practice was defined as: 'Initiatives, projects and activities that have a tangible impact on improving trainers and/or teachers' skills, professionalisation and working environment; and proven to be sustainable in their social, pedagogical and organisational components and/or through lasting changes in policy and decision-making.'

Sources of innovation, potentially at least, could be located in a range of areas such as a unique target audience for the programme, in the context within which the programme was developed, in the teaching strategy or technology adopted, or in the ways in which project teams worked. Innovation could also be demonstrated in the range or combination of competences used by team members in developing a programme. The same basic set of competences can be organised in many different ways; on many occasions a single team member may provide a broad range of different competences, on others a single competence may be shared by different team members. The division of labour among team members can be very rigid or relatively loose.

In order to fulfil the aims of the project, therefore, a number of research objectives were specified (see Introduction). One approach would have been to conduct a survey, either postal or web-based, using a large-scale sample. However, not only have a number of such surveys already been completed, some of them commissioned by Cedefop itself, but the survey approach can

also present a number of limitations. For instance, with web-based surveys, respondents tend to be self-selecting and therefore the extent to which their views are representative of the whole population is questionable. With both postal and web-based surveys, the responses can tend towards the generalised, lacking the detail required by this study. It was thus decided that a case study method was ideally suited to this project. This would provide detailed and illuminating data on innovation in e-learning development and implementation (getting to the heart of what is happening in terms of innovative practice) and the kinds of activities and competences needed for e-learning development. In this respect, it provides a richness and layering of data that other approaches often do not match.

The research was divided into two sub-projects with distinct remits (see Introduction): the innovations research and the activities and competences research. For the purpose of convenience, in the remainder of this report, these sub-projects will be referred to as either the innovations or competences research.

2.1. Sample selection

In view of the research method selected, cases were chosen not on the basis that they were particularly representative of e-learning projects in general (even assuming that such consistencies exist) but on their potential for yielding original and illuminating results as a guide to practice.

A total of 25 case studies were chosen for the innovations research on the basis that this number was feasible within the time and budget constraints of the project, and because they offered a sufficiently wide base for developing comparisons and contrasts across the cases. Subsequently, 17 of these cases were revisited for detailed interviews conducted for the competences research.

The case studies were selected through the issue of a case study selection template (see Annex 1). Since the case studies were intended to elicit data on the work of people in a wide range of e-learning development and delivery roles, care was taken to define each of these roles; project manager, instructional designers, tutors, etc. The project also sought to analyse the work of a cross-section of organisational types, hence respondents were asked to indicate whether their e-learning development was for teachers or trainers, within the public or private sectors or undertaken within large or smaller organisations. The study also sought to elicit information on different models of e-learning including collaborative learning, tele-teaching and blended learning. Again, care was taken to define these terms.

Case study templates were issued by network leaders (in France, Italy and the United Kingdom), and the leaders of associated networks (in Belgium, Spain, the Netherlands and Austria) to potentially innovative organisations or sites. More templates were issued than organisations selected for subsequent interviewing, providing a wider sample from which selections could be made. Table 1 provides a summary of the sampling frame for the issue of the case study templates and the size of the eventual sample (determined in advance) for the detailed interviewing for both the innovations and competences elements of the project.

Network leaders and the leaders of associated networks sent out the case study template with a letter of explanation which was often followed up with a telephone call to ensure the sample organisations understood the purpose of the research. Once case study templates were returned, network leaders and the leaders of associated networks completed a quality control sheet (Annex 2) to check that all sections had been answered. If there were any gaps or inconsistencies, they were followed up with the sample organisation to ensure that these gaps were filled. Completed case study templates were then sent to the transnational consultants for review.

Table 1. Sample selection across network leaders and associated networks for innovations and competences parts of the project

Country	Planned sample for issue of case study template	Effective sample for issue of case study template	Sample chosen for innovations project	Sample chosen for competences project
France (network leader)	10	8	5	5
UK (network leader)	10	10	5	3
Italy (network leader)	10	10	5	5
Austria (associated network)	4	2	2	1
Belgium (associated network)	4	13	2	0
Netherlands (associated network)	6	7	3	0
Spain (associated network)	6	6	3	3
TOTAL	**50**	**56**	**25**	**17**

A total of 56 case study templates were received for the selection process. Quantitative and qualitative approaches were adopted, with quantitative selection scores allocated to each case based on a list of key research criteria (Annex 3) including:

(a) the duration of the project;
(b) the number of learners;
(c) the type of initiative (for example, public or private);
(d) the new roles and skills (competences) emerging through the project.

However, it was felt that to select cases merely on the basis of numerical scores would be too mechanistic. So, a range of qualitative criteria were applied (Annex 4) to ensure a balance of criteria (variables) across all the 25 cases.

As a result of the selection process, a grid was drawn up (see Table 2) which shows the way in which the cases cover key research variables such as the type of organisation, duration of the programmes, roles and technological platforms. From the 25 cases selected for the innovations part of the project, a further 17 cases were chosen from these, that seemed to offer the potential for investigating the roles, skills and competences being developed within these projects (competences project).

Figure 3. Overview of the research process

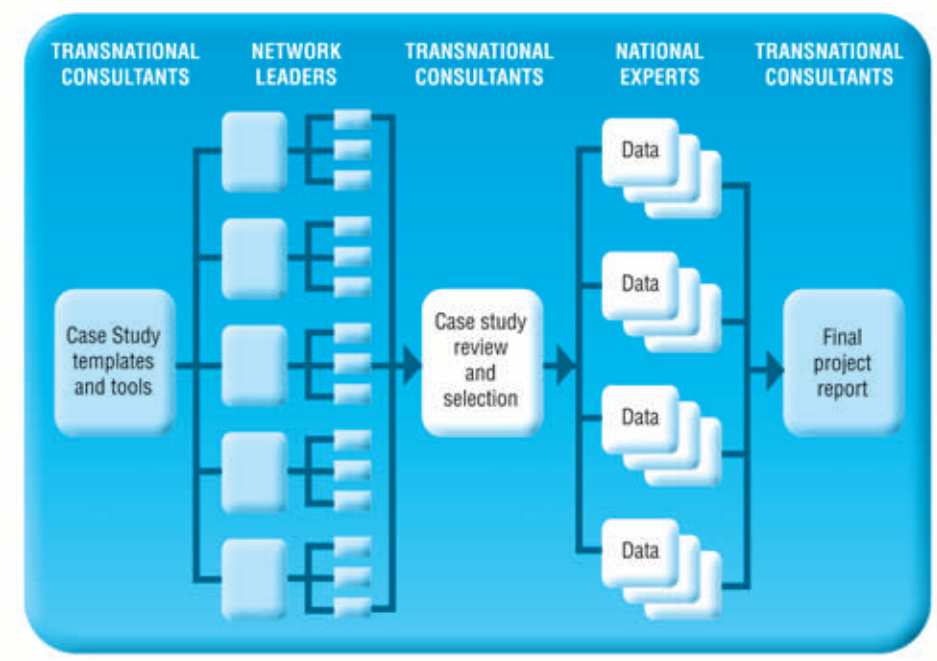


Table 2. Case study selection grid for project in terms of key variables

	Teachers	Trainers	Public	Private	Corporate	SME	University	Learners	Duration (Years)	Model (A)	Skills (B)	Roles (C)	Technology (D)
ITALY													
Case 1: IL PROMOTER		●	●			●		<50	2	BL	DPIM	ITSLP	COM
Case 2: FaDoI SAF		●	●		●			>500	>3	MUL	IM	ITSP	LMS
Case 3: PICO		●	●	●		●		>500	2	MUL	DIM	ITSL	COM
Case 4: ALMAWEB	●	●		●		●		<50	2	BL	X	TS	COM
Case 5: INDIRE	●						●	>500	2	BL	I	T	COM
FRANCE													
Case 6: INTERFOC		●		●	●	●		<50	2	SSL	DI	ITSL	WEB
Case 7: AFPA		●		●	●			<50	3	COL	D	ITSP	COM
Case 8: FIPFOD	●	●	●	●	●			100	<1	MUL	DPIM	ITSLP	COM
Case 9: FOREM		●	●		●	●		<50	2	BL	PIM	ITSL	COM
Case 10: CNPR	●	●	●				●	<50	<1	BL	DPIM	ITSLP	COM
UNITED KINGDOM													
Case 11: THOSE WHOCAN	●					●		>500	2	BL	X	T	WEB
Case 12: Learn Net	●		●	●	●			>500	>3	VC	D	ITSLP	COM
Case 13: CeLTT	●	●	●	●		●	●	<50	1	VC	X	ISL	VLE
Case 14: NOTTINGHAM		●		●		●	●	<50	2	VC	DPI	ITSLP	COM
Case 15: CIPD COL	●		●	●	●	●	●	>500	2	COL	DPIM	ITSL	COM
AUSTRIA													
Case 16: WIFI		●		●		●		50-100	1	BL	DI	ITSL	COM
Case 17: TeleCoach	●	●		●		●		<50	<1	BL	?	TL	COM
BELGIUM													
Case 18: VOV LRNG SQ		●		●	●	●		>500	3>	BL	DPIM	ISL	KM
Case 19: EXEMPLO		●		●				>500	3>	COL	X	S	KM
NETHERLANDS													
Case 20: DIDICLASS	●		●		●			?	1>	TT	IPI	ITS	COM
Case 21: FONTYS	●		●		●			>500	3>	SS	DIO	TS	COM
Case 22: Knowledge Net	●		●					>500	3>	SS	X	ITS	WEB
SPAIN													
Case 23: UNIFF		●	●	●			●	>500	3>	VC	IM	TSO	COM
Case 24: BLANQUERNA	●			●		●		<50	3>	BL	D	TO	LMS
Case 25: IFO		●	●	●	●	●		<50	2	TT	MO	TSO	WEB
TOTAL	**12**	**16**	**14**	**16**	**11**	**14**	**6**						

(A) Models	(B) Skills – refer to the phases of the training process	(C) Roles	(D) Technology
BL = blended learning COL = collaborative learning MUL = multiple models (combined) SSL = supported self-learning TT = tele-teaching VC = virtual classroom	D = design I = implementation M = management O = others P = prescription They can be combined: for instance, DPIM means that new skills are required within these four phases of the whole process.	I = instructional/ system designer L = learning/system administrator O = others P = project manager S = subject matter expert/writer T = tutor/coach/ mentor These roles can also be combined.	Com = combination KMS = knowledge management system LMS = learning management system VLE = virtual learning environment Web = website

Figure 3 represents a schematic summary of the research process (see also Annex 5) comprising:

(a) design of the case study template and tools by the transnational consultants;
(b) issue of these templates and tools by the network leaders (France, Italy and United Kingdom) and leaders of associated networks (Belgium, Spain, Italy, the Netherlands and Austria) to the identified recipients;
(c) the evaluation of the completed templates by the transnational consultants and the selection of 25 case studies drawn from a predetermined sampling frame across the six countries;
(d) the issue of data gathering tools (analysis tool and data report template) by the network leaders and leaders of the associated networks and the subsequent interviews and data gathering by national experts and appointed research consultants (field researchers);
(e) The collection of the data, analysis and reporting by the transnational consultants.

2.2. Data gathering tools and process

A wide range of data-gathering tools are potentially valid for case study research. For both the innovations and competences parts of the project, particularly given the intention of gathering illuminating data, it was decided to use semi-structured interview schedules (for innovations, see Annex 6 and for competences, Annex 7). The use of short, pre-determined questions would allow for the development of some standardisation and focus on the

themes of the research. However, through the use of open questions, the research tool was designed in such a way as to elicit rich, 'thick' descriptions and detailed responses. The questions were administered by in-depth, face-to-face interviews or, in a minority of cases, by telephone interviews. Interviewers for both wings of the project (innovations and competences) were provided with detailed instructions on how to conduct the interviews (see Annexes 8 and 9). Each interview lasted between one and two hours.

2.2.1. Special methodology and tools for competences

Among the 25 projects that agreed to participate in the study and filled in a questionnaire providing basic information about the project, interviews were successfully organised in 17 cases: three in Spain, five in France, five in Italy, one in Austria and three in the United Kingdom. Of these projects, 10 addressed trainers or teachers in the public sector, nine in the private sector and five in both (see Table 3). The size of projects varied widely (see Table 4). While four projects involved 500 or more learners, eight involved 50 or less.

Table 3. Projects by target audience (17 in-depth studies)

	Public	Private	N.D.
Teacher	4	3	2
Trainers	10	8	0
N.D.	0	1	2

Table 4. Projects by number of learners (17 in-depth studies)

Scale	Total
<50	8
50-100	2
100-500	1
>500	4
N.D.	2

As can be seen from Table 5, learning strategies were similarly varied. Many projects applied mixes of different strategies: three used tele-teaching, nine adopted a blended learning approach, seven employed forms of collaborative learning, and five based their approach on tutor-supported self-learning.

Table 5. Projects by Learning Strategy

Learning strategy	Total
Virtual classroom	4
Tele-teaching	2
Blended learning	10
Collaborative learning	3
Supported self-learning	3
Any others	0
N.D.	3
Total	**25**

The competences element of the project also made use of three different tools. First was a semi-structured questionnaire for collecting project information about the candidate projects. There were the same items as the ones for innovative practices questionnaire: project goals and rationale; the target audience; the number of trainees involved; the duration of the project; project learning strategy; the technologies used; the main actors involved in the project; new skills/competences required by trainers involved during the design and implementation of the project; and the transferability and scalability of the project results. This questionnaire was transmitted to selected project leaders via e-mail. Replies were collected via e-mail.

There was also an open format questionnaire which elicited qualitative data on specific innovative practices and the competences involved in their implementation. It was administered through in-depth, face-to-face or telephone interviews. Interviewers were provided with detailed instructions. The average interview lasted between one and two hours. The questionnaire consisted of a set of non-structured items in which the interviewee was asked to provide specific information: the instructional design process adopted by the project; the competences required by those involved in the process; the tools and techniques used to assess user needs; the technologies used in implementing the project (authoring tools, learning management systems, virtual learning environments, synchronous and asynchronous communications tools etc.); the competences involved in using these tools; the tools and techniques used to assess learner performance; new activities engendered by the project (during the design and the delivery phase); new skills required to implement these activities; the key competences that determined the success of the project; and open issues.

Figure 4. Activities by project phase

ANALYSIS GRID

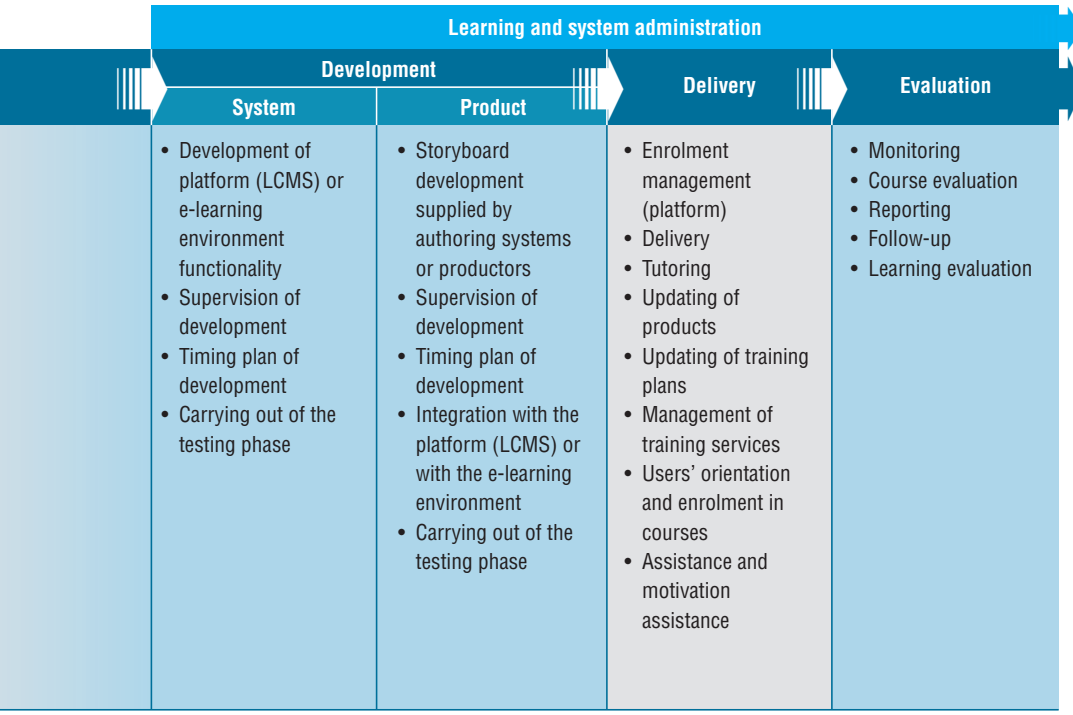
PHASES	Needs analysis	Instructional design	
		System	Product
ACTIVITIES	• Analysis of enterprise's context • Analysis of culture and impact changement • Policy analysis competences management • Analysis of training • Definition of receivers' profile • Definition of requisitions for admission to courses • Definition of competences assessment • Analysis of existing software (HR, ERP) • Analysis of condition technology • Costs and analysis	• Communication plan • Selection of a LMCS or e-learning environment • Definition of functionality • Integration with enterprise's software or with competences assessment • Definition of blended learning paths	• Definition of users' competences • Individuation of how and definition of contents • Definition of learning objects/aims and methodology • Instructional design modular structure of the course • Definition of the evaluating and monitoring system • Definition of specifics development • Integration with synchronous and non synchronous communication • Storyboard writing
ROLES	• Project manager • System instructional designer	• Product instructional designer • Learning administrator	• Tutor • Writer

Finally, a structured analysis grid was designed to identify key activities in a typical e-learning project and to analyse the way in which these were assigned to different human resources. The grid identifies 5 stages in the design and implementation of a typical e-learning project; needs analysis, instructional design, development, delivery and evaluation.

In the instructional design and development phases, the analysis makes a further distinction between activities designed to develop the basic technological platform (the system) and activities designed to develop training content (the product). The analysis identifies the specific activities involved in each phase (see Figure 4).

Furthermore, the analysis identified the typical members of a project development team:

(a) the project manager: the team member responsible for managing the team, interfacing with the customer and steering the project towards its



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goals. The project manager is responsible for costs, human resources, deadlines and quality;

(b) the system instructional designer: the team member responsible for selecting, designing and/or implementing the project's technology platform;

(c) the product instructional designer: the team member responsible for planning the training activities, and related learning materials to be used within the project;

(d) the learning administrator: the team member responsible for coordinating learning activities (e.g. tutoring, virtual classrooms) and related administrative activities (e.g. admissions) during the delivery phase;

(e) tutors: resources involved in assisting learners and facilitating the learning process;

(f) writers: resources involved in the development of learning content.

Interviewees were asked to fill in empty grids showing the activities performed by specific resources in specific phases of the project. In some cases the difficulties experienced by interviewees made it possible to identify issues that had not been considered in the initial phases of the analysis.

National experts were required to send data from their very first case study to the transnational consultants for review. The transnational consultants then verified that the results were of appropriate depth and quality before giving the national experts the authority to conduct their remaining studies.

Under the auspices of Cedefop, through close cooperation among the project participants, a number of meetings and many distant communications, the transnational consultants analysed the data based upon the templates written by the national experts. This iterative process produced this collaborative work. The report is jointly written by different key people in the TTnet network. In this context, this final report reflects a diversity and variety of intellectual approaches, which is also its richness.

CHAPTER 3

Research findings

3.1. Overview of the case studies sample

Many of the cases studied in this project demonstrated imagination, flexibility and forward-looking perspectives. The approaches reported by the case studies included:

(a) providing advice and guidance and tele-training to home-based disabled tele-workers;
(b) delivery of a doctoral programme to professional teacher educators, with a strong emphasis on collaboration and the sharing of knowledge;
(c) trainee teachers using web-delivered video segments showing best practice;
(d) the provision of over one hundred e-learning courses for the training of apprenticeship trainers;
(e) a knowledge management tool developed by and for trainers to share good practice;
(f) an e-learning programme for trainers on e-learning methodologies and ICT applications;

A summary of the 25 cases studied in this project is provided at Table 6 (see also TTnet website: http://www.trainingvillage.gr/etv/Projects_Networks/TTNet/).

What emerged from many of the case studies were imaginative and innovative ways of using the functional strengths of the technology:

(a) using computer-based simulations (video clips) of communication interactions, trainee social workers are able to observe, and are e-assessed on their reaction to positive and negative aspects of behaviour;
(b) using online asynchronous discussion where students are studying in a language that is not their first. This allows them more time to consider and reflect on what is being said;
(c) using end users to design their own web sites and to add content to an existing web portal;
(d) developing a network and community of practice among professionals;
(e) building a knowledge management system through which a growing network of developers and trainers add descriptions of good practice and

Table 6. Summary of the case studies

CASE STUDY	DESCRIPTION
ITALY	
Case 1: IL PROMOTER	Through a blended learning environment used by five regional agencies, trainees are trained in the development of blended learning materials for small and medium enterprises.
Case 2: FaDoI SAF	A large scale project for the development of the professional skills of workers in vocational training centres using online courseware, virtual classrooms and video conferencing.
Case 3: PICO	A regionally-based ICT system aimed at tele-training trainers in SMEs and at training agencies and educational institutions interested in developing and designing e-learning for SMEs.
Case 4: ALMAWEB	An executive MBA using blended learning, through which tutors act as intermediaries between learners and subject matter experts.
Case 5: INDIRE	An open and flexible learning environment for newly hired higher education lecturers comprising 25 hours of online materials combined with five face-to-face meetings.
FRANCE	
Case 6: INTERFOC	Six online training modules in seven languages aimed at developing problem-solving skills amongst occasional trainers.
Case 7: AFPA	A blended approach to the training of trainers including work experience, individual assessments, resources (CD-ROMs, articles, websites) and e-learning through interactive forums and e-mails.
Case 8: FIPFOD	A tool that allows for the design of an open and distance learning system, allowing developers (teachers) in universities to manipulate and test different combinations of programmes, and facilitating collaboration between partners.
Case 9: FOREM	A collaborative learning project using blended learning delivered by CD-ROMs, web sites and interactive forums for directors and managers of paramedical institutes.
Case 10: CNPR	An open and distance learning programme for learners in agricultural training centres, based on six toolboxes which help learners to build their own projects. The toolboxes include materials such as DVDs and pdf files, as well as forums and e-mail.
UNITED KINGDOM	
Case 11: THOSEWHOCAN	A VLE for further education colleges to help train lecturers in accordance with national competence standards.
Case 12: Learn Net	The delivery of remote online advice and guidance to people with disabilities (physical and mental ill health) in their own homes.

CASE STUDY	DESCRIPTION
Case 13: CeLTT	A facilitated, online programme for teachers and trainers using four different e-learning approaches to demonstrate alternative e-learning methodologies.
Case 14: NOTTINGHAM	A doctoral programme in teacher education delivered through a mixture of online methodologies including e-lectures, a collaborative learning environment and videoconferencing.
Case 15: CIPD COL	An accredited online programme to train trainers in how to manage and facilitate e-learning.
AUSTRIA	
Case 16: WIFI	A blended learning programme for the training of trainers involving face-to-face sessions plus one hundred e-learning courses supported by e-tutors.
Case 17: TeleCoach	A certificated multimedia programme for the training of e-learning tutors including content (200 course hours), audio conferences, group work and group assessment.
BELGIUM	
Case 18: VOV LRNG SQ	An ICT-based, subscription only learning network of corporate professionals and training consultants for sharing information and experience.
Case 19: EXEMPLO	A knowledge-management tool for the sharing of good practice and information on training products among members of the European Vocational Training Association, including facilities for comments on postings and requests for information.
NETHERLANDS	
Case 20: DIDICLASS	Video segments to train students on a university teacher training programme on classroom practice.
Case 21: FONTYS	An e-learning tool involving digital video for the assessment of communication competences of social work students.
Case 22: Knowledge Net	A national project involving the rollout of infrastructure into primary and secondary schools and adult education/vocational institutions. It provides content for teachers, pupils, parents, ICT coordinators and developers.
SPAIN	
Case 23: UNIFF	A government sponsored and ESF supported university-based e-learning programme for the training of trainers.
Case 24: BLANQUERNA	A university-sponsored programme for the training of trainers, utilising blended learning through a virtual classroom containing content, images, presentations and websites.
Case 25: IFO	A programme for the training of trainers in Latin America incorporating a virtual classroom involving both individual and group participation and video conferencing.

exchange information about training products (creating a virtual, not-for-profit market);

(f) using e-learning technology with high numbers of end users across departments, sectors or regions;

(g) aiming at a very high number of users, creating a sector/department impact;

(h) using numerous methods and tools for didactic communication (synchronous/asynchronous communication, forums, chat facilities, video-conferencing, mail);

(i) designing e-learning activities to fit individual users' needs;

(j) allowing part-time and non-expert trainers to have access to a kind of online survival kit.

Other, more prosaic, reasons given included the fact that e-learning could be used in situations of student dropout or where teachers were ill and not easily replaced.

Perhaps the most common reason given was the possibility of providing access to learners who would find it difficult to attend conventional classes. One large-scale project, for instance, aimed to give college teachers a formal teaching qualification. The project leader noted that: 'to organise times when all unqualified teachers could attend a taught programme would throw college timetables into chaos'.

In other projects (such as FaDoI: case study 2), learners were thinly dispersed over a very wide geographical areas, making it hard or impossible to organise classroom training. In another case, e-learning was used to reach audiences outside the country providing the training. Access was not, however, the only motivation. In several cases e-learning was seen as a way of promoting teacher or trainer ability to learn alone ('self-training') or of introducing new training methodologies or of providing better attention to individual learners. Several interviewees believed that the use of e-learning would improve learner familiarity with ICT technology.

Interestingly, not a single interviewee referred to e-learning as a way of reducing the cost of training.

3.2. Technical issues

3.2.1. Selection of authoring and development tools

Where project teams were new to the development process, many found the task of selecting appropriate software development tools problematic. Some attempted to develop their own tools, before abandoning the task and seeking out existing software programs, or using a reliable development agency. One approach was to set out clear specifications of standards required, and then to work in partnership with an organisation that had experience in delivering these standards through authoring tools it had already developed and evaluated. Evidence suggested that, when working with an external organisation of this kind, it is prudent to sign a service level agreement through which the type and quality of service is predefined. The adherence to consistent and robust design standards is seen as one of the platforms of stability. Here, one approach was to look at European standards for collaborative environments.

In some cases, staff created a technological platform customised specifically to the project itself. This could involve making modifications to an existing learner management system (LMS) or building an entire system from scratch. A complete LMS, however, is not always necessary. A front-end tool can be built that allows designers to map out an overall training system and individual learning experiences and pathways.

3.2.2. Specification of design standards

The data revealed that the specification of design standards is usually carried out on a collaborative basis. For example, subject matter experts will identify the functionality of the programme, which programmers then have to convert into a software specification. In an international learning environment, learners may be using different computer specifications with no support for upgrading their systems. The technological platform adopted has to take this into consideration. Conforming to WWW design standards was also mentioned as important, as is an awareness of the potential and functionality of all the technologies. Design should also seek to ensure complete privacy and personal data protection for each student and for the course content.

In certain cases, however, design standards were seen to be of no value since homogenisation was not the key success factor; taking learning style into account and adapting the training materials (contents, forms and delivery mode) was far more relevant.

3.2.3. Start up costs

One cost involves the politics of getting institutional support, i.e. getting the project publicised and accepted across an institution, especially if it is a large one. Other factors contributing to the overall cost include hardware for tutors as well as learners, induction, the provision of a 24-hour help desk, continuing maintenance and development of learning materials, and tutor training.

Sometimes the cost of start up is quite difficult to estimate precisely, but it is hazardous to underestimate costs. In many cases, it was found that the initial costs of an e-learning development programme were much higher than anticipated, partly because more mistakes were made at this stage, particularly by novice project managers and development teams. Indeed, it is probably better to avoid estimating return on investment (ROI) and focus on return on knowledge.

'If you use the return on knowledge to measure benefit, it is easier to convince management and directors of its value, although knowledge itself is not tangible' (case study 19).

3.2.4. Development tools and platforms

One organisation found that changing from a client notes platform to giving learners direct web access yielded real advantages in terms of freedom of technical development. The downside is that it becomes more expensive to end users (if they are paying for their own connectivity) although Internet connections are becoming less of an issue as costs of connectivity decline.

Project managers considered that development had been made unnecessarily complicated by the use of too many development programs or tools. The message was 'keep it simple' if possible, using one, standard but functional development platform. Above all, avoid tools that are themselves undergoing development. Even using standard platforms, however, did not always provide a seamless solution. Starting from an IBM corporate e-learning platform, it was necessary to rebuild (even technically) the design structure because it did not correspond to the aims of the initiative (INDIRE: case study 5).

All projects deployed a range of communications tools, allowing learners to communicate with tutors and among themselves. In the majority of cases communications are based on asynchronous technologies (e-mail, forums). Where synchronous communications are used these tend to be based on 'chat' (between learner and tutor, within learner groups). Two projects (FaDoI: case study 2; PICO: case study 3) implemented large-scale videoconferencing systems, allowing live audio-visual discussion between

learners and tutors. These systems are used heavily and are strongly appreciated by both learners and tutors. On just a few occasions projects have deployed application sharing.

3.2.5. Technical challenges

A wide range of technical problems presented themselves. Slow connection occurred because of students using old software and hardware and large number of participants making network access extremely difficult (4 000 users at the same time) (INDIRE: case study 5). Teachers' lack of technical expertise and competences and insufficient or erroneous documentation of some aspects of the development environment also had an effect. One project (case study 21) found the use of video fragments problematic, with a slow playback speed. This was overcome by the use of smaller lengths of video fragment. For one project (case study 24), a commission has been established to anticipate future technical problems so that plans can be formulated to address them.

3.2.6. Learners

The basic ICT literacy of students can often be over-estimated. In some cases, learners were hindered from accessing an e-learning programme because of their own inexperience in using the media. Other problems included programmes where learners had to download software (such as plug-ins) before the e-learning programme could operate.

Some projects have had to backtrack into designing front-end e-learning programmes explaining how to use the web. On a positive note this, in some cases, has also generated, cooperation among peers in learning communities.

In one national context (Italy) it turned out that 30 % of participating teachers had never used a computer before, and the scholastic infrastructures showed major differences in terms of computer facilities (case study 5: INDIRE).

3.2.7. Access to expertise

The essential feature here is that there should actually be access to expertise, whether external in terms of consultancy, or internal, by bringing an expert into the development team. In some cases, technical problems were avoided by simply outsourcing the technical aspects of the project such as building infrastructure. Other projects used an external consultancy bureau for answers to technical issues, while some used an internal team of technical experts.

Ideally, it is best to have access to someone with knowledge of both the training and the technical world. This 'double skilled' person can then translate the needs of the trainers in to a system design.

'If you don't have someone who can make that translation, it's going to be either too technical to work with, or it's going to be not technical enough.' (Case study 19: EXEMPLO).

It also helps if project managers and technical experts are able to work together in close physical proximity, resolving technical issues as they occur.

3.2.8. **Infrastructure**

In some projects, the design and development of infrastructure comprised one of the key deliverables. For other projects, the infrastructure of other organisations comprised the problem; for example, safety systems such as firewalls may require the project to communicate with the company's internal IT safety expert to improve communication.

It is currently admitted that most flexible systems, including e-learning programmes, suffer from these different types of technical issues; this is a problem that project managers have to solve. There are many possible answers but one respondent mentioned that all these malfunctions could be collected, recorded and then reinvested in the programme to be used as training materials by trainees and trainers/teachers.

3.3. Project management of e-learning development

Most projects were developed by teams rather than by small groups or by individuals. This may be a product of the types of relatively large scale projects that were chosen for the research, or the fact that the scale of investment in e-learning is growing and, with it, the size of projects. Moving from individual or small scale teams to large team development can be problematic, however, as it takes time to develop understanding, positive group dynamics, and overcoming bottlenecks.

In terms of institutional support for projects, problems can arise if the target audience for e-learning development does not fit the pattern that the organisation understands. For example, for some educational institutions, e-learning may be used to gain access to new, less traditional groups of students (for example, in an attempt to widen participation or to gain access to overseas markets). But the institution itself may have difficulty understanding or empathising with the different needs of these learners. Sometimes, the potential end users may be apathetic or even hostile to using

e-learning. The approach here is to elicit their collaboration in the design of the project, or to promote the project through, say, articles or even wall posters distributed where they will be seen by users.

E-learning projects are usually developed by teams containing a diverse range of skills. The key question is how the team collaborates, shares knowledge and makes decisions.

'The main problems and challenges encountered resulted from the fact that technicians and pedagogues speak two different languages' (case study 19: EXEMPLO).

The diversity of approaches include:

(a) the use of 'flattened' management structures in which the emphasis is placed on team decision-making. 'Knowledge capital' is shared across the whole team through discussion, rather than having a reliance on the skills of a single member;
(b) a project is managed by a partnership of organisations. Here, problems sometimes emerged due to conflicts of interests, agendas, and timeframes among the different stakeholders. A more strategically coherent approach is to appoint a dedicated project manager and to allocate roles across other members of the project management team. The interests of the partners can then be represented by a steering group, drawing together experts from the different organisations;
(c) the use of a full-time community manager to oversee and assist interactions within a virtual network of practitioners;
(d) building and developing a knowledge management system with strong emphasis on using the ideas and suggestions of the community of users (bottom up project management);
(e) establishing an advisory board that may contain some internal (e.g. course leaders) as well as external experts (e.g. e-learning consultants), to review quality and to identify enhancements;
(f) establishing twice-yearly regional workshops among participants (teachers and trainers) so that participants can learn from each other and provide feedback to the programme development team;
(g) a very open dialogue with technical expertise to estimate costs of infrastructure related activities (e.g. carry out the analysis of infrastructure);
(h) some applications such as Groupware (a virtual project and knowledge management platform) were used to support and facilitate project management. But this kind of tool induces new professional practices and working processes that can sometimes constitutes a constraint rather than the supposed help.

It is important that all participants in a project, technicians, trainers, authors and designers have the same understanding of various terms. Projects must have, or develop, a common technical and pedagogical language.

One, sometimes overlooked, issue is the selection of a name for the project. It was suggested the choice of name is important, that it should reflect the goals and aims of the project, and should be acceptable to users. Indeed, careful selection of a name may help to promote a project and its outcomes. Sometimes, top-down national projects fail or have difficulties, precisely because the government is seen to be the promoter. It might be better to pass ownership of the project down towards end-user organisations.

As more than one project leader told us, one of the main differences between e- and traditional learning is that e-learning projects are more complex than traditional ones. There are more issues to be decided: the mix between classroom and distance learning, teaching strategies, technologies, and tutoring techniques. Moreover, many e-learning projects (particularly large projects) involve the design and implementation of complex technological systems and/or digital learning materials. These are processes, unfamiliar to most training organisations, with budget overruns and missed deadlines common.

For the reasons outlined above, e-learning projects are inherently more risky than conventional training. One interviewee stated that 'no project is ever executed according to the original plan'. Budgets are often higher than for conventional training programmes and large projects often imply large project teams, including, for instance, engineers who may lack a deep knowledge of training needs, and speak in terms different from those used by trainers.

In this setting, effective coordination and project management is of vital importance. The results of the study show that, in many projects, project management is in the hands of a training manager who takes on full responsibility for the success of the project. In other cases, however, management appears to be dominated by the organisation responsible for building and maintaining the technology platform. There are indications that this approach may be less than fully effective.

3.4. Issues in e-learning design

A key question in e-learning design is whether to use the technology at all. The decision to use e-learning is often influenced by the type of group the learning is directed at. For example, e-learning is often used for groups that may have difficulty attending a regular programme. These groups may include those who are too busy to attend regularly at an institution, have low levels of confidence in relation to educational institutions or have a poor school history. E-learning may also be used for people who have carer responsibilities, are widely spread in terms of geographical territory and with a high number of users, or for those who have professional constraints and need flexibility to access the training materials and guidance means. For example, SMEs have time and resource constraints.

But there is sometimes an assumption that e-learning will be used in any circumstance. 'When we set up programmes we see how we can include e-learning' (case study 12: Learn Net). Pressure can also come from funding bodies, particularly at national or community level. In some cases, resistance to e-learning comes from curriculum staff who present a counter-argument successfully.

3.4.1. Pedagogy and design

There are no definitive answers to what instructional principles or processes should be adopted for e-learning design. However, it is not always clear that any particular pedagogical stance has been adopted, and some projects were honest enough to admit that this was the case. They did, however, try to adopt a common-sense approach using guiding principles to make the exchange of knowledge and information easier.

As most respondents pointed out, the pedagogical approach, largely depends on what the project is trying to achieve. In one case, a range of ICT platforms were used (WebCT, WebQuest, OCCA and eLecture, all supported by e-mail, webcam and Net Meeting), depending on the pedagogy of the learning material. While this helped to match the technology with pedagogy, it had the downside of making students interact with a range of different software platforms which, in some cases, caused confusion, particularly for those with lower levels of ICT skills. It is clear from some responses that project managers recognise the need for the use of pedagogic principles in instructional design. What is less clear, is whether they understand how pedagogy can be applied to their own projects. Sometimes arguments are reported on whether a programme should be structured or open in design.

However, the results of these debates do not seem to have led to the provision of alternative pathways through the material, an approach that could, potentially, cater for different learning styles.

In one case (case study 13: CeLTT), however, a number of alternative structures had been developed over time. The first course used a more instructivist or behaviourist approach that was mostly teacher-centred. Subsequent courses allowed for much less teacher control and were more learner-focused. Indeed, one course was based largely on social learning in a group.

Pedagogic principles that underlie the design process included social-constructivist models following the principles of Rich environments for active learning: REALs, collaborative learning, involving reflective thinking, social learning (from peers) and a 'reward pedagogy' with regular and timely feedback as well as the use of role-model behaviour (illustrated through video clips). The design process also addressed user needs (specific learning goals), utilising coaching (facilitating) online; this is similar to Vygotsky's theory about the zone of proximal development (see Figure 5) in which people learn new skills by following the example of others.

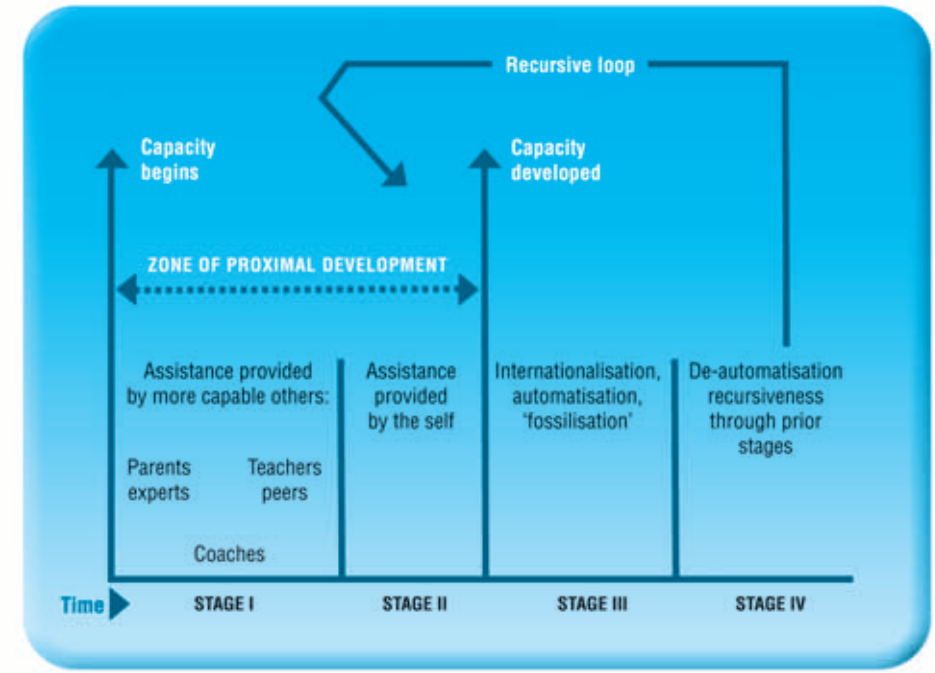
Neurobiology and cognitive studies have also been taken into account. Ten cognitive actions (e.g. select and connect to organise, interpret and make sense to implement knowledge, etc.) have been relied upon to structure the different training situations proposed to the trainees, whilst Kolb's learning cycle has enabled trainers to take individual learning styles into account.

The activities were managed using blended learning methods, with particular attention placed on the tutoring functions. An educative, but also existential and cognitive, self-learning concept and principles supported the design of the training paths.

One of the main pedagogical axes on which some projects were formerly designed and implemented is constructivism. In certain cases it has sometimes been necessary to limit the openness of the system to provide more steady support to the learners by going back to more basic and traditional approaches which are far from self-learning.

One project, FIPFOD (case study 8), has developed an original concept where transfer is integrated on a continuous basis in the overall programme. The target group is composed mainly of teachers, lecturers, technical and administrative staff among universities. To be more effective and allow rapid and high value dissemination in this environment, FIPFOD established expert groups within some universities. These 'expert' groups will be trained on FIPFOD methodology and programmes. Then they will act as transfer agents

Figure 5. The four-stage model of the zone of proximal development



who develop the FIPFOD programme and create expertise, thus facilitating skills evolution. One of the most important objectives in FIPFOD is empowerment to make actors become fully autonomous. This transfer is a one-year process during which a kind of Kaizen (continuous improvement) process is engaged with these groups who generate new demands and identify new needs. Finally a kind of community of practice is emerging.

Other factors worthy of consideration include the entry skills of learners. Not only are some learners unfamiliar with e-learning, some are novices when it comes to the use of computers. This group should not be disadvantaged, and may require training in how to use computers. In addition building a culture of openness, trust and tolerance so that a learning culture emerges, and maintaining students' motivation is another important pedagogical consideration.

3.4.2. Evaluation

In some cases an action research approach was adopted, whereby tutors and learners worked to evaluate and review the project and made changes throughout the development process. Other cases used a 'customer panel'

that evaluated all new aspects introduced to a programme including style and navigation. Perhaps significantly, very little evidence emerged of projects evaluating pedagogic or teaching methodologies. No reasons were given for this.

Some cases have developed continuous evaluation through different management boards such as a scientific committee or an 'orientation committee' (composed mainly of people in charge of the training funding) dedicated to identifying more accurately the needs and target groups thus helping the project management team to improve, and adapt the programmes.

3.4.3. Learning styles

These tend to be catered for through the discussion element of a programme rather than within learning materials themselves. For example, in case study 12 (Learn Net), in the training of trainers, learners explore how learning styles can be accommodated within virtual interactions.

In a number of case studies, however, designers seem aware of the concept of learning styles, without being able to provide substantive evidence that they had, in fact, catered for them. For example, claiming that learning styles are catered for because the materials are totally open may demonstrate a lack of appreciation of the issue. Other projects claimed that their programmes contained such a wide variety of approaches they must, in some way, match different learning styles. This, approach, however, seems to rely more on chance than on pedagogic planning. Hence, the notion that learning styles may be treated as more of an aspiration, rather then a serious pedagogic plan.

3.4.4. E-tutoring

E-tutoring is relatively new as a learning and teaching process. It is clear that, where it is used, most organisations are 'feeling their way' into it. Most tutors come from a traditional classroom teaching or training background. They have to learn new approaches to teaching and supporting students. One approach to this has been through experiential learning, with virtual tutors being trained in exactly the same environment as their learners.

A number of significant issues emerge. The first issue to be addressed is managing the online presence. Traditional teaching timetables are respected by the institution and by colleagues. This is not the same for e-learning because no-one sees the students or the tutor when online; the work has low institutional visibility. Time needs to be created (and respected) for online interaction. Another issue is that of resource management, especially tutor

time. For a global learner audience, e-tutor rotas may have to be organised to ensure quick response and interaction times to learners, across multiple time zones.

In addition, a range of issues concerning the learner need to be fully addressed. In this context, the skills are similar to those facing a classroom teacher. These include encouraging the quiet learner, managing the loud learner (but recognising that this person might be quite vulnerable so care needs to be taken with their motivation), dealing with people with poor etiquette, but without disconnecting them from the programme, and managing people who leave the programme.

Furthermore, the creation of the portfolio of course participants and the problem of managing the virtual class, in an absolutely new context, and maintaining students' motivation and getting them to respect agreed working times, should not be overlooked. Also, managing the online tutors, especially where they have been used to facilitating within an academic environment (often with teachers) and then have to move to facilitating human resource professionals and trainers, needs to be addressed.

Moreover, getting access to software that recognises when learners have not been online for some time and flags this to e-tutors can be beneficial. A range of different e-tutors may be employed in differing capacities to assist the learner at various stages of the project. These may include:

(a) a module tutor, responsible for a specific training module, for group animation and for modifications in response to learner feedback;
(b) a pedagogic tutor, who supports users during learning and who has a good area of the subject matter covered by a module;
(c) an expert, with the ability to deal with specialist queries from learners;
(d) a technical tutor, providing support on technical issues;
(e) a social tutor, handling personal or emotional issues which may be affecting learner ability to participate fully in the programme;
(f) a counsellor who helps learners in the orientation phase.

For projects that focus on the training of e-tutors, is has been found beneficial if groups of learners from different fields– for example, those seeking to become trainers, organisers or e-learning project managers - are mixed together. Some projects also use a one or two day event involving face-to-face participation, seen by some projects as absolutely essential for success.

Some successful e-tutoring projects seem to have very low tutor-learner ratios with 1:3 or 1:4 not being unusual. This seemed to result in rich learning experiences and very low drop-out rates for the project.

3.4.5. **Assessment**

A distinction is made between assessment and evaluation. Evaluation concerns exploring the quality of materials and programmes. Assessment examines learner attainment. Assessment tools included:

(a) the development of an online portfolio, including self-assessment forms, reflective activities, gapped handouts, group activities and evidence of collaborative decision-making;
(b) the use of interactive tasks which are assessed online by a group of learners who give feedback to each other on each others' performance;
(c) common standard self-tests including multiple choice tests, completion tests;
(d) formal examinations, taken at a university, and involving online assessments including multiple-choice tests, completion tests and a short examination paper, submitted in advance;
(e) tests and self-assessment tools, mainly comprising essay exercises and work presented by the students and commented on by the tutors.

In the majority of case studies from the United Kingdom, learner evaluation was considered an essential part of the project life cycle. All projects devoted a significant effort to evaluation and evaluation tools were created at a very early stage in the design process.

Case studies in Spain, France and Austria also gave great weight to evaluation. In several cases, however, learners were being trained for formal exams or certification procedures. In these cases formal evaluation of learner progress was conducted by outside bodies. As a result, the only assessment activities carried out by the projects were self-diagnosis by learners and informal evaluation by tutors (primarily as a support to learners).

In several Italian case studies, learners received certificates attesting to the training received and the completion of the course, but were not subjected to a formal evaluation process.

There are now an increasing number of courses for online tutors that are both assessed and accredited. This is part of the professionalisation of e-tutors.

3.5. Professional development for designers and tutors

Many e-learning projects are developed by experienced trainers and teachers. However, getting the commitment and engagement of this group can be problematic, particularly among those who feel that e-learning will threaten their jobs, or just add additional tasks to an already heavy workload.

Winning hearts and minds is essential.

In one, large scale, project, evidence of good practice emerged, in that all employees of the project met in a 'knowledge academy' four times a year to learn about the project and its management. Linked to this approach, every employee works with a personal development plan that is monitored by managers. Where collaborative and network learning is used, coaches and facilitators can use the ICT platforms to converse with, and learn from, each other.

For some projects, professional development tends to focus on technical skills (such as building knowledge of a particular virtual learning environment or software application) rather than pedagogic or instructional design skills. It is also important that learners are provided with flexibility, being able to learn at a time that is convenient to their busy work schedules as teachers or trainers. If a professional development programme is accredited, participants should be able to defer taking a course or unit, if their work schedules become too intense.

Research data indicate that people want accreditation, want to learn in an appropriate way, want learning to fit in with lifestyle, and that learners want to network. Accreditation usually requires everyone to work to a standard and produce work for assessment but some learners may only be concerned with process rather than product and not wish to be time constrained. Such tensions may be exacerbated by the claimed flexibility of e-learning as an anytime/anywhere approach and designing to meet such competing needs may prove impossible or expensive.

For the future, the lack of professional training (and accreditation) for online tutors is likely to be a factor that could limit the future expansion and scalability of e-learning.

3.6. Impact of e-learning

Some projects reported a culture change, or at least a change in thinking, with multimedia becoming accepted as a valuable and viable means of educational development, both by managers and end users. There are times, therefore, when e-learning only becomes accepted through the development of a pioneering project that changes perceptions. Sometimes e-learning helps to change an organisational culture. At other times, however, deliberate steps have to be taken to facilitate cultural change. Whatever the context, e-learning is clearly making a difference to the extent that it is being utilised in a multiplicity of organisational environments and for diverse audiences.

For collaborative learning through online discussion groups, one of the challenges remains that of getting people to participate in the system. This can be particularly problematic for those with a low level of ICT skills and low levels of confidence (and motivation).

3.7. Innovative transfer

In the case of communities of practitioners using knowledge management systems, the issue of transfer is hardly problematic. Participants merely have to join the group. In one project, for example, new entrants merely post information about themselves (sometimes with a photograph), they can immediately access the frequently asked questions, or post new questions and receive replies. Even if questions are posted in a language other than that of the system (French and English) the hosting organisation arranges a translation (case study 19: EXEMPLO). A potentially limiting factor could be if the number of participants makes the system cumbersome for users in terms of information overload. The answer here might be to start a new knowledge community with other members. In some cases (case study 3: PICO) innovative transfer is part of the project's aims. The basis for the PICO project included the transferability of the project and its compatibility and potential for being integrated at a European level with other projects and tools aimed at broadening, qualifying and simplifying user access to further training. These aims were kept under careful consideration throughout its development.

Target groups coupled to a flexible pedagogical model and simple technological architecture constitute two levers for transferability. For example, INTERFOC's potential for transferability and scalability is quite important as it concerns a huge potential target audience. In fact, we can consider that occasional trainers can be found in every SME (regarding specific training practices in such environments), in most large firms and also in associations or public institutions. The web-based architecture and the six training path structure allow high flexibility and easy access. Only trainee support (distant or not) could be a limit. It is also a multilingual system, thus crossing possible language barriers.

In contrast, the use of specific tailor-made tools and applications as well as the pedagogical strategies can limit transferability. For example, if trainee project orientation is at the core of the programme, this will require quite complicated and important monitoring and tutoring; thus the number of tutors and organisational constraints can impact on transfer potential. Most French cases have not been thought to be transferable.

CHAPTER 4

Innovative practices

This chapter examines innovative practices used in particular case studies. The analysis involves verifying management of innovative projects, pedagogical principles and models of learning, origin of innovation, types and scale of output with reference to the six research objectives (see Introduction) of this study.

Innovation is relative. For some institutions, moving to a modest level from nothing is innovative. Partnership can prove to be innovative: for example FIPFOD (case study 8) gathered four training programmes, including existing and specifically developed programmes, supported by four different universities. Each independent programme belongs to one partner but the different components (such as sequences, pedagogical activities, and contents) are shared and collectively enhanced by the members of the partnership. This enables the partnership to embrace the complete spectrum of e-learning processes from definition and design stage through to the management, implementation and evaluation of the e-learning project.

Overall, a range of ideas emerged as to what elements of different e-learning projects were considered to be innovative (see table 7).

Another clear example of innovative practice is demonstrated by INTERFOC (case study 6). This project is the result of a strong and operative collaboration between eight partners among six European countries whose contribution has enabled the design of six online training modules (2500 screen pages) translated into seven different languages: Czechoslovak, English, French, German, Greek, Italian and Spanish. The partnership operated a distant collaborative working environment, with only 14 days allocated to face-to-face meetings. For instance, the basis of the website framework was built by a computer technician who lives in Lapland.

FIPFOD demonstrates an innovative approach by using the flexibility of the system and ICT integration within the project set up. FIPFOD has been designed according to the notion of ODL engineering. Three operating functions are considered: project managers, designer/scenario producers and tutors. Eleven generic training modules covering the overall process of training are made available. This allows the building of a flexible environment in which each partner, depending on their specific requirements, is able to

Table 7. Innovative elements of e-learning projects

Moving from resource-based learning (usually learning materials) to a networked model and therefore learning from each other.
Student-based learning, benefiting from peer comments and support as much as from the tutor.
Disseminating through ensuring a programme is learner-friendly and that learners actually want to use it.
Getting learners to participate in the development of the programme.
Achieving networking and collaboration between learners.
Continually reviewing and enhancing programmes in order to make a real difference to the impact on learning.
Inter-regional and inter-organisational collaboration between operators.
The creation and use, with positive results, of an LMS (learning management system) capable of providing managers, designers, trainers, tutors and students with innovative tools for the design, management and use of e-learning activities.
Spreading awareness and information about e-learning to tutors, designers, heads of educational institutes, training agencies, entrepreneurial and trade-union associations, by means of seminars, discussion forums, newsletters and special information sheets.

create tailor-made training paths. To support the customisation, the ENST has designed and developed OASIF, a tool to help design/redesign training programmes and paths for training engineering.

4.1. Approaches to the management of innovative projects

The world of training and education has imported first a lexicon and then methods, tools, and principles that were originally rooted in industry. Terms such as ‘quality’, ‘just-in-time’, and also ‘project management’ are now commonly used in training and education. In this context, project management approaches have also embraced innovative practices. In the field of e-learning, it appears that project management constitutes a relevant productive organisation that fits innovation development and facilitates the reaching of training objectives.

A project may be defined and operated to provide a response to the needs of a user, a customer, or a set of clients, thus involving an objective, activities and means to carry out these activities. A project may be viewed as innovative if there is at least one innovative practice, total or partial, in one (or more) field(s): technology, pedagogy, or organisation of the project.

The scale and organisation of the project teams varied enormously with project management teams ranging from 4 to 100 people. In most cases the project team consists partly or totally of experts in different fields such as pedagogy, technology, psychology and sociology. The team also includes those who will be in charge of administration of the project. Most interviewees referred to the general and systematic consensus that is looked for between partners but specifically between pedagogues and technicians (to prevent conflicts of interests) on pedagogical concepts, contents development, and openness of the training system. A consensual approach ('equal partnership means equal say') is needed because only 'similar thinking people' can carry out such innovative projects. Building a common lexicon appears as the basis of effective project management.

4.2. Examples of innovative practices

Most of the e-learning projects studied may be classified as one of the three categories: R&D projects, small projects or new products or services development.

R&D projects are usually aimed at internal or external customers of about two years' duration. These projects may sometimes be viewed as modest, receiving minimum attention. Feasibility study and conceptualisation of these projects are a significant part of the study and participants are usually experts in their fields.

Small projects are sometimes seen as a disruptive event in their own environment, lacking clarity with respect to their objectives. These may have a limited number of participants and time allocated to them. They may rely on a project manager who is an expert in a technical field and not necessarily with project management skills. Small projects may receive only limited support and resources.

New products or services development is normally not demand-led. It usually relies on an informal structure, with people having confidence in each other's expertise, or a linear structure. This type of project may experience difficulty in creating synergy between marketing, production and conception.

Overall, what comes as no surprise is the recurrent 'over-involvement' of

the 'pioneer(s)', the person(s) at the origin of the idea. Passion for innovation acts as a real driving force. It is neither possible to determine the different profiles (pedagogues, technicians, training engineers, etc.) of these pioneers, nor the institutional legitimacy that will impact on their actions, but they are, nonetheless, key figures.

It is also interesting to note that, in some cases, the management team has evolved during the implementation of the project. From an initial top-down approach when the project was set up, some have moved on to a more bottom-up approach. For instance, one case was first strongly dependant and linked to the political institution which had launched and supported the project, but then became a rather independent body (i.e. a foundation). This can illustrate a kind of successful and operational transfer: users are now running their own system.

Most teams have developed their project in a step by step process, relying first upon the existing procedures and know-how. In addition to traditional project organisations, more informal structures and activities were also employed. For example, trainees were asked to participate actively through designing and testing of online contents. Their comments and remarks allowed for subsequent enhancement of the programme. This innovative approach to partner empowerment resulted in collaborative learning, networking, learning communities: 'people changed their old habits of inventing and developing the same products in different places'.

The participative and iterative approach based on an open culture facilitates the sharing of expertise and continuous training of the staff and members of the project teams, inducing 'the extension of the knowledge capital rather than depending on individual specific expertise'.

4.3. Communication and coordination

To bring about effective communication, a rather common approach could involve setting face-to-face coordination meetings on a regular basis. Coordination meetings (virtual or not) provide a kind of continuous assessment, thus facilitating the revision of methodology through a feedback process. This implies the ability to adopt a rather reflective attitude: stop and think about the programme being developed. This can be supported by external experts or dedicated committees such as a scientific committee that will manage continuous reporting and monitoring of the project.

Some projects have tried to decentralise the coordination activity through (for example) twice yearly workshops in regions thus facilitating

dissemination and collective knowledge building. One project manager did not envisage meeting regularly as necessary and instead arranged two to three-day seminars. However, in this specific case, all participants knew each other very well, and confidence was already gained through former experiments. Furthermore, a virtual project management tool such as a 'groupware' was relied on to support communication, cooperation and collaborative working. This rather innovative approach is coherent with the field participants were working on, particularly lending itself to cases where partners resided in different countries.

4.4. Planning and cost management

Although an analytical approach may be adopted to plan a project, a more heuristic approach is usually called for during the development stage to define the required project activities. This is because it is difficult to develop one type of activity without considering the impacts on other aspects of the project. For instance, technical set up impacts on pedagogy and organisation as well as the economic viability of the project.

Projects are subject to certain constraints. These constraints included internal competition at a stage where the project was expanding, resulting in difficulties in achieving continuity. When added value was not visible enough for the participants, this also acted as a constraint. Consequently it was difficult to keep the teachers motivated over the two-year period of the project. Overall, it was evident that, as projects progressed and more wide-ranging decisions were taken, the degree of freedom to bring about further changes that may have been deemed required were progressively reduced, with the process gathering momentum toward a final output.

Another problem was a lack of prior knowledge of project management, and widely agreed benchmarks in e-learning. In certain cases, time management proved a real challenge, with some projects suffering from unrealistic schedules. Comments such as the project took 'twice as long as planned' or 'technicians often tend to fail to keep deadlines set up by themselves' exemplify these unrealistic time-scales.

A further problem is the fact that innovation implies the development of new products/services, new resources for the firm and also new ways of working including new procedures, methodology, management tools and functions and roles. The project manager is, therefore, required to manage the project itself as well as the organisational changes that result from the innovative approach adopted, leading to an overall slow process.

Cost management presents a real challenge in project management as a whole. However, it becomes even more crucial when planning an innovative e-learning programme (or ODL in general) ([21]), where few economic models exist and theoretical backgrounds are often inadequate or controversial.

Budgets are obviously context dependent. Global budgets ranged from EUR 40 000 to EUR 118 million (including infrastructure on a 3 year basis). However, in certain cases the data collected does not specify the time-scale (year, two years, etc.) on which budgets are based; indeed the distinction between investment budgets and running budgets is often not specified. This lack of clarity is exemplified by comments such as 'this question cannot be answered', 'I can't really put a figure on the budget', 'difficult to estimate', 'I have no clear view on the cost of investment'. One project mentions there was no budget at all: 'time spent was funded by the university'.

One case mentions that they first determined what budget was available, and then adjusted actions to this budget. This approach enables the project manager to limit right from the start any overspending, which mainly results from software and content developments.

As far as economical viability is concerned, about 50 % of the cases assert that the project was, or will be, economically viable, although they offer no evidence to support this statement. The other 50 % confess that viability was not a specific project aim ('it is a zero-sum game', 'there was no profit target') and/or that it is not economically viable for the moment: 'only in a few years will it be possible to see whether it is economically viable or not'.

This explains the lack of economic models. It is evident that e-learning projects are mainly financed through public and European funding. However, economic models do not necessarily form a core part of such funding mechanisms. It is widely acknowledged that most experiments in e-learning have encountered difficulties moving beyond the initial contract and meeting market requirements. Consequently the life cycle of e-learning experiments is, more often than not, limited to the duration of the contract. Although it could be argued that cost-effectiveness is not of paramount importance in education, this aspect certainly deserves further scrutiny.

([21]) See Algora's studies on Economy of ODL: www.algora.org

4.5. Project design

It is evident that a wide range of approaches has been adopted. In particular, some projects identified existing good practice within their own organisation and/or from the literature and used that as a starting point or stepping stone. These projects sought to exploit the potential of ICT to meet, 'the need for a more flexible and innovative product', often as a consequence of market forces or consumer preference. The reuse of existing materials and resources, as used in f2f classes, supplemented by selected technological tools was a hallmark of some projects. In such circumstances the projects were seeking to examine the potential of ICT and to add value to or solve particular problems on existing programmes of study.

In designing their learning environments, several projects focused on the needs of the trainee, seeking to exploit those aspects of the technology such as its asynchronicity and 24/7 availability in order to make training opportunities more accessible. In a similar vein the use of a wide variety of multi-media learning objects helped to cater for a range of learning styles and preferences. Both of these innovative design features may lead to widening participation and some projects reported a growth in the number of trainees as a direct consequence of adopting the technology.

Another equally important innovative design feature is a blended approach to e-learning rather than relying on a wholly online experience. Such an approach allows an organisation to exploit aspects of the technology appropriately in support of existing good face-to-face (f2f) or flexible/distance practices and provide added value. Across the range of projects that had adopted this approach, the blend varied considerably between 20 % and 80 % online. This provides some indication of the flexibility of the approach and the extent to which technology can be used to enhance a range of quite traditional forms of learning and teaching.

Alongside the adoption of a blended approach it was quite common for only some of the wide range of ICT communication or assessment tools to be used. The advantages of using the technology in this manner include low initial investments of time and money and an immediate but simple change in practice leading to learning gains. In a context where resources are limited, such an approach has considerable merit and exemplifies the appropriate exploitation of technology.

Surprisingly, few projects had adopted the fully integrated approach of the virtual classroom. Hailed towards the end of the 20th Century as the future direction of education and training, it is clear from those projects that had

adopted this approach that they had invested heavily and were expecting to deliver to a large number of clients.

Of particular interest were those projects that had consciously designed their e-learning environment in order to establish a community of learners. The guiding principles of this approach focused on developing mutual trust to facilitate the easy and open exchange of ideas and experiences while exploiting the possibilities of ICT. In one project in particular it was significant that, 'The overall goal is to facilitate the exchange of knowledge and experience between … members. The first one is "learning from each other", that's the guiding principle of the whole tool: the members can ask questions to the rest of the members, instead of just to one person, they can also exchange documents, etc.'

In some ways such an approach may not be considered innovative insofar as the use of computer mediated communication (CMC) to support collaborative learning has been in existence for more than 20 years. However, the adoption of new ways of learning when compared to former practice is innovative as is the focus on the process rather than the product.

4.6. Learning theories

In only a few cases did projects appear explicitly to embrace a range of learning theories. The reasons for this are not immediately obvious but may be attributed to the lack of published works on e-learning and underpinning pedagogy on one hand and lack of awareness on the part of trainers/developers on the other. Certainly an ETV survey of teachers and trainers in 2001 identified a lack of knowledge about underpinning pedagogy related to e-learning as a significant concern of practitioners. Where such studies had been undertaken projects were able to clearly articulate their approach.

One project that made use of a virtual classroom indicated that design decisions were,

'based upon models and principles that were already well established including: neo-behavioural psychology, collaborative learning, constructivist psychology, andragogy - adult learning, approach to dialogue-conversational type training design, and new paradigms: T-learning, N-learning, M-learning, I-learning' (G. Salmon).

'The project's nature was such that each participant was offered not a course, but rather a chance to construct his/her own training path in various contexts: such as laboratories, forum, courses. Most of the proposals were

transversal, that is they were suitable for all school grades and for all subjects.'

Constructivist theories of learning have been favoured by many early adopters of e-learning and underpinned many examples of the use of communications technologies but in these projects there was a healthy balance between instruction and construction.

4.7. Toolbox approach

A number of projects relied upon a 'toolbox approach', exemplified by the use of different sets of tools. These included in-situ visits and working sessions with experts; company placement for the learners; and use of multiple resources (CD ROM, papers and articles, books, websites). The toolbox approach also incorporated trainee empowerment and self-learning (individually and/or collectively at home, public access points, or in the training centre), multi-mode tutoring and face-to-face sessions, as well as distant support and tutoring. This innovative approach enabled trainees to build their own strategy, to experiment with different learning situations, to assess (to a certain extent) what are the limits and difficulties of self-learning and being a distant trainee.

4.8. Supported self-study

Continuing the theme of supported self-study, a number of projects had designed e-learning environments to facilitate resource-based learning. The web was used as a repository and trainees worked independently, accessing training materials of an instructivist nature on the one hand or in problem-solving mode on the other. Learning by doing was often associated with a problem-solving approach because the technology was claimed to be effective at presenting scenarios and facilitating communication.

The use of technology in a coaching mode was also referred to by several projects and the possibilities and value of making 'experts' available to a learning community were also used to inform decisions about the design of learning.

4.9. Role of the tutor

A significant factor of many e-learning approaches was the role of the tutor. In several projects the role was clearly articulated and formed an integral part of the design of the learning environment. Such tutor-rich environments were thought to be expensive but greatly appreciated by trainees. This was especially true of those projects seeking to be more inclusive and in role modelling as part of teacher/trainer education programmes. Less clear were the steps taken to ensure that tutors were appropriately trained to work within an e-learning environment.

4.10. Virtual and managed learning environments

Despite the plethora of virtual and managed learning environments (VLE/MLEs) available, few projects actually identified they were using a proprietary platform. It is known that most commercially produced platforms have an underlying pedagogy or set of principles and these may be inappropriate for a context in which alternative principles are central to the intended learning/training event. Interestingly, most projects used a range of tools drawn from those widely available on the desktop or via the Internet or in some cases had commissioned the production of a bespoke tool. Unless significant funds are available for such developments, it is probably more prudent to exploit existing tools and this is what the majority of projects appeared to do.

4.11. Innovation framework

Overall, the main influences on project initiation can be divided into two different categories: external and internal. Responding to customers' specific needs, detailed and formalised demands, prospective analysis, market surveys, call for tender from institutions or directly from the market are examples of external factors that may initiate a project. In contrast, factors such as sharing the existing expertise across the organisation or supporting pedagogical and/or organisational changes, or more specifically facilitating and supporting the growth of an existing network, are forms of internal factors that may promote project creation.

At first sight, most of the projects seem to be influenced by external factors. However, most flexible systems (e-learning, ODL, etc) have a hybrid

character, where a combination of internal and external factors brings about the project's emergence (e.g. guidelines from ministries in conjunction with the need for transferring local expertise across a network). In this context, it is sometimes quite difficult to assess which factor is the most influential in the project's establishment.

These tensions are not always translated into a detailed, singular, formalised call for tender, convention or contract. Some projects are driven more by 'self prescription', a strong desire, than by a real demand: 'the main influence was the initiative of two teachers'.

Overall, certain significant factors that characterised the cases studied should be borne in mind. Most comprised small numbers of learners: in 40 % of the cases there were under 200 participants, and there was a contrast between duration (sometimes more than three years) and number of participants (less than 100). Moreover, in certain cases there appeared to be a lack of clarity between means and objectives of the projects, the target audience and the supporting organisation, and the new skills and roles emerging. This certainly calls for further detailed qualitative research to ascertain the exact nature of these ambiguities.

4.12. Organisation versus innovation

It is widely accepted that, initially, innovation does not fit well with the existing institutional frameworks, as it may be quite difficult to plan in detail the way an innovative project is going to develop. Most organisations are under tensions and torn between two different forces: on the one hand the standardisation logic (to organise) and on the other hand the differentiation logic (to be innovative). To some extent, we can argue that this situation illustrates what the innovation and organisation sociology has identified as the innovation-organisation dilemma. The more the organisation is subject to innovation constraints, the less it is able to rule and manage its own activity; thus innovation seems to be acting in the opposite direction to organisational models. Innovation expands in a limited free area of the firm or its market.

Consequently, most of the innovative projects studied tended to limit their sphere of activity to 'missions' that failed fundamentally to question and challenge their relative stability, avoiding the need to rethink the overall organisational strategy. Statements such as 'when the product was ready those enthusiastic colleges felt unable to take it onboard straight away, the future vision being different from the organisations' capability to take on new challenges now' illustrate this point clearly.

This is also illustrated by practices such as buying external expertise instead of launching heavy training sessions It is argued that internal organisational limitations prevent an innovative development and professionalisation of the teachers and trainers. Outsourcing on an ad hoc basis may be viewed as less costly than undertaking an extensive training programme for teachers and trainers within the organisation.

In certain cases this tension may lead to severe strains in well-established partnerships at a stage where the project is able to progress from the experimentation/innovation stage into dissemination. This is clearly demonstrated by the following comment: 'in my opinion, success, and the positive impact that it had in its experimental phase, paradoxically had a negative effect on the project's development after it ended, because it created the fear that its continuation could upset balances and interests that were already consolidated or being defined. E-learning, can actually have a destabilising effect, since it sets in motion deeply innovative processes within existing training organisations and systems, whether on a company scale or territorial scale'.

4.13. Aims of e-learning projects

There are potentially many different reasons to embark on e-learning. It is, therefore, important to identify and analyse the originating circumstances, threats and opportunities that have driven the innovation. Thus innovative practices can be determined, analysed and considered as a model, only when considered in the context of their specific initial conditions.

Objectives included sharing expertise, building a learning community, getting expertise in e-learning, creating a regional portal, facilitating inter-regional and inter-organisational cooperation. In this context, projects are driven more by opportunities (among which incitements from ministries, regions, ESF, etc) than threats or challenges. So it is no surprise at all if pedagogical aspects seem dominant, since the main goal was to design and operate a flexible training system.

Many questions in the innovative practice analysis tool refer to aims, issues, motives, and impacts but the data collected is still not detailed enough to provide a complete and significant analysis of the different dimensions: pedagogy, organisation, and economy. The ability of the interviewer to draw valid data from the interviewee is of paramount importance. For example, even when one dimension appears a major concern, data are still not detailed enough: 'economic considerations are the

main reasons for carrying out the learning project…there is a huge market for e-learning…we have realised there is still a lack of qualified trainers… that's why we launched this project to train trainers for e-learning'.

The survey aimed to verify the efforts directed to, and the degree of interest in, the underlying pedagogical characteristics, impact on socio-organisational and economic aspects of each project. Analysis of the responses indicates that, in the majority of cases, there was an 'essential interest' in the pedagogical models, as expected. This is in sharp contrast to 'limited, poor or no interest' expressed toward the impacts on socio-organisational and economic aspects of the e-learning projects undertaken.

This is a significant finding. It indicates that the need to drive fundamental change in the organisational set-up, which is required if innovative practices are to continue and expand, is not fully appreciated. This clearly represents a challenge for future e-learning projects.

Obviously, some cases go beyond the training of trainers (e.g. Kennisnet from the Netherlands), with a large target audience. The Kennisnet project is developed for three sectors for all three groups (primary education, secondary education and vocational/adult education) with all their participants (teachers, pupils, parents, policymakers, ICT coordinators, etc.) Kennisnet may be viewed as mainly concerned with the (r)evolution of the overall educational system and programmes.

The study found that in half of the cases the projects were promoted, supported and managed by universities, colleges and research institutes. In addition, ministries, training and/or employment bodies, and foundations, non-profit associations and training associations had played a smaller role. It is not surprising that public institutions and organisations play a major role in this context. Universities play a major role in the front line of innovation, even if they are subjected to certain prevailing cultural resistances. But they also have to face major changes such as competition at national and European/international level, rationalisation efforts, lack of students, and extending their audience base to include the private sector. The financial context is also a major factor, as the return on investment or simply the added value, may not always be easy to assess. Thus, financial engineering through ESF could play a major role.

It appears that, in view of the impacts of a project, both on the organisation originating the project and on the participants' own organisation, training of trainers/teachers is not considered as an answer to inner tensions, organisational issues, or the need for professionalisation. Therefore, impacts are to some extent limited to trainer and teacher skills evolution. Furthermore, considering the possible transfer or long-term development of

the project, the life cycle of the project seems to depend on the market forces or on the duration of the initial agreement when supported by ESF. It is widely acknowledged that a vast number of projects experience major difficulties in progressing beyond this initial agreement and finding economic independence.

4.14. Types of e-learning projects

E-learning can comprise a range of different or combined learning and teaching methodologies and media. One of the challenges of this study was finding a common language to describe these approaches which everyone would understand. Another was to identify whether e-learning was moving away from the didactic delivery of teacher-focused learning materials towards more learner-centred approaches.

Clearly while some projects have developed a considerable volume of courseware (for example, case study 17: TeleCoach 200 course hours) for most cases online materials were just one element of the offering. Indeed, in many cases, courseware was not necessarily the most significant medium. The largest category of learning strategy, a total of 10 projects, was blended learning (see table 5). Even though it is acknowledged that this rather loose term can be applied to quite a disparate range of media and methodologies, nevertheless this clearly provides an indication of innovative practices in e-learning.

What seems clear is that many projects make use of collaborative environments (sometimes delivered via a learning management system) in which learners engage in dialogue and mutual support, facilitated in some way by a tutor.

Furthermore, not all the projects were about learning in the narrow sense of the word. Case study 18 (VOV LRNG SQ), for example, was characterised as a knowledge management system, or network, through which trainers and others shared information and experience. Another project (case study 12: Learn Net) provided online advice and guidance to people with disabilities. Again this was not learning in the strictest sense.

There was relatively little evidence, however, of learning systems making use of the web as a source of knowledge, information or learning (as in the notion of ‘harvested knowledge’ presented in Chapter 1).

4.15. Scale of e-learning projects

In the past, e-learning has been characterised by small-scale development projects, a 'cottage industry' approach. Such projects often had relatively little impact in terms of dissemination and ran the danger of remaining sidelined even within their own sponsoring organisation. One problem was that such projects often tended to be conceptualised, planned and implemented by small numbers of innovators or enthusiasts while, from a strategic perspective, they could be ignored, neglected or simply patronised by their sponsoring organisation. Obviously, this presents a stereotype, since some, large scale developments (for example, through the United Kingdom's Open University) have been highly successful. Nevertheless, even virtual or corporate universities have encountered difficulties.

However, the results from this project are generally positive. The cases selected were chosen on the basis of a variety of specific variables and so the projects are not representative of the type and scale of e-learning development in general. Nevertheless, Table 4 shows that, while it was possible (and necessary for this research) to investigate many small scale projects, it was equally easy to also select many that are large, regional or even national in scale.

One project in Italy (case study 5: INDIRE), for example, has a potential target audience of 62 000 teachers and has involved the use of 30 technicians including web designers and programmers to develop 25 hours of online material. There can be as many as 4 000 people using the learning system at the same time while 2 400 tutors support 54 000 learners.

At a more modest, but still significant level, the VOV LRNG SQ (case study 18) comprises a series of networked communities of corporate professionals (70 % of the group) and training consultants (30 %), with about 600 participants within seven learning communities. The membership of this community could be larger, but is deliberately limited by membership and subscription.

A United Kingdom project (case study 11: THOSEWHOCAN) is aimed at the many thousands of people in further education who are now required by the government to attain a teaching qualification set against competence standards. The programme developers researched the feasibility of the project through discussions with 20 colleges and eventually signed most of them up as participants but there were delays and this process of gaining commitment was not easy.

In Spain, the UNIFF programme (case study 23) has trained over 100 trainers and 1 500 trainees since its inception three years ago.

But the largest project in the study (in terms of development budgets and size of target audience) is case study 22 (Knowledge Net). This is a government-sponsored project aimed at a broad range of educational sectors (primary, secondary, adult/vocational training). Its ICT system is accessed by between 50 000 and 100 000 people per day. Research undertaken by the project developers has shown that nearly all Dutch teachers are aware of, or familiar with, the system. Knowledge Net is delivered via 11 000 locations.

The study, however, also found a significant number of small projects, designed to meet very specific needs. Many projects studied during the investigation had a target audience of 50 or fewer learners. As seen later, the learning strategies, technologies and organisation applied by these small projects are very different from those required when very large numbers of learners (and large budgets) are involved.

Concerns remain, however, that there may be a credibility gap between the large scale aspirations of some projects and what they are currently able to deliver in terms of uptake and learner numbers. It is sometimes easier to identify the number of online learning hours that have been developed and the time and resources used in their construction, than it is to quantify the number of people who are actually using the programme. Furthermore, many of the projects are still quite new in terms of duration. Seven of the 25 projects, for example, have been in existence for less than two years, while eight had been going for between two and three years. Nevertheless, nearly a third had sustained themselves for three years or more, and so could be deemed to have attained some degree of durability.

Even with a technically successful project, it can take more time than originally expected to get commitment from potential partners and organisations offering learners. The shortage of skilled and experienced e-learning online facilitators is also a problem, which is being currently addressed.

This is certainly not to argue that the small-scale projects investigated as part of the research are of diminished value. Quite the reverse, as some of the innovative features of these projects, illustrated in other parts of this report testify. But there must come a time when e-learning can demonstrate scalability and rollout to large audiences at either organisational, sector, regional or even national level. Currently, this is being achieved by a limited number of projects, while many remain ‘interesting’, experimental’, ‘groundbreaking’ but relatively small scale. E-learning developers aspire to an ‘Oscar-winning’ performance, but too often are supplied with only a walk on role.

4.16. Impacts of e-learning projects

Most of the projects are still developing and it is difficult to verify the longer lasting project impacts. 'What the real impact is, is hard to say at this moment, because the project in its current form, has not been running for a long time'; 'the project is still developing, so not much can be said about this yet, but it promises to be a successful project'.

In order to verify the qualitative and quantitative impacts of projects, a set of objective and tangible indicators need to be developed and systematically applied. In general, it is argued that the indicators used to assess the impacts of these projects lack the vigour required. Certain indicators, such as number of learners participating in a study, are not necessarily a significant factor in verifying the impact of that study. Statements and value judgements need to be viewed with a degree of caution:

(a) nowadays 50 000 to 100 000 persons, i.e. inlogs use … per day; probably more users than this, but this cannot be monitored yet;
(b) research from … shows that almost 100 % of all … teachers are familiar with …;
(c) deep involvement of the institution or project manager;
(d) high impact on the sector;
(e) people are very enthusiastic;
(f) feedback from learners is very high;
(g) novice teachers developed new competences;
(h) the project brought cultural change;
(i) extension of the project;
(j) the integration of ICT in education.

What is evident, nonetheless, is that all these projects have had a tangible impact on teacher and trainer skills, resulting in development of new modules supporting new pedagogical practices, and continuous evolution and improvement of the training programmes. In a number of cases the expertise already existed individually or collectively among the institution that manage the project or among the partners or was bought in:

(a) a team of pedagogues and technicians designed the software products;
(b) the basic idea is always to meet with a team of specialists from different fields;
(c) there already was an electronic platform;
(d) the project team exists of four persons who are experts in the field of e-learning and/or teacher training;
(e) 100 interim-persons were hired to start the project;
(f) we made use of an external specialist;

(g) we bought the programme from an external consulting bureau;
(h) a technical consultant of the software company was hired for additional advice.

To some extent, it is quite difficult to assert that there had been major impacts on skills because the project was supported and implemented by experts in e-learning, even if we accept that they have obviously gained more expertise during the project progress.

To assess the impact on specific groups such as trainers of trainers/teachers, a more detailed and verifiable set of data is required than is currently available. It appears that external and existing internal expertise do not encourage project managers to 'invest' and/or plan training for e-tutors as part of the project. Paradoxically, it seems that training is often considered as good and necessary for others: 'no real training, all the members have their own in house technical experts and information scientists'.

One extreme position was illustrated by a project manager who asserted that he has 'no confidence in the professional qualification of the distance tutor. The competences are of such a low profile that I take them for granted. The courses for tutors are mediocre, as are the participants'. In addition 'the designer trained himself/herself, the tutors are directed and followed but they do not go to class'.

In most cases, the collected data relating to the training of e-tutors has not been specific enough to verify the contents, duration or the methods of delivery. When details exist, programmes have been mainly of short duration ('one day training on using the system'), sometimes in conjunction with information and focus on technical aspects. Also, delivery has not always been coherent with e-learning (mainly face-to-face sessions). Most of the projects are aimed at trainer and/or teacher training so it is surprising to see, to some extent, that programmes designed for the initial target audience are not fully reused to train e-tutors involved in the project itself. It is encouraging to note that certain programmes specifically designed training components for e-tutors.

Sometimes designing a training programme for teaching e-learning appears as a kind of induced impact as the following statements illustrate: 'This will possibly change when we do a masters programme'; 'don't offer anything else yet, in September there will be a training event'; 'a specific programme for teaching e-learning is currently being developed'.

A significant finding of the study is the limited number of accreditation procedures. Only about 25 % of the cases refer to accredited training programmes for e-tutors. In certain cases, the accreditation relates to a specific university diploma ('valid' in one university only) or national level

(university degree) as 'there does not exist any obligatory training course specifically for trainers and/or e-tutors'. It is, therefore, argued that there is a principal need for developing a set of European 'standards' to promote the training of trainers and teachers.

To assess the impacts of projects on the organisation itself, the situation prior to the development and implementation of the project needs to be compared and contrasted with that following it. However, some organisations/networks are expanding with a continuing demand for sharing knowledge and expertise. The introduction of a new technology supporting networking constitutes a change. But whether this represents a major change, or a next step that could be considered merely as a kind of 'logical' continuum, needs to be verified.

Most of the cases investigated do not appear to represent a radical change and, on occasions, a lack of definition in the strategic dimension is evident. In certain cases, objectives and impacts are not distinctly defined: 'in the first few months it was not clear in what the project should result…'. However, efforts are being made to expand networking and collaborative learning and certainly changes are taking shape: 'people changed their old habits of inventing and developing the same products in different places'.

It is evident that, strategically, most of the operators have chosen not to consider e-learning as a substitute and have instead adopted it as a complementary approach to training. Although, in certain cases, it was envisaged that the virtual environment could develop into a possible substitute for training centres, schools, resource centres and universities, organisations seem to be aware that the best way forward is to develop both strategies.

It has not been possible to verify objectively whether any of the project teams had been able to move forward to develop the flexible system or embark on new projects and gain further ground among the supporting organisations.

E-learning finance is dominated by public bodies, which suggests that it is very risky (even for big training companies) to invest massively. This is clearly demonstrated by the closure of Cegos e-learning from Cegos France, about a year ago, as a direct result of financial difficulties. In an unsettled environment, it is best to develop R&D activities (including trials in the e-learning field) even if only very few private centres can afford it due to their economic shortcomings and lack of network assistance. It appears that, for the time-being at least, most of the supporting organisations are 'traditional' solid firms, able to reinvest their own experience and expertise (gained on a long-term basis) in the field of e-learning.

Experiments in e-learning can have external impacts at different levels, including the target audience of trainees (trainers, teachers, other categories) and peripheral audiences (those in the supporting organisation who were not directly involved in the project). There may also be impact and on organisations in terms of work process, working conditions, internal rules and standards. Other potential impacts include partnership (activities that are subcontracted, produced directly, level of contribution, building of learning communities) and on policy making (important political decision taken at professional branch level, regional and/or national level, target audience nature of the decisions). However, the current study did not set out to collect data, which could verify any such impact.

4.17. Potential for transferability and scalability

It may be argued that a best practice transfer becomes feasible and desirable when an organisation recognises another organisation has successfully implemented a solution for a set of problems or issues which the former is seeking to address and is willing to inspire its own action based on lessons derived from that success.

There are potentially three types of transfer:

(a) technical, the transfer of skills and technology as well as development and implementation processes and models;
(b) informational, the transfer and exchange of ideas and solutions, as well as concepts, methodologies, approaches;
(c) managerial, a system or series of decision-making and resources allocation processes that can be transferred and adapted.

Certain projects have indicated that they have taken the issues of transferability fully on board at the design stage of the programme: 'the transferability of the project… among the main objectives taken as the basis for the PICO project (case study 3) and kept under careful consideration throughout its development'. However, in practice this project achieved only limited transfer to a wider audience.

Another case has integrated right from the start a kind of expertise integration and transfer protocol, this protocol being one component of the overall pedagogical framework. In that specific case, a significant degree of transfer has been achieved as it had been considered a major objective to be reached by trainers and trainees.

Even when some cases seem to apply to a specific target (e.g. future apprenticeship trainers) 'its concept is transferable to any other content'. The formalisation of lessons learnt constitutes also an output ('we want to make a kind of manual with dos and don'ts for other organisations') and illustrate the need and a desire to transfer. But we also find some (rare) cases that seem to have deliberately (or not) closed the door and limited transferability. Paradoxically, this applies to e-virtual communities where quantity and quality limitations regarding the target audience are, to some extent, a condition of survival: '…does not want everybody to use the system…it is selective in choosing their members, the system can't become too big otherwise it becomes administratively unmanageable.'

It is obvious that most of the cases have expected the initial experiment to be widened to a greater audience. Some cases seem to have succeeded in instituting new practices and new learning organisations in their own environment. Others have attempted a national transfer through the overall education system (schools, colleges, universities, etc.) which has proven itself to be successful.

Few cases have thought their project to be transferable at a transnational level. Nevertheless potential for transfer and scalability appears to exist in cases where, for instance, the former target audience is generic enough to be widened, the training paths are modularised enough to allow high flexibility, and content is easily changeable and adaptable. Moreover, projects may be transferred if contents are translated into several different languages, content delivery is on a web based architecture and freely accessible, the technology that is used is specially designed and dedicated to sharing and exchanging knowledge and is user friendly.

Certain aspects act as limiting factors on the extent of transferability of any project. These include factors such as the legal framework within which the cases have been operating, availability of tutors, economical framework, and language barriers.

The intermediary role is a key element in the transfer process. From the start, the intermediary who is 'knowledgeable about good and best practices' enables documentation and sharing on successful solutions. We could see this study as a first step in the overall process. Cedefop's contribution in the support of networking is of paramount importance, though TTnet has proven itself an important means of information access, matching supply with demand and sharing lessons. It can now become a useful tool in best practice transfer.

CHAPTER 5

Activities and competences

European training organisations are gradually increasing their use of e-learning and are using it to educate their own teaching and training staff. Increasing numbers of successful initiatives address new subject areas and new target audiences, applying new teaching strategies, new technologies and new ways of using them. These innovative practices require – and contribute to - the development of new skills and competences and new ways of putting them to work. In this chapter we describe an investigation into the relationship between different kinds of innovative practice, the skills and competences on which they are based and the different ways in which these skills and competences can be organised in a project team.

The same basic set of competences can be organised in many different ways. A single team member may provide a broad range of different competences while a single competence may be shared by different team members; the division of labour can be very rigid or relatively loose.

From these premises it follows that, to the extent that projects share the same characteristics and goals, they will require the same competences and the same kind of project team. Similarly, different kinds of projects – projects with different goals, or audiences, projects designed for different kinds of organisation - will adopt differing teaching strategies and technologies. Implementing these strategies and technologies will require different skills in the project team and different ways of organising the team. It was these similarities and differences among projects that our study set out to investigate.

This chapter summarises the main characteristics of the projects studied during the investigation, then describes how these characteristics affect the activities conducted by projects during the e-learning life-cycle. It proposes an analysis of the competences required to implement these activities and looks at different ways of organising these competences in a project team. Finally the conclusion draws on these results and previous sections to formulate recommendations for practitioners and for policy-makers.

5.1. E-learning project characteristics

The preliminary analysis conducted prior to the case studies modelled the life cycle for a typical e-learning project in five activities; needs analysis, instructional design, development, delivery, and evaluation. The harmonisation of these activities requires coordination and project management. The results of this study indicate that all projects include these activities, although the stages in the process did not always follow the same order and were not always organised in a linear sequence of 'phases', as might be suggested by the original model.

In the majority of projects the analysis of learner needs came before the instructional design phase. However, in two cases training design and the design of the technical platform preceded the analysis of student needs. More significantly, perhaps, it was observed that in many smaller projects, needs analysis, instructional design, design, development, delivery and evaluation proceeded in parallel for the whole duration of the project. The experience gained from delivery and evaluation was used continuously to update the needs analysis and the instructional design. Adopting an analogy from the software industry we could refer to a 'cyclical' development model, as opposed to the 'waterfall' model used in other, larger projects.

Figure 6. Waterfall and cyclical development models

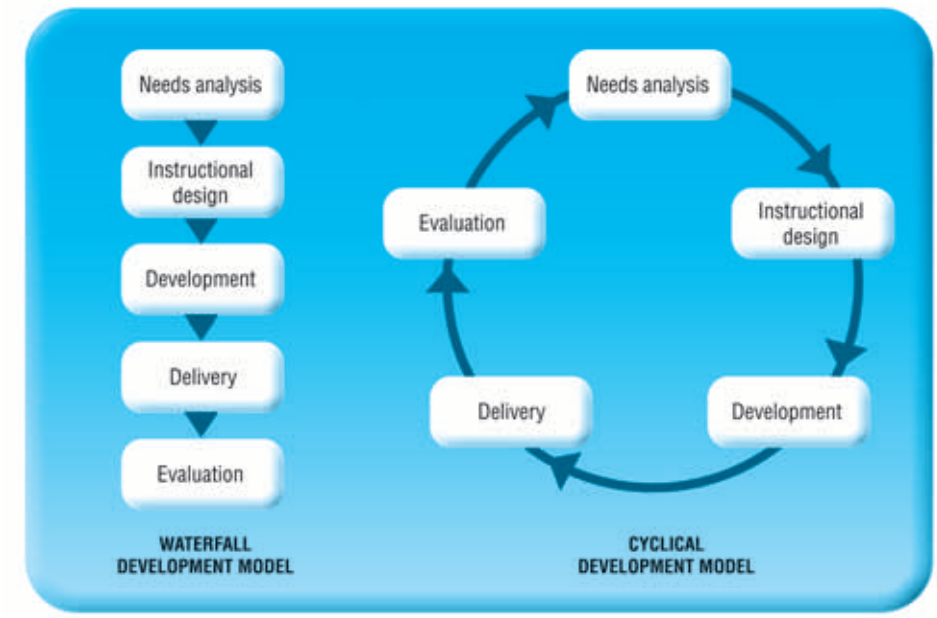
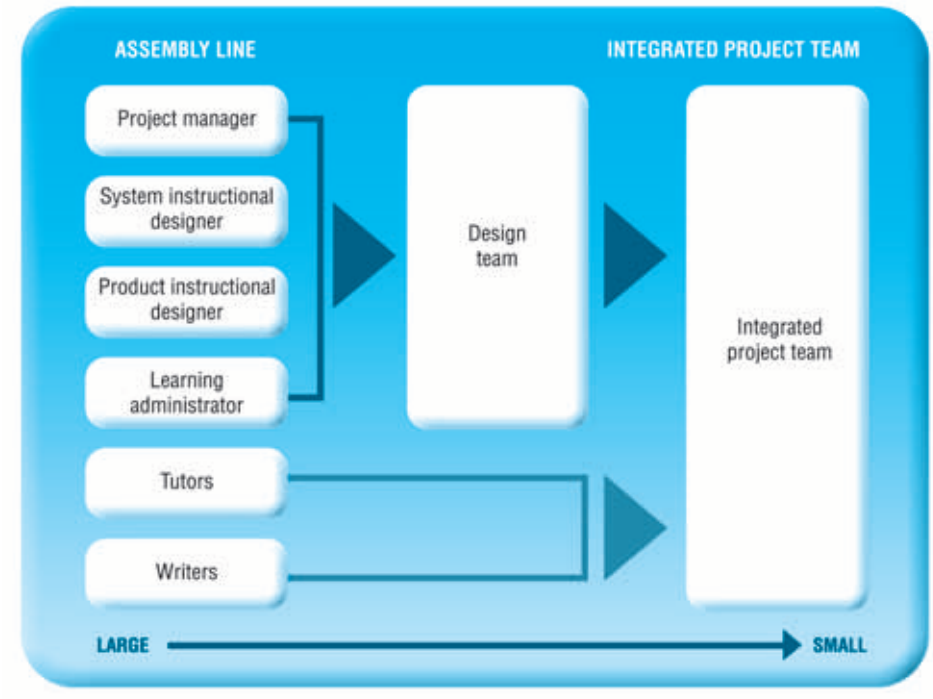


Figure 7. Different models of organisation in large and small projects



Projects differed not only in the way they implemented the project life cycle but also in their approaches to individual activities.

Considering different models of organisation within the project team, the fundamental issue is the degree of specialisation existing within the development team. At one extreme it is possible to imagine an assembly-line model of the life cycle in which each individual in the team performs one particular activity (e.g. user needs analysis, instructional design, tutoring) and takes responsibility for all decisions necessary to bring that activity to completion. At the opposite extreme we can posit an integrated work team in which the individuals making up the team have overlapping competences and in which the majority of decisions are taken collectively. The study compared these idealised cases to the ways in which different projects actually organised their work.

The analysis grid designed for this study identified a number of key positions in a typical e-learning development team. These included: the project manager, the system instructional designer, the product instructional designer, the learning administrator, and the tutors and writers. In a number of large projects investigated by the study this figure provides an accurate

representation of organisational structures. In these cases it is possible to talk in terms of an assembly-line model of production, with the project manager supervising the process (see Figure 7).

The cases studied showed, however, that there exist a number of alternatives to this model, particularly in the case of teacher-driven projects. In reality, the majority of projects follow neither the assembly line nor the integrated project team model. They lie somewhere along a continuum connecting two poles, with large, content-driven projects closer to the assembly line model and small, teacher-driven models tending towards the creation of highly integrated teams.

In the majority of cases, the skills to be taught were to a large extent 'soft skills' (e.g. tutoring). This implies a major distinction with respect to many e-learning projects in manufacturing and service industries where the key goal is to transmit factual knowledge (e.g. about products, techniques and procedures). It should be noted, however, that the scope of the training provided varied vastly from project to project. While some projects provided training courses of many months, leading to the award of formal government certificates, others offered relatively short courses, aimed at transmitting relatively elementary facts, concepts and vocabulary.

5.1.1. User needs analysis

For organisations providing training to their own students or trainers, the goal of user needs analysis is to ascertain the needs of learners. In other cases the project manager is working on behalf of a customer or a funding organisation. In this case the key goal is to satisfy the requirements expressed by the customer, while maximising reuse of existing know-how and resources. In other cases (PICO: case study 3), the goal of a project is to develop learning services which will have to compete with other services on what is essentially an open market. In this case the user needs analysis has to take account not only of user needs but also of possible competition.

In large projects with heavy investments in technology and/or learning materials, the user needs analysis is a well-identified phase in the project life cycle and the results of the analysis strongly influence the subsequent development of the process. During the needs analysis, the project team compares the competences of future learners with the competence requirements of the organisations to which they belong, identifying the skill gap to be filled.

In smaller projects, it is much easier to modify organisational structures, teaching strategies and content. As a consequence, user needs analysis is a continuous process. Several projects organise regular meetings with

learners, identifying problems and possible solutions. These meetings lead to observable changes in project strategy. In one case (FIPFOD: case study 8), user feedback led to a change in the technology platform used to deliver courses.

In the majority of projects, needs analysis is conducted as part of the project itself but approaches vary widely. At one extreme one French project (AFPA: case study 7) bases its investigation of customer needs on a highly formalised process (*ingénierie de la demande*). A number of other projects were able to exploit their own pre-existing, largely informal knowledge of user needs. This was especially common in organisations adopting e-learning to provide training in subject areas where they already offered classroom courses. In such projects (INTERFOC: case study 6; Certificate in tutoring CIPD: case study 15), the emphasis was not so much on user needs as on learning aims and outcomes.

Where projects make a systematic effort to investigate user needs they use a mix of different techniques. These include paper and web-based questionnaires, interviews with teachers and learners, expert review, and direct observation. A key issue in the user needs analysis is the user context, the organisational setting in which the learning will take place. An essential goal of needs analysis is to identify 'how much time users have, their personal interests and goals, the constraints they are working under'.

5.1.2. Project design

Projects on different scales adopt different approaches to design. In very large projects, design is frequently a highly formalised process. In at least one project materials are subjected to 'pilot tests' before being released to end users.

In smaller projects the design process may be much looser. In at least one project covered by the study there was no formal process at all. In other cases the design was continuously modified to respond to the difficulties experienced by trainers and feedback from learners.

A further distinction among projects concerns the role of assessment in the design process. Projects from the United Kingdom tended to define aims and assessment tools at the same stage in the design process: when designers chose learning goals for a project they also chose the assessment tools. Projects in other countries considered assessment only at a later stage in the process. A number of French interviewees stated that assessment of e-learning courses was based on the same official procedures used for conventional courses and that the definition of assessment tools lay outside their mandate.

Several interviewees expressed their dissatisfaction with the concept of 'instructional design' which, in their opinion, reflected an outmoded view of the educational process. Project leaders used many different terms to refer to this phase in the project life cycle. Some talked in terms of 'educational design' or 'educational engineering' (*ingénierie pédagogique*); others saw themselves as designers of 'training paths' or 'learning experiences'. Yet there were also a number of interviewees who saw the term instructional design as an entirely correct description of this phase in the life of a project. In reality what appears at first sight as a mere problem of terminology reflects more general differences in approach. The main objections to the concept of instructional design came from what is referred to as 'teacher-driven' projects.

5.1.3. Development

Perhaps the greatest distinctions among projects are those concerning the development of learning materials and technological platforms.

As far as learning materials are concerned, it has already been shown that different kinds of project start with very different assumptions about what has to be produced. Content-driven projects produce large volumes of high quality materials, with standards equivalent to those in professional electronic publishing. Layouts are professionally designed and the 'aesthetic' quality of graphics, audio and visual material can be very high. In many cases web design and graphics work is outsourced to experts using professional authoring tools. As a rule, this kind of development process requires heavy investment in time, money and human resources.

In smaller, teacher-driven projects, on the other hand, the volume of learning materials required is usually much smaller and quality of content takes priority over professional design. Some or all of the learning materials used in the project may be developed using simple personal productivity tools (such as those provided by Microsoft Office). Obviously the development process for this kind of material has very little in common with the processes used by larger projects.

Although the majority of projects recognise that Web design requires specific professional skills, in some, learning material was developed personally by the project leader (FOREM: case study 9). In others, projects make a distinction between the project website, which is designed professionally, and learning materials for specific activities, created directly by the tutor. In these cases, materials may be developed week by week as the project progresses.

Just as large-scale projects invest more in the development of learning materials than smaller ones, so they also invest more in 'platforms': learning

management systems, virtual learning environments and content management systems. This need, just like the need to develop a large volume of learning materials, has a heavy impact on the development process. In many projects it changes the balance in the project team, with engineers and web designers taking on a far more important role than in smaller, teacher-driven projects.

5.1.4. Delivery

In the blended learning projects that constitute the majority of those in the study, delivery involves a mix of teacher-led activities in the classroom, teacher-led or group activities at a distance and self-study (nearly always with tutorial support). These activities are supported by a range of technological tools that are used, on the one hand, for the distribution of learning materials to learners and, on the other, to provide effective channels of communication among learners and between learners and tutors (or trainers). In most projects the main activity during the delivery phase consists of tutoring and teaching. But at the same time, the use of technological tools implies additional activities to manage, maintain and support these tools. Furthermore, the success of the project will often depend on the quality of technical support provided to end users.

During the learning process, tutors continue in this facilitating role. This implies not only that they help to explain problems or exercises where a student is having difficulty, but that they may be called on to provide help on issues that go beyond what is normally expected of a teacher. An example is helping with personal or work problems affecting learner performance, or with technical difficulties.

One project distinguished between several different kinds of tutor (FIPFOD: case study 8). These include a module tutor, a pedagogic tutor, an expert, a technical tutor, a social tutor, and a counsellor (see Chapter 2).

Another project, investigated by the study, found it useful to provide learners with a local tutor or mentor (CNPR: case study 10) – a more senior colleague working in the same physical location as the learner – with no specific expertise in the subject the learner is studying but who can help out in resolving the whole range of personal, technical and workplace problems which can affect the effectiveness of the training programme. This facilitating, supporting role of the tutor can be found in virtually all projects. In other areas, however, the kind of tutoring projects provide can vary widely.

Content-driven projects tutors are primarily reactive, responding to requests coming from learners. In the best cases they may be proactive, attempting to identify and stimulate learners who are not participating or who

are not achieving the desired results. In smaller, teacher-driven programs, in contrast, the teacher/tutor actively guides the learning process, assigning work to students and assessing the results in the same way as a teacher in the classroom. In many of these projects the tutor who guides students during distance work is the same teacher or trainer, who provides classroom training. In larger projects, with hundreds or thousands of students this is usually impossible.

In addition to tutoring, the delivery phase of an e-learning project involves activities to manage, maintain and support the technological tools used by the project. As in the case of tutoring, the scale and nature of these activities varies among projects. Large projects that use sophisticated learning management systems or virtual learning environments may devote significant effort to learner administration: user registration procedures, password management, the assignment of learners to tutors/teachers, management and analysis of data on user behaviour and performance. The adoption of complex learning management tools or complex communications technologies may also require a significant technical maintenance effort. In projects with simpler technologies, on the other hand, user management schemes may be extremely simple and technical maintenance can be minimised.

A key element in the success of e-learning projects is technical support for end users. This may be required at several different levels. There is the need to support learners in their day-to-day interaction with the system. During this interaction learners encounter problems both of their own inadequate knowledge (of the desktop operating system, of the browser or the e-mail application, of the e-learning platform software, of the software used in specific learning materials) and of malfunctions in local and central systems and applications. Technical support has to help learners resolve these problems, even when they fall outside the direct responsibility of the project.

At the same time it may be necessary to provide technical support to organisations providing learners to the e-learning programme. This may be particularly important in identifying minimum software and hardware requirements and resolving security-related issues (compatibility with internal company security standards, firewalls etc.).

5.1.5. Evaluation

Evaluation covers two separate activities, namely the evaluation of learner performance and the evaluation of project outcomes.

Learner evaluation depends to a large extent on national traditions and institutional constraints. With respect to project evaluation nearly all projects

placed considerable emphasis on the collection of feedback from users. In the case of very large projects automatic tools were used to distribute and collect questionnaires. Smaller projects emphasised direct meetings between designers, learners and employers, using the feedback received during these meetings to modify their projects' learning strategies and technological options.

5.2. Competences for e-learning

The data from this study show three clear results:

(a) distance learning and traditional classroom learning are far more similar than is often supposed. Just as in traditional learning, the key phases in distance learning involve the analysis of user needs, curricula design, interaction with students and assessment. Implementing these activities requires the same skills required to implement the equivalent phases in traditional learning;

(b) traditional skills are essential to e-learning but are not enough. Successfully designing and managing an e-learning project requires new skills to handle the complexity of e-learning projects, to properly exploit the potential of new technology and to manage the special problems arising from the lack of face-to-face contact with learners. In many cases, as we will see, these skills cross traditional boundaries between disciplines. A key requirement for participation in e-learning teams is the ability to work effectively in a team whose members may have very different skills and backgrounds;

(c) the problems described in the previous point are common to nearly all e-learning projects. Responding to these problems requires core skills and competences that do not depend on the specific nature of the project.

However, it should be noted that many other skills necessary for e-learning projects depend on the goals and nature of the project and the specific activities it entails. Thus large, content-driven projects, with a strong emphasis on digital learning materials involve a different set of activities than less expensive projects, where the emphasis is on the teacher/tutor.

5.2.1. **Coordination and project management**

Given the vital importance of effective coordination and project management in e-learning projects it is not surprising that many interviewees identified project management skills as one of the most important areas where they or their staff had needed to acquire new competences.

Key project management skills mentioned during interviews included the ability to:

(a) understand and manage the inherent complexity of e-learning programmes;
(b) communicate and negotiate with management, partners and customers;
(c) show flexibility in the face of a constantly changing environment;
(d) work in a team, encouraging others to do likewise;
(e) fully understand the educational, technological and economic consequences of policy decisions;
(f) deal with issues of budgeting and finance;
(g) manage complex schedules.

5.2.2. **User needs analysis**

Several interviewees pointed out that successful e-learning projects, just like traditional training projects, involve a deep awareness of user needs, including the needs directly perceived by learners and those expressed by the organisations to which learners belong. The exact skills needed to achieve this goal vary from project to project. In projects organised by organisations with a long history of interaction with a specific class of user, formal analysis of user needs may be superfluous.

In these cases the key competence required may be a deep practical knowledge of the specific needs of a specific category of users. In organisations providing services to diversified populations what is required is the ability to use analysis tools and techniques (questionnaires, user interviews) already applied within the organisation. Other organisations may need to devote specialist resources (e.g. with training in psychology, sociology and/or pedagogy) to the design and implementation of new tools; in many cases user needs analysis may involve the ability to negotiate with management in a customer organisation. In international projects it may be necessary to take account of linguistic and intercultural issues. In projects where the needs analysis is supplied by the customer or an external funding organisation, the most important skills are likely to be the ability to 'read' a pre-existing analysis and to translate it into practical guidelines for the design of the project.

Although specific skills required may vary from project to project, there are also common needs. In particular, while user needs analysis may require specific technical skills, technical skills on their own are not enough. In successful projects awareness of user needs informs every aspect of project design and implementation. While specialist skills (e.g. the ability to design, administer and analyse questionnaires) may be vested in a single member of

the development team, everyone in the project (designers, developers, trainers, tutors) requires the ability to make the analysis their own and to use it as an operational tool.

5.2.3. Project design

According to at least two interviewees (CNPR: case study 10; THOSEWHOCAN: case study 11), effective design for e-learning is based on exactly the same curricular design principles as those applying to the design of traditional training. The designer of an e-learning course should thus possess the same set of basic skills as the designer of traditional training.

There is, however, wide recognition, that distance learning projects are far more complex than traditional projects. In traditional training, curricular planning largely consists of the definition of learning goals and the number of classroom hours to be dedicated to each goal. In e-learning (or blended learning), on the other hand, some activities can be organised in the classroom and some at a distance; some may be based on explicit teaching, some on group and some on individual activities. Different activities may require different kinds of paper or digital learning materials, some of which may require expensive and time-consuming development work. In short, the designer has to take into account a far greater number of variables than in traditional learning.

Designers of e-learning require a deep, practical knowledge of the teaching strategies available to them and of the ways in which these could be implemented in technology. And they require great mental flexibility to exploit these possibilities to the full. This means, among other things, that an effective e-learning development team requires the presence of multidisciplinary skills, not only within the team but within individual members of the team.

Just as designers have to understand the possibilities offered by technology, so engineers working on the underlying technology need to communicate these possibilities effectively; they have to learn the language and understand the needs of designers.

5.2.4. Development

Different projects have significantly different approaches to the development process. This implies that different types of projects require very different skills with respect to technological tools and platforms and the learning materials required for the project.

The results of the study show, unequivocally, that it is entirely possible to organise educationally and cost-effective, small-scale, teacher-driven e-

learning projects in which all learning materials are produced by teachers/trainers/tutors themselves, using simple personal productivity tools, such as those provided by Microsoft Office. The skills required to produce such materials are the skills of the traditional teacher and largely depend on knowledge of the subject area and effective writing. Interviewees emphasised that technological skills were not an issue. It is perhaps significant that all instances of this approach in the study came from France, whose education system has always placed great emphasis on writing skills, and where computer literacy among trainers may have reached higher levels than in other parts of the European Union.

Although teachers can produce learning materials on their own a number of interviewees emphasised that this is not always desirable. In particular teachers/trainers may lack the design skills, necessary to produce educationally effective and visually attractive materials. A number of projects responded to this problem by adopting a mixed production model, in which certain materials (e.g. pages on the project web site) were produced professionally, while others (e.g. classroom exercises) were created directly by the teacher.

A number of small-scale projects included a web designer within the development team. One of the advantages of this approach was that the web designer acquired an excellent awareness of the educational requirements of the material she was producing. In a number of larger, content-driven projects, on the other hand, implementation of materials was outsourced to external suppliers. So long as this outsourcing was limited to the implementation of web-pages based on content produced within the team, this did not pose any particular problems. In short, so long as these competences are provided from outside, it is possible to create an effective e-learning project team which does not include specific competences in visual design.

Whether or not the development team required additional technological platforms and tools depended on the choice of technologies. In general terms the results of the study show a reduction in required technological competences for the project team. In particular, the move from ‘home grown’ to commercial or open source technologies (LMS/VLE, synchronous and asynchronous communications tools) implies that e-learning teams adopting these solutions no longer require skills in software development (systems analysts, programmers).

Where organisations maintain their own technological infrastructure, they will require specific technological competences within the project team. Where they use LMS/VLE, the installation and configuration of the system (and the underlying systems software and hardware) may require skills in

system engineering. Even where such systems are not used and education is delivered via conventional web servers, technical skills will be required to install and configure the server.

One solution to this problem is again to resort to an outside applications service provider who assumes responsibility for installing and maintaining the necessary software and hardware. Although only a limited number of projects have adopted this solution, it appears to function well. In projects that adopt this solution it is no longer necessary to maintain specific technological competences within the project team.

5.2.5. **Delivery**

Successful delivery of an e-learning course involves tutoring and teaching, plus a number of specific technical and administrative activities to manage, maintain and support technological tools and to guarantee adequate technical support.

Even in content-driven projects, successful delivery of e-learning involves a teacher or a tutor. Many of the basic skills required by distance teachers and distance learners are the same as those required of their classroom colleagues. Good teachers have to be aware of – and respond to – learners' individual backgrounds, goals, learning styles and problems. They have to deal with demotivated, slow, and noisy learners. At the same time, however, distance learning poses problems of its own that distinguish it from traditional training.

The fact that e-learning is carried out at a distance means that the distance trainer (and the distance training manager) no longer receives the natural feedback teachers receive from learners in the classroom. This has a number of important implications in terms of the skills required of trainers and tutors.

In distance learning, more than in conventional training, the relationship between tutor and learner is a one-to-one relationship. This implies that it is easier for the tutor to adapt to the learner's specific learning style. This, however, requires knowledge of the specific teaching techniques that can be used with specific kinds of learner and a willingness to be flexible: to adapt teaching styles to the needs of the individual learner.

In distance learning, learners work in a context which is not immediately visible to the tutor/trainer. The tutor/trainer requires the ability to adapt to detect the way in which the context affects the learners' motivation and behaviour (e.g. the ability to deliver exercises on time) and to react accordingly.

Particularly when they use asynchronous tools, tutors have to be very attentive in their communications with learners. Interviewees report that e-

mail and forum messages can easily be misinterpreted. Effective distance tutoring requires skills in informal, written communication.

Several interviewees report that learners expect very fast response times from tutors. Distance trainers/tutors require the ability to respond rapidly and reliably to learners and to manage their disappointment when this is not possible.

Administrative and technical skills required will also depend, as in the development phase, on the choice of technology. In large projects based on an LMS/VLE, it will be necessary to 'administer' learners. While it may be necessary for the learning administrator to master a specific software application, the skills required are not substantially different from those required in conventional training (with computerised administration).

Where the project is based on an in-house technological infrastructure (e.g. an LMS/VLE, synchronous and asynchronous communications tools, a web server) the team will require competences in systems engineering and maintenance. The size of the technical staff may vary greatly depending on the specific technologies applied by the project and the quality of service required. Large LMS providing guaranteed 24/7 service may require a substantial maintenance staff. A single, part-time technician can often manage a small Web server and associated communications tools. This is particularly feasible if 24-hour operation is not required.

It should be noted, however, that the technical competences required by a successful e-learning project are not limited to the maintenance of the internal technological infrastructure. The success of e-learning projects depends to a large extent on the quality of the technical support offered to learners and to organisations. Providing this support effectively and efficiently requires significant managerial, technical and communications skills, which many training organisations may be ill-equipped to provide. For this reason, one very large project created a special organisation, outside the main project team, dedicated exclusively to technical support.

5.2.6. Evaluation

Until the second half of the 1990s the majority of platforms were developed in-house by the organisations intending to use them. The results of the study show, however, that most current projects use commercial products, and that smaller, teacher-driven projects often have no LMS or VLE. In some cases this represents a deliberate strategy. One interviewee expressed the view that LMS lead automatically to a content-driven learning strategy that he strongly wished to avoid. In other cases project leaders believed that LMS are simply unnecessary. For some, however, the main problem was cost.

Table 8. Core skills required by e-learning projects

Phase/Activity	Skills shared with traditional training/education	Specific skill required by e-learning
Coordination and project management	Communication and negotiation with management, partners and customers	Managing the complexity of e-learning programs
	Budgeting and finance	Flexibility in the face of a constantly changing environment
		Team work ([22])
		Managing complex schedules
User needs analysis	Deep awareness of user needs	
	Ability to design/implement tools for formal analysis	
	Ability to use formal analysis tools	
	Ability to apply awareness of needs to project design and implementation	
Design	Basic skills in curricular design	(Designers): awareness of potential of technology
	Writing	(Technologists): awareness of educational needs
		Visual design
		Computer literacy

Several project leaders from smaller projects stated they were considering the introduction of a learning management system, with a strong preference for open source systems, which do not require the payment of licence fees (AFPA: case study 7).

This study showed that even where projects did not adopt a fully integrated project team, many attempted to integrate roles that the assembly line model maintains independently. More specifically: many projects create a design team which integrates the roles of the project manager, the system

([22]) Team working skills are obviously necessary in traditional training as well as in e-learning projects. E-learning development teams tend, however, to be larger than teams developing conventional learning and will usually involve a broader range of competences. In this setting the ability to work in a team is especially critical.

Phase/Activity	Skills shared with traditional training/education	Specific skill required by e-learning
Delivery	Responsiveness to individual user needs and learning styles	Sensitivity to specific needs of distance learners
		Effective (and sensitive) use of asynchronous communications tools. Informal writing skills
		Good time management to ensure fast response to learner requests
		Technical, management and communication skills ensuring effective technical support to end users and organisations
Learner evaluation	Standard skills in learner evaluation	
Project evaluation	Standard skills in project evaluation	

instructional designer, the product instructional designer and (on occasions) the learning administrator in a single design team. While there is a project manager, he or she is a member of an integrated group that shares the same basic competences and takes key decisions collectively. This is, of course, especially easy when the technologies employed by the project are relatively simple and when there is no need for industrial-scale production of digital learning materials. In several projects the integrated project team co-opts members with specialist knowledge (e.g. psychologists, web designers) to help in specific tasks.

Many projects (especially small ones) take integration a step further. In these projects, trainers and tutors are full members of an integrated project team; they teach what they have helped to design. This, again, is only possible if the number of tutors is relatively small. In very large projects (FaDol for instance has 63 full time tutors) some division of labour is inevitable.

Although many projects give a specific role to subject area specialists (e.g. in the initial planning and later review of learning materials) many involve trainers and tutors in the creation of learning materials. In these projects there is no specific role for writers.

Table 9. Skills required in large scale, content-driven projects (in house production)

Phase/Activity	Skill
Design	Subject area specialists
	Storyboarding
	Visual design
	Professional writing/editing
Development	Use and management of advanced authoring systems
	Installation/configuration of LMS/VLE, advanced communications tools and basic technological infrastructure
Delivery	Learner administration
	Maintenance of LMS/VLE and of basic technological infrastructure ([23])

Interviewees strongly stated their belief that the evaluation of learners in e-learning systems requires the same basic skills – and should be judged by the same criteria - as other forms of evaluation. The evaluation of the outcomes of an e-learning project depends on essentially the same criteria used to monitor and evaluate traditional training programs.

5.3. Different solutions for different needs

The results of this study shows that:

(a) despite their differences all distance learning projects require a certain set of core skills;

(b) many of these skills are identical to the skills required for effective classroom training.

Table 8 summarises these core skills. In addition to such skills, large-scale content-driven projects that produce learning materials in-house and/or maintain their own technological infrastructure, require some or all of the additional technical skills summarised in Table 9.

([23]) Maintenance is likely to be especially expensive where 24-hour service is required.

Table 10. Two classes of e-learning projects

Characteristic	Teacher-driven projects	Content-driven projects
Learning goals	'Soft skills' (typical skills required for teaching)	Acquisition of basic facts, concepts and vocabulary
Audience	Often (though not always) small (tens of users)	Large (hundreds or thousands of users)
Context	Strong learner motivation, long courses extending over many months.	Weaker learner motivation (mandatory training), courses relatively short. Need to maximise speed, minimise cost
Teaching strategy	Negotiated learning. Blended learning, collaborative learning	Knowledge transmission Tutor-supported self-instruction
Technologies	Low-cost (open source) LMS or standard web server. Standard Internet communications tools	Advanced authoring tools LMS/VLE Specialised communications tools Standard office tools or simple HTML editors
Development cycle	'Cyclical' development model	'Waterfall' development model
The project team	Various degrees of integration within the project team	Assembly-line model

Even though it is possible to make a meaningful distinction between e-learning projects that are teacher-driven and projects that are content-driven, this does not mean that every single project studied by TTnet fits neatly into one of the two categories. In fact, a number of interesting projects fall between the two extremes identified here. The distinction nonetheless facilitates the task in identifying the main activities, skills and organisational structures required by different kinds of project.

The main characteristics of the two kinds of project are summarised in Table 10. In dividing projects into two categories it should be emphasised that this does not imply a judgement of relative value.

CHAPTER 6

Conclusions

With the exception of only one project (case study 4: ALMAWEB), the target audiences included in the study consisted either of teachers, (mainly in the public education system), or of trainers. In a number of cases the audience for a project included both groups. In some projects for trainers, participants came exclusively from the public sector, in others only from private industry; in several cases the project addressed a mixed audience, from both sectors. There was also a bias in the sample towards the training of teachers in, or for, the higher education sector.

While each project has its own specific learning goals, these can be grouped into two main categories:

(a) a large number of projects have the specific goal of teaching skills related to e-learning. Some projects cover a broad scope; others aim at teaching specific e-learning skills (e.g. how to develop multimedia learning materials, tutoring and mentoring skills);

(b) a second large grouping of projects uses e-learning as a tool to teach general teaching and/or training skills (often in preparation for formal qualification or certification), with no specific reference to distance learning.

Just as e-learning projects are differentiated in terms of their goals and target audiences, so they operate on very different scales. One project in Italy, (case study 5: INDIRE), for example, has a target audience of 62 000 teachers. A project from the United Kingdom has as its target, all college teachers lacking a formal teaching qualification (THOSEWHOCAN: case study 11) and an Italian project (FaDol: case study 2) trains more than 12 000 trainers in professional training centres throughout Italy.

Although these projects are extremely large, there are a significant number of small projects designed to meet very specific needs. Many projects studied had a target audience of 50 or fewer learners.

The choice of learning strategies by individual projects was determined by the projects' learning goals, and the nature of the subject matter to be taught. The organisational context in which the training was to take place and by the different numbers of learners involved in individual projects also had an influence.

The kind of 'soft skills' required for teaching (or for work in e-learning projects) ideally call for negotiated learning (Gaimster and Gray, 2002), involving a continuous interaction between learner and teacher. Where this is achieved, e-learning can be viewed as an extension of traditional teaching by other means. There can be little doubt that the best way of teaching the soft skills required by teachers and trainers is through a strategy of negotiated, teacher-driven learning. This approach has, indeed, been successfully adopted by a number of projects studied by TTnet.

There are many different ways of implementing negotiated learning. Most projects adopted a blended learning strategy, in which various forms of distance learning are mixed with more traditional classroom training. The distance learning component of the training involves a mix of different techniques including both self-instruction and collaborative learning, in which students work together in a group. In all these projects learning is guided by a tutor, who is often the same trainer who leads classroom activities. Although most teacher-driven projects are relatively small, this approach has also been implemented in a few relatively large projects.

It is important to realise, however, that teacher-driven training is no panacea. Rather it belongs to a set of possible strategies, where no single strategy can respond to all possible goals in all possible situations. Many e-learning projects in manufacturing and services industries do not attempt negotiated learning but prefer to rely on transmitted knowledge (C. Gaimster and Gray, 2002), delivered via multimedia learning materials. Very often the facts and notions these projects attempt to transmit are relatively simple. Learners (typically technicians or sales staff) are often highly motivated and find it easy to learn from the materials provided. The key goal of these projects is to train very large user audiences, rapidly and at low cost. In this setting a content-driven approach**,** based on digital learning materials may prove more practical than a teacher-driven strategy. This was the case in a number of large-scale projects (FaDoI: case study 2; INDIRE: case study 5) investigated by TTnet where logistic, organisational and economic constraints made it impractical to adopt a teacher-driven strategy.

In all modern e-learning projects, whether teacher or content-driven, a key role is played by the tutor**,** who acts as a facilitator, helping students to resolve the conceptual, personal and technical difficulties they encounter during learning. However, the concrete activities carried out by tutors differ widely. In teacher-driven projects, trainers or tutors play a key role in guiding learners; learning activities (e.g. reading, writing, analysis of cases) are in many ways similar to those they would carry out in a traditional classroom and digital content is viewed, primarily, as a support to these activities. In

content-driven projects, on the other hand, the role of the trainer/tutor, though still extremely important, is primarily to provide user support. Actual learning depends largely, sometimes exclusively, on digital learning materials. In these projects, unlike teacher-driven projects, the need to design, produce, manage and deliver effective learning materials is of critical importance in determining project strategies and technologies.

Different projects adopted different technology strategies. Authoring tools used by different projects can be divided into three main groupings. A first group of teacher-driven, small-scale projects base their production of learning materials on standard 'personal productivity' tools (Microsoft Word, Microsoft PowerPoint, Microsoft Excel) sometimes supplemented by simple HTML editors (such as Microsoft FrontPage). In some projects a significant proportion of learning material is supplied on paper. It is important to note that these materials were used as support for teacher-driven activities (in the same way as a school text-book supports the work of the school teacher). At no time were these materials at the centre of the learning process (AFPA: case study 7). In one such project, for instance:

'There is no "direct transmission" of content. Rather learners are provided with learning goals, information resources (documents, pointers to web sites etc.), and a set of exercises to be performed'.

A second group of projects used web editing tools (e.g. Dreamweaver) (FIPFOD: case study 8) to produce professional quality web pages. Here, too, the content of the pages was conceived primarily as a support to learning activities (e.g. performing case studies, writing, reading books, 'harvesting information' on the web) which involved far more than just reading the page.

The philosophy adopted by these first two groups of projects contrasts strongly with a third group of large scale, content-driven projects, where digital learning materials play a central role in the learning process. These projects, unlike those belonging to the first two groups, make heavy use of professional authoring tools designed to facilitate the efficient, professional production of high volumes of standardised learning material by large production teams.

It is interesting to note that nearly all the multimedia learning materials used by the projects participating in the study are based on text, graphics and, occasionally, video and sound. More advanced possibilities (e.g. simulation) are rarely used (though one French project is planning to introduce simulation-based learning materials in the coming months) (CNPR: case study 10). One interviewee (CIPD: case study 15) noted that her project was continuously looking at new media but that it was necessary to strike a balance between the desire to use new technology and the risk of creating technological barriers for students.

A key finding of the study is, however, that different learning goals and organisational contexts require different solutions. Even in the world of training and education, there exist circumstances where knowledge transmission strategies are more appropriate. In particular there exist projects with relatively simple learning goals, very large, geographically dispersed target audiences and strong time and cost constraints where this kind of strategy may be an optimal solution.

Content management and delivery is closely tied to learning management. In large projects, which have invested in an LMS or a VLE, the same system is used to manage learners and to deliver digital content. Smaller projects, on the other hand, tend to adopt 'low tech' solutions. In one French project learning materials are distributed exclusively via CD-ROM and on paper (though a web-based solution is planned for the coming months) (AFPA: case study 7). Other projects also make extensive use of paper (with technology being used primarily to handle communications between learners and tutors). In the majority of cases learning materials are provided in the form of pages on the project website or of office documents that can be downloaded from the site. Websites are managed using standard server technology (e.g. Apache). Documents are managed using general-purpose web management tools.

In addition, the study noted that a number of technologies, strongly promoted by their vendors, were not used. Only two of the projects (case study 18 and case study 19) in the competence study used knowledge management tools to facilitate the sharing of knowledge among learners and tutors; none deployed technological tools for skill gap analysis. It is possible that, at least at the moment, education and training organisations do not see these tools as particularly significant. An alternative explanation could be that the pricing of these systems is high compared to the perceived benefits.

Virtually all projects investigated by the study have invested substantially in tutoring. It is important to realise, however, that, in practice, the term 'tutoring' covers a range of very different activities some of which are present in all projects, while others have a more restricted scope.

The tutor is a learning facilitator; this is true for virtually all projects and implies that one of the tutor's key jobs is to understand and respond to user needs. In the early stages of a project the tutor has to create a relationship with learners and ascertain that they meet prerequisites. Where these are met the tutor has to counsel or 'orient' learners, identifying each individual's specific skills, needs and goals and proposing an appropriate training or learning plan. This facilitating, supporting role of the tutor can be found in virtually all projects. In other areas, however, the kind of tutoring projects provide can vary widely.

In many cases the focus is the training of trainers in the state – for example, trainers working for regional or state training agencies - rather than the private sectors. There was also a bias in the sample towards the training of teachers in or for the higher education sector. Future research may like to focus on trainers working and training in the private sector, both SME and corporate.

Above all, the major conclusion lies in the limited number of accreditation procedures. Only about 25 % of the cases refer to accredited training programmes for e-tutors. But the accreditations suffer from the specific contexts in which they are delivered: at local (specific university diploma acknowledged in one university only) or national level (university degree).

Two elements to the design of e-learning that did not emerge from the study were accessibility and the human-computer interface (HCI). Perhaps general web and multi-media design principles are now so embedded in either the software that is employed or part of the tacit knowledge/skill-base of developers that the latter aspect does not warrant a mention. However, the literature shows that poorly designed interfaces, web pages and media artefacts can be a barrier to learning. As this study was not primarily concerned with the artefacts themselves, they were not generally scrutinised nor was any specific attempt made to evaluate the media or resource-bases of the projects. In some cases managers made reference to the associated costs and/or difficulties of producing and assuring the quality of artefacts. In terms of evaluating the effectiveness of e-learning this is one aspect that would need further investigation before an overall judgement could be made.

The issue of accessibility is perhaps more problematic as only one project actually made specific reference to inclusivity as an aspect of the design of their e-learning environment. Legislation in the United Kingdom, USA, Canada and Australia makes it mandatory for organisations to take all reasonable steps to ensure that any web-based materials are accessible to all including those with specific disabilities. Potential users with a range of visual and/or aural impairments may be prevented from participating in innovative e-learning projects if, for example, web-based components are not designed using accessibility principles. While there have been no test cases, and such legislation does not yet apply Europe-wide, we should be mindful of the needs of all potential users if we are to be truly global in our attempts at delivering high quality training using e-learning. A very useful resource in addressing accessibility issues may be found on the web at TechDis (http://www.techdis.ac.uk).

The overriding consideration should be that the technology is still in its infancy and developing at an unprecedented pace. Features that are commonplace today would have been unthinkable some five years ago. In this context, it is not feasible to predict accurately what the technologies of the future may enable us to do but enhanced level of utilisation and experimentation will inevitably bring about a greater awareness and understanding in this field.

CHAPTER 7

Recommendations

The results of this study allow for formulation of a number of recommendations for practitioners, plus national and European policy-makers.

7.1. Recommendations for practitioners

For practitioners embarking on an e-learning project for the first time, or deciding whether to extend or change the direction of their existing initiatives, the main recommendations of the project are summarised in this section. The following recommendations are not exhaustive, and include basics, which may have already been integrated into current practices. However, the list should be considered as best-practice guidelines by those practitioners who are embarking on such complex and innovative projects for the first time.

Identify and build upon existing effective practices: there exist many different ways of applying e-learning. Many organisations are not aware of approaches alternative to their own. Before deciding on a particular e-learning strategy explore the full range of alternatives and particularly for novice development teams, elicit the involvement of an experienced e-learning project manager or programmer in the starting phase of the project.

Determine and formalise your own e-learning strategy bearing in mind that there is no 'one best way' in e-learning: do not succumb to fashion trends (i.e. assume you need advanced digital learning materials), and do not choose a solution because it is more 'advanced' or 'progressive' than another. Make your decision in line both with the goals, needs and possibilities (strengths and weaknesses) of your organisation and the environment threats and opportunities (commercial, political, financial constraints). An e-learning project development is context dependent.

Determine and formalise the business plan of your e-learning project: even if you do not consider education/training in general as being a commercial product, a good to be sold, even if there is no profit target, ensure that your project will at least be a 'zero sum-game'. Passing from experimentation to full development is hard work. It implies that your e-learning economic model

is viable for your organisation. Marketing strategy will also be of paramount importance.

Build a stable and adequate environment to work in/with: ensure full and long-term institutional commitment, particularly in terms of policy and processes as well as budgets. Establish coherent management structures with minimum turnover of participants, with clear reporting lines, roles and responsibilities. Document every project development meeting, contact and information source. Ensure that all members of the development team share or understand each other's language. Get technicians to set themselves more realistic deadlines, and to keep to them. Avoid overspecialisation in the development team: effective teams need specialists (e.g. psychologists, web designers) but above all they require integration and multidisciplinary skills.

Adopt a participative approach: end user co-production and empowerment of all participants (including of course the project team) are important. They facilitate the project development and its enhancement (for example via the building of mechanisms to collect and react to user feedback even when this requires major changes in plan), limit risks and avoid dead-ends. A participative approach often improves dissemination and facilitates transfer too.

Monitor and assess the system on a continuous basis: e-learning systems are built on a step-by-step process that requires many adjustments all along the project life cycle. As there is no 'one best way' to conduct such flexible systems, no generic procedures to rely upon, continuous monitoring and assessment will limit risks, enables project managers to anticipate and improve the system, facilitate effective communication between all participants and finally respect commitments as far as resources are concerned.

Determine a full range of performance indicators for every phase of the development cycle (from the feasibility study to the full production of the system): qualitative, quantitative and financial indicators facilitate the project monitoring and continuous evaluation. To some extent, they can also guarantee future developments. These indicators are to be used in the continuous monitoring and assessment of the project.

Build a strong 'back office' sub-system: first ensure high and adequate levels of central technical support and advice for both the ICT development team and learners. Use a service provider willing to give real-time technical support. Beyond technical problems, it can also be necessary to ensure full support to learners parallel to official tutoring (the one that is planned and formalised in the trainees' road map) for administrative problems, social difficulties, even pedagogical problems that often cannot be solved by the

tutor etc. The back office is also in charge of contents and pedagogical organisation revisions all along the project life cycle, taking trainees' comments, critics, suggestions, etc. into account. The financial charge of this back office sub-system is often neglected despite its importance.

Adapt tutoring (techniques, action modes, interaction levels, rhythms, etc.) to users' autonomy (motivation + meta-skills): effective projects require effective tutoring. There are many different tutoring models depending on the contexts. Make the role of the e-tutor explicit; ensure they are adequately trained to operate fully within an e-learning environment. Develop or adopt a set of e-tutoring standards (for example, response time to learners' e-mails) that constitute a kind of roadmap for e-tutors. Beware, because, in a well-designed project, tutoring is likely to account for a significant proportion of the total project budget.

Design and operate a user-oriented technical architecture/make platforms and systems human-friendly: use technology when it will enhance or extend existing practices. Ensure that design is influenced by the content of the programme rather than the ways in which the technology functions. Choose ICT tools on the basis of their fitness for purpose and ease of use avoiding unnecessary complexity. Support choice and use of tools with reference to appropriate learning theories and models.

7.2. Recommendations for national policy-makers

In addition to recommendations for practitioners, the TTnet project suggests a number of recommendations for national policy-makers. These are summarised below:

(a) advise e-learning developers to identify clearly the add-on value of e-learning (if any) for users, compared with traditional learning activities. Ensure that this add-on value is unambiguous and is perceived as an add-on by end users themselves;

(b) encourage e-learning developers to specify and design against coherent learning (pedagogic) models and to demonstrate how such models bring good educational practice to the instructional design process. Above all, ensure that design is influenced by the needs of learners and the content of programmes, not by the ways in which technology functions;

(c) encourage e-learning developers to work with potential end users (teachers and trainers) in the instructional design process as well as formative and summative evaluation. See end users as a valuable, active resource not just as a target for learning programmes;

(d) develop policies for improving the ICT skills of end users so that they are more 'enabled' for using e-learning;
(e) advise novice e-learning development teams to elicit the involvement of experienced e-learning project managers or programmers in the start up phases of a project;
(f) encourage e-learning providers to use low tutor-learner ratios in order to establish quality in the tutor-learner relationship;
(g) attach great importance in funding decisions to educational considerations; technologies (unless clearly inadequate) should be considered to be of secondary importance;
(h) recognise that e-learning requires new skills (e.g. skills in project management, design skills, tutoring skills, skills in technical support) which are currently extremely rare. Funding should be provided for training in these skills. This would reduce the current skill gap, leading to better projects, improved uptake by learners and a greater contribution of e-learning to the new information economy and knowledge society.

7.3. Recommendations for European policy-makers

EU policy-makers have an opportunity to influence the direction that e-learning for teachers and trainers will be taking over the coming years. It is recommended, therefore, that policy-makers consider some of the following approaches:

(a) advise governments, regional authorities and other stakeholders that e-learning developers make out a clear business case for e-learning development prior to the funding of projects;
(b) establish and promote a coherent set of European-wide e-tutoring competence standards, linked to accreditation and qualifications in order to promote professionalisation of e-tutoring;
(c) seek to encourage diversity, as there is no such thing as an 'ideal' e-learning project. Different project goals, different target audiences and different organisational contexts imply the need for different learning strategies, technologies and skills, which should be encouraged by European funding;
(d) continue to fund large e-learning projects with thousands or tens of thousands of users and recognise that the strategies and technologies adopted by these projects will be very different from those used by smaller projects;

(e) recognise the vital role played by small and very small projects, especially where the proposing organisation can demonstrate deep knowledge of the needs of a specific target population;
(f) recognise the importance of traditional training and training management skills in effective e-learning; at the same time recognise that, in certain circumstances, these skills may be inadequate. Funding should be provided to update the skills of e-learning personnel in this area.

The TTnet study brought to light the diversity of current European e-learning projects. At the same time, the study showed that many project leaders are unaware of the full range of options that are open to them. Developers in one European country often have no knowledge of what is common practice elsewhere. It is essential that policy-makers take measures to encourage the sharing of best practice (e.g. 'networks of excellence', exchanges of staff, scholarships, study visits, conferences, seminars publications).

ANNEX 1

Case study selection template

1. Country		
2. Name of project/organisation		
3. Name of project manager		
4. E-mail address		
5. Type of initiative (Please circle)	Teachers	Trainers
	Public	Private
	Corporate	Small/medium enterprises
6. Number of trainees who have completed the training initiative? (Please circle)	Less than 50	50 to 100
	100 to 500	more than 500
7. Duration of project	Less than 1 year	1-2 years
	2-3 years	more than 3 years
8. Is the project specifically aimed at the training of trainers or is it another type of e-learning initiative? (Please, give some info)		
9. Which dominant model of e-learning was used in this project? (Please circle)	Virtual classroom	Collaborative learning
	Teleteaching	Supported self-learning
	Blended learning	Any others, etc.

10. Did the trainers involved in the project need to acquire/develop new skills in order to develop/ deliver this programme? **YES / NO** If yes, at which stage(s) in the development/delivery of the project?	• Design: system design, instruction design, product design, etc. • Prescription: training needs analysis, prior learning assessment, etc. • Implementation: training delivery, evaluation of training/certification, etc. • Management: project planning, coordination, budgeting, etc. • Others:
11. Which of the following technologies have been used to deliver your project?	• sharing application • CD-ROMs • websites • learning management system, portals, intranet • knowledge management software • combination of tools
12. Within your project, which of these new roles did your trainers/teachers have to undertake?	• instructional/system designer • tutor/coach/mentor • subject matter expert/writer • learning/system administrator • project manager • other(s) *please specify*

13. With reference to the following questions and on one side of A4 please describe the project explaining why this is an example of innovative practice.

- Why was this project undertaken? What outcomes were you seeking to achieve?

- Description of the way the project was developed and delivered?

- Main actors concerned with the project?

- What was achieved?

- In what way would you say it is an example of innovative practice?

- Are the results of your project transferable and/or scaleable?

14. The second phase of this project involves a face-to-face interview. This would require up to two hours of your time. We would find your input of great value. Would you be willing to be interviewed further on this project?

YES / NO

Role descriptions (Q10)

Project managers: have responsibility for the project to guarantee costs, human resources, timing and quality performance. They manage resources also as a team and interface with customers to steer the project towards the set objective.

System instructional designers: are in charge of the design of the training system, the definition of platform's functionality or the e-learning environment and of the training offer. They also realise the technological architecture in cooperation with information technology engineers on the basis of different factors (timing, costs, existing equipment, etc.). They take customers towards the choice of the most convenient system according to their needs.

Product instructional designers: are an expert in didactic design and learning processes applied to technological networks, of which they have to know potentiality, limitation and context of application. Their knowledge allows them to make the best use of the different functionality within their teams, particularly with the software developers.

Learning administrators: are responsible for the online learning system, they establish virtual classrooms, are in charge of admissions, input courses, update the training courses catalogue, are the tutors' coordinators and they supervise activities carried out within the learning environment. They also receive reports from tutors and produce management reports on the activity's progress.

Tutors: help the user during the training session and they contribute to monitoring the training path; they can carry out the tutor's activity on training contents or make the learning process smoother and motivate the students. In particular, they enliven the virtual classrooms and debate sessions, keep in touch with the students through e-mail and internal messages, answer questions with the back up of contents experts and also give contents support to the students. Finally, they produce reports on learning results and all items related to their virtual classroom.

Writers: are in charge of authoring of text by structuring content exposure to match learning goals.

ANNEX 2

Quality control sheet 1

Innovative practice case studies

Item	Filled	Partly filled	Not filled
		To be completed	
01.			
02.			
03.			
04.			
05.			
06.			
07.			
08.			
09.			
10.			
11.			
12.			
13.			

Name and mail address
of the national expert: _____

Template to be sent back to the project manager: **YES** **NO**

Template to be sent to the transnational consultants: **YES** **NO**

ANNEX 3

Selection criteria – quantitative approach

Duration Q7	
- less than a year	0
- from a year to two years	1
- from two to three	2
- more than three years	3
New skills in action Q10	
- at one stage	0
- at two stages	1
- at three stages	2
- more than three	3
Significant number of trainees Q6	
- under 50 trainees	0
- between 50 and 100	1
- between 100 and 200	2
- more than 200	3
Role emerging Q12	
- one	0
- one to three	1
- four to five	2
- more than five	3
Technical support Q11	
- sharing application	1
- CD-ROMs	1
- web sites	1
- LMS, VLE, MLE, portals and intranet	2
- knowledge management software	2
- combination of tools	3

Target Q8	
- not aimed at trainers or teachers at all	0
- partly aimed at trainers or teachers	1
- specifically aimed at trainers or teachers	2
- specifically aimed both at trainers and teachers	3

Type of initiative Q5	
- private	1
- public	2
- private and public	3
- corporate	1
- SMEs	2
- very small companies (less than 10 people)	3

ANNEX 4

Selection criteria – qualitative approach

	Case study 1 (e.g.)	Case study 2	Case study 3		
Country	Greece				
Teachers/ trainers	Tr				
Public/private	Private				
Corporate/ SMEs	N/A				
Number of trainers	150				
e-learning model	Virtual campus				
Aimed at innovation	Re-engineering of the distribution model				
Observable achievements	No evidence				
Measurable impacts	YES				
Transferable/ Scalable	NO				
Quantitative score	10				

			Overview
			Variety of European countries
			Balanced number of training of teachers/trainers projects (60 % minimum) and non trainers/teachers oriented e-learning project
			Balanced number of private and public institutions
			Range in terms of organisational size
			Number of trainees: 60 to 80 % of the projects concern over 200 trainees
			Balanced number of e-learning models
			Addressing a major change (new process, new methodology…)
			Significant evidences of emergence of new skills or professional transformations
			Measurable impacts
			Transferable

ANNEX 5

Research process

Phase	Procedure	Tools
Cases identification	Case study templates were issued by network leaders and the leaders of associated networks to potentially innovative organisations or sites. Once case study templates were returned, network leaders and the leaders of associated networks completed a quality control sheet. Completed case study templates were then sent to the transnational consultants for review.	Case study selection template + quality control sheet.
Selection of cases	For the selection process both a quantitative and qualitative approach was adopted. For quantitative selection, scores were allocated to each case. Then a range of qualitative criteria were also drawn up and applied to ensure a balance of criteria across all the 25 cases. As a result of the case study selection process, a grid	Case study selection template + quality control sheet + selection grids (quantitative approach and qualitative approach) + final selection grid for the results of the selection process.

Strong and weak points	Impacts of weak points	Hypothesis on the reasons for defaults
The fiches are easy to use and to fill but the users' guide was not always respected. In fact, the fiches were sometimes 'bypassed'. It appears that some TTnet leaders have filled the fiche instead of the project managers themselves. Some items are sometimes unreadable thus inducing some confusion (e.g. item 5 mishmash between the target group and the institution at the origin and in charge of the project). A first important task should have been performed right from the start: to assume whether the data collected was valid or not (e.g. some cases claim new roles emerge but at the same time no new skills in action). Validating the data right at the beginning of the pre-selection phase would have impacted and facilitated the selection (a phase during which TNCs had many questions but few answers…).	Some incomplete templates. Some rather incoherent data. Difficulties for TNCs to progress in the selection process. Impossible to disseminate the data collected as planned.	Project managers' lack of time. Difficulties to 'call up' project managers. Unfilled quality control fiches. The selection grid is not clear enough. Weak level of interaction between TTnet leaders and TNCs.
The double approach (qualitative and quantitative) enables consultants to be more objective and build a sample in which some important variables exist. It is also a procedure which allows to « make TNCs level »: build and then share a common lexicon, global and consensual vision on the projects, first critical analysis and	The sample is not strictly appropriate to the research objectives. Final results are potentially impacted.	Some incomplete grids. Some grids were not properly filled. Some data are not detailed enough thus quite difficult to interpret so they may induce confusions: the ratio between duration of the project and the number of participants, the distinction between objectives, aims and means, the relation between roles

Phase	Procedure	Tools
	was drawn up which shows the way in which the cases cover key research variables.	
Data collection	National experts have conducted semi-structured interviews as well as documentation collection on the project itself.	Analysis grid + interview protocol

Strong and weak points	Impacts of weak points	Hypothesis on the reasons for defaults
first identification of the potential limits in future investigations. Because the quota rule had determined how many cases were to be selected in each country, each TNC has allocated a score regarding a national sample to the detriment of other cases which might have been more relevant but rejected (e.g. case number 6 in Italy could be more relevant than case 2 from France that was selected because the quota rule had imposed 5 Italian cases and 5 French cases). The pre-selection grid was supposed to make the selection of the cases fit more easily with the investigation needs of sub-projects 1.1 and 1.2. But, this was not always possible for some cases did not meet the criteria.		emerging and competences in action, the distinction between real evidences and individual hopes, etc. Some cases were badly identified.
Rapid appropriation by national experts. The grid is exhaustive enough regarding research objectives and should enable experts to collect relevant data: quantitative and qualitative. This was not always possible. Some items need to be explained, others need consensus. The use of the grids has proven that a two-hour interview is too short. An exhaustive document collection must be carried out (in order to make the data collected as objectives as possible) but this was not clearly specified in the national experts' road map. The analysis grid is not self-sufficient. It is only a tool in the hands of a high skilled worker. This worker is supposed to handle his	Some poor data quantitatively and qualitatively speaking. Some very important data are missing: impact indicators for example. Some imprecise data, weakly supported and/or argued. Some difficulties to interpret, 'translate' and synthesise the data collected at first level consequently transversal analysis is made even harder. Need to question some national experts. More time was spent (by national experts) on the data collection and analysis so this implies overspending.	Quality control procedure was not fully respected (national experts were supposed to send a first case before embarking on further investigations). Feedback from TNCs was not regular. Coordination was weak. The role definition among TNCs was not fully respected. Some data were not totally shared among TNCs. National experts were not able to go further in the interview when details, clarification were needed.

Phase	Procedure	Tools
Analysis of data	Deskwork performed by the national experts: reading and 'translation' of the analysis grids , of the documents collection, surfing on web sites, LMS, etc. in relation to the projects, online resources analysis, translation, cross-checking and synthesis.	Reporting template.
Transversal analysis	Deskwork performed by TNCs: reading of the reporting templates, data processing, crosschecking and synthesis.	Filled reporting templates.

Strong and weak points	Impacts of weak points	Hypothesis on the reasons for defaults
tool skilfully to guarantee the quality of the output. Consequently he's supposed to be trained on how to use his tool.		
A synthetic grid that facilitates through a kind of stepping back movement, data processing: from description to analysis. A grid that is coherent regarding both the analysis grid's items and the research objectives. A grid that facilitates transversal analysis. A grid that needs to be explained through a kind of user's guide or road map for national experts. A grid that was not subject to quality control. The procedure does not include any quality control at this step.	To some extent a confusion on the way the grid was supposed to be used: a tool to analyse and synthesise. Analyses are sometimes not detailed enough. Data in many cases are subject to mere description instead of deep critical analysis. Grids that are not self sufficient in order to analyse cases and worse for transversal analysis.	Lack of time to formalise. Difficulties to 'translate' and interpret the data collected. Weak step back from the interviewees. Limited critical eye from interviewers. Grounds that were less 'fertile' than expected. Lack of explanation from TNCs on the 'best way' to use the grids: analysis grid and reporting templates. Lack of synchronisation between TNCs, national experts and TTnet leaders The importance of the synthesis (for the final analysis) was underestimated. Vision of the overall logic/process was not clear enough: research objectives, methodology, tools, etc.
A confusion on the way the grid was supposed to be used: a tool to analyse and synthesise. Analyses are sometimes not detailed enough. Data in many cases are subject to mere description instead of deep critical analysis. Grids that are not self-for analysing cases and worse for transversal analysis.	A transversal analysis that is based on data that are not precise enough to a certain extent not reliable, to go beyond (sometimes) hypothesis. To a certain extent data that prevent TNCs from going beyond mere description. Conclusions on analysis that may appear as controversial and questionable. TNCs have had to cross check the data collected through first the analysis grids and then the reporting templates.	No quality control at this step. The level of information between TNCs was not homogeneous. Weak synchronisation and coordination between national experts and TNCs.

ANNEX 6

Analysis tool for innovation

Why use e-learning?

1. What was the main rationale for undertaking the project/programme?
2. What or whose needs is the project/programme meant to address?
3. Who were the main sponsors?

Entry level skills to e-learning development

4. What were the main lessons you learnt from your own start-up in particular:
   - selection of authoring/development tools;
   - specification of design standards;
   - costs of start up;
   - any other factors (please specify).
5. From your own experience, what advice would you give to an organisation about to embark on e-learning development?

Technical issues

6. What are the main technical problems or challenges that you face?
7. How do you get answers to technical questions?

Project management

8. How is e-learning development managed?
9. What have been the main problems/challenges to this management?
10. Would you manage the project in a different way next time? If so, how?
11. What was the overall budget for the project and how was it distributed?
12. Were budgets kept to?
13. Sometimes a project can suffer 'political' or other interference from other parts of the organisation. Did you have this sort of problem, and, if so, how did you handle it?

Design

14. How do you select between courses that are to be delivered by e-learning and those that you will deliver by more traditional means (e.g. face-to-face)?
15. In terms of design, what kind of pedagogic/teaching methodologies do you use?
16. Have you evaluated your use of the above methodologies, and were they found to be effective?

17. Do you take individual learning styles into account when designing programs? If so, what mechanisms have you put in place to achieve this?
18. Do you make use of e-tutors? What challenges have they faced in terms of teaching or the facilitation of learning?
19. Do you make use of assessment in your e-learning programmes? If so, what kind of assessment methodologies do you use? What kind of assessment tools do you use?

Professional development/updating for designers and tutors

20. What kind of training do you offer for developing or updating your designers and/or tutors/others (please specify)?
21. Are any of these accredited? If so, what is the qualification?
22. Do you have access to what you consider to be innovative or state-of-the-art programmes for the professional development of designers or tutors? What evidence can you offer that they are, indeed, innovative or special?

Innovative practice

23. What do you understand by the term 'innovative practice' in e-learning development?
24. To what extent would you say that this project is an example of 'innovative practice' in e-learning?

Impact analysis

25. What are the main outputs from the project?
26. What evidence can you offer for the impact of the project in terms of a) its original objectives; b) unforeseen outputs?
27. What about scalability? Can the project be expanded to a wider audience without compromising quality? If NO, give reasons; if YES, what are the main conditions?
28. What about transferability? What evidence or key factors can you provide that the lessons or outputs of the project can be transferred to other audiences, including a trainer/teacher audience? What about transferability across EU Member States?

Overview

29. If there was one piece of advice that you would give to a team about to undertake an e-learning development for trainers/teachers, what would it be?
30. Is there anything else that you would like to tell us?

ANNEX 7

Analysis tool for competences

DESCRIPTION OF THE INNOVATIVE PRACTICE

Name of project/organisation _____

Type of initiative (please circle)

Teachers	Trainers
Public	Private
Corporate	Small/medium enterprises

INTERVIEWEE DESCRIPTION

Name _____

Role _____

Main activity _____

ACTIVITIES and RESOURCES

1. Do the stages of the project's work process match with those of a traditional work process?

2. Which new/different stages were necessary to carry out the project's work process?

3. Which is the main output for each stage of the work process?

4. During the needs analysis stage which kind of assessment methodologies do you make use of?

5. Which kind of assessment tools do you make use of?

6. What mechanisms do you put in place to identify the learners' needs?

7. While carrying out the design stage do you make use of templates?

8. In which way do templates differ from the ones used for traditional design?

9. During the implementation/development stage do you make use of authoring tools?
   - If yes, which authoring tools do you use?

   - If no, which resources do you put in place to develop the programme?

10. During the delivery stage do you make use of a virtual learning environment (or learning management system)

- If you do not use a virtual learning environment (or learning management system) how is the learning/training packaged? Do you use a web site or intranet, please specify.

11. While carrying out the delivery stage do you make use of synchronous communication tools?

12. While carrying out the delivery stage do you make use of non-synchronous communication tools?

13. Which communication tools do you make use of?

14. During the evaluation stage do you make use of a virtual learning environment (or learning management system)?

COMPETENCES

15. Which new/different activities have you faced during the whole work process?

16. Which technical skills have you acquired/developed in order to achieve outputs of the new/different activities?

17. Which conceptual skills have you acquired/developed in order to achieve outputs of the new/different activities?

18. Which human skills have you acquired/developed in order to achieve outputs of the new/different activities?

19. Did you acquire new skills in order to carry out the instructional design activity?

20. Did you acquire new skills in order to monitor and control the learning process?

CONCLUSIONS

21. Which do you think have been the main factors that contributed to the success of the project?

22. Is there anything else that you would like to tell us about the skills/competences involved in this project?

ANNEX 8

Guide to the interviews (innovations)

Pre-interview

National experts should contact the sample organisation/site and send a copy of the Analysis tool in advance. They should also follow this up with a telephone call so that any problems or concerns can be solved before the date of the interview. It is also an opportunity for the national expert to check that the person they are intending to interview is appropriate i.e. that they have access to the information needed by the project.

Conducting the interview

You should check that the interviewee is relaxed and willing to talk. **It is strongly suggested that the interview is tape recorded.** The national expert should take detailed notes during the course of the interview, but these may be later supplemented by reference to the tapes. If tape recording you should ask permission from the interviewee. Table 1 presents some typical 'dos' and 'don'ts' for conducting an interview.

After the interview

A report should be compiled which contains:

(a) the name of the person interviewed, the name of the organisation, and the type of case study (teachers/trainers; public/private; corporate/small medium enterprise);

(b) data, in typed format, for each of the 30 Analysis tool questions, or for as many for which a response was received. Where there is no response, or the question is not relevant to the organisation, this should be marked as N/A (for no answer). The data should contain occasional quotations where these are illuminating or interesting, but the main data should be a ***selected synthesis*** of the conversation, not a verbatim transcript.

The report should be sent to the relevant network leader or leader of associated network for validation. If network leaders find that there are gaps or inconsistencies in the data, then it might be appropriate for the national expert to recontact the respondent, by e-mail or telephone, to gain the necessary data.

Table 1. Checklist of dos and don'ts of interviewing

DO	DON'T
Establish clearly what the interviewee thinks	Do not give an indication to the interviewee of *your* meanings and understandings or appear to judge their responses.
Provide a balance between open and closed questions	Do not ask leading questions or questions to which it is easy for interviewees to simply agree with all you say.
Listen carefully to all responses and follow up points that are not clear	Do not rush on to the next question before *thinking* about the last response.
If necessary, either to gain interviewer thinking time or for the clarity of the audio recording, repeat the response	Do not respond with a modified version of the response, but repeat exactly what was said.
Give the interviewee plenty of time to respond	Do not rush, but do not allow embarrassing silences.
Where interviewees express doubts or hesitate, probe them to share their thinking	Avoid creating the impression that you would prefer some kinds of answers rather than others.
Be sensitive to possible misunderstandings about questions, and if appropriate repeat the question	Do not make any assumptions about the ways in which the interviewee might be thinking.
Be aware that the respondent may make self-contradictory statements	Try not to forget earlier responses in the interview.
Try to establish an informal atmosphere	Do not interrogate the interviewee.
Be prepared to abandon the interview if it is not working	Do not continue if the respondent appears agitated, angry or withdrawn.

ANNEX 9

Guide to the interviews (competences)

The guide's objective is to offer to the interviewer the methodology to utilise the reference documentation in order to assure a satisfying qualitative analysis of the innovative practice.

Interview structure

Activities	Players involved	Modality	Tools	Time
Administration of analysis grid	Interviewer and project manager or trainer or e-learning team	Conversation on the field and filling in or individual filling in	Analysis grid	15-30 mins
Administration of questionnaire	Interviewer and trainer or e-learning team	Interview on the field	Questionnaire	1 hour

Tools description

1. Questionnaire

The questionnaire will be used as an operative tool during the interview. It is divided into four sections:

- description (of the case study and of the interviewee);
- activities and resources (14 questions);
- competences (6 questions);
- conclusions (2 questions).

Each question is to be filled in on the field during the interview and completed with further useful information if the interview is being recorded.

2. Analysis grid

The analysis grid is made up of four sheets that match with the work process stages: needs analysis, instructional design (system and product), development (system and product), delivery, evaluation.

The sheets are to be filled in by the interviewer together with the interviewee or individually by the interviewee, in the following way:

for each line in which activities are specified, the associated role/s in the vertical column/s must be crossed (Sheet 1).

Sheet 1

		ROLES					
STAGE	Needs analysis	Project Manager	System Instructional designer	Product Instructional designer	Learning administrator	Tutor/Coach/ Mentor	Subject matter expert / Writer
ACTIVITIES	• Analysis of organisational enterprise's context	X					
	• Analysis of culture and impact changement		X				
	• Policy analysis and competences management systems	X					
	• Analysis of training plans						
	• Definition of receivers' profile						

Roles are defined in the following way:
Project managers: have responsibility for the project to guarantee costs, human resources, timing and quality performance. They manage resources also as a team and interface with customers to steer the project towards the set objective.

System instructional designers: are in charge of the design of the training system, the definition of platform's functionality or the e-learning environment and of the training offer. They also realise the technological architecture in cooperation with information technology engineers on the basis of different factors (timing, costs, existing equipment, etc.). They take customers towards the choice of the most convenient system according to their needs.

Product instructional designers: are an expert in didactic design and learning processes applied to technological networks, of which they have to know potentiality, limitation and context of application. Their knowledge allows them to make the best use of the different functionality within their teams, particularly with the software developers.

Learning administrators: are responsible for the online learning system, they establish virtual classrooms, are in charge of admissions, input courses, update the training courses catalogue, are the tutors' coordinators and they supervise activities carried out within the learning environment. They also receive reports from tutors and produce management reports on the activity's progress.

Tutors: help the user during the training session and they contribute to monitoring the training path; they can carry out the tutor's activity on training contents or make the learning process smoother and motivate the students. In particular, they enliven the virtual classrooms and debate sessions, keep in touch with the students through e-mail and internal messages, answer questions with the back up of contents experts and also give contents support to the students. Finally, they produce reports on learning results and all items related to their virtual classroom.

Writers: are in charge of authoring of text by structuring content exposure to match learning goals.

Pre-interview

National experts should contact the sample organisation/site and send a copy of the Analysis tool in advance. They should also follow this up with a telephone call so that any problems or concerns can be solved before the date of the interview. It is also an opportunity for the national expert to check that the person they are intending to interview is appropriate i.e. that they have access to the information needed by the project.

Conducting the interview

You should check that the interviewee is relaxed and willing to talk. **It is strongly suggested that the interview is tape recorded**. The national expert should take detailed notes during the course of the interview, but these may be later supplemented by reference to the tapes. If tape recording you should ask permission from the interviewee. Table 1 presents some typical 'dos' and 'don'ts' for conducting an interview.

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Where interviewees express doubts or hesitate, probe them to share their thinking	Avoid creating the impression that you would prefer some kinds of answers rather than others.
Be sensitive to possible misunderstandings about questions, and if appropriate repeat the question	Do not make any assumptions about the ways in which the interviewee might be thinking.
Be aware that the respondent may make self-contradictory statements	Try not to forget earlier responses in the interview.
Try to establish an informal atmosphere	Do not interrogate the interviewee.
Be prepared to abandon the interview if it is not working	Do not continue if the respondent appears agitated, angry or withdrawn.

After the interview

Two reports should be compiled namely:

(a) a *data report* which should contain:

(i) the name of the person interviewed, the name of the organisation, and the type of case study (teachers/trainers; public/private; corporate/small medium enterprise);

(ii) data, in typed format, for each of the 31 Analysis tool questions, or for as many for which a response was received. Where there is no response, or the question is not relevant to the organisation, this should be marked as N/A (for no answer). The data should contain occasional quotations where these are illuminating or interesting, but the main data should be a 'selected synthesis' of the conversation, not a verbatim transcript.

We ask that after the **first** interview, you send a copy of your Data report for that interview immediately to Patrick Borsarini (patrick.borsarini@isvor.it). The transnational consultants will validate the quality of the data and notify you when it is appropriate to complete your remaining interviews.

(b) An overarching *Strategic analysis of selected e-learning cases* report should be compiled, **in English***,* from the data reports for all your case studies.

All data reports should be sent to the relevant network leader or leader of associated network for validation. If network leaders find that there are gaps or inconsistencies in the data, then it might be appropriate for the national expert to recontact the respondent, by e-mail or telephone, to fill the gaps.

Abbreviations

24/7	24 hours a day, 7 days a week
BL	Blended learning
CMC	Computer mediated communication
COL	Collaborative learning
ESF	European Social Fund
ETV	European training village
f2f	face-to-face
HCI	Human-computer interface
HTML	Hypertext markup language
ICT	Information and communication technology
IT	Information technology
KMS	Knowledge management system
LMS	Learning management system
MBA	Master of Business Administration
MLE	Managed learning environments
ODL	Open and distance learning
R&D	Research and development
REAL	Rich environment for active learning
ROI	Return on investment
SMEs	Small and medium-sized enterprises
SSL	Supported self-learning
TNC	Transnational consultant
TT	Tele-teaching
TTnet	Training of Trainers Network
VC	Virtual classroom
VLE	Virtual learning environment
WWW	World Wide Web

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Cedefop (European Centre for the Development of Vocational Training)

E-learning for teachers and trainers

Innovative practices, skills and competences

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New technologies are irreversibly transforming training processes into complex systems. They have a profound impact on the roles of teachers and trainers in the learning process and lead us to reconsider the skills and competences they require.

The current report presents the results of the research work done by Cedefop's Training of trainers network – TTnet – in 2002-03 in analysing examples of innovative practices in the training of teachers and trainers who use e-learning and identifying the range of activities, competences and roles involved in such practices. The study was carried out by a partnership of e-learning practitioners and developers, training experts and university researchers from seven European countries: Belgium, Spain, France, Italy, the Netherlands, Austria and the United Kingdom.

The overarching outcome of the study was to produce findings on innovative practice in e-learning that could be of value to practitioners (such as educationalists, web designers and instructional designers), policy-makers (both nationally and throughout Europe) and researchers.

EN

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