

Edizioni  
MENABÒ  
**DIDATTICA**

*published in*  
*June 2005 by*  
**MENABÒ s.r.l.**  
Via F.P. Cespa 102  
66026 Ortona/Italy  
tel. +39 085.9062001

*managing editor*  
Gaetano Basti

*graphic design & paging*  
MobyDick, Ortona/Italy

*cover illustration*  
Francesca Puddu

ISBN 88-86396-98-8

*Copyright*  
© Menabò edizioni  
June 2005

*All rights reserved.*  
*No part of this*  
*publication may be*  
*reproduced without the*  
*prior permission of the*  
*publisher and authors.*

# **A Common European Framework for Teachers' Professional Profile in ICT for Education**

*edited by* Vittorio Midoro

Edizioni  
MENABÒ  
**DIDATTICA**

# Index

---

<i>About the authors</i>	6
<i>Preface</i>	8
<b>1. Building a Common Framework for The teacher's Professional Profile in ICT for Education</b>	<b>10</b>
Context	10
Laying the foundations of the Framework	11
The teacher's professional profile in ICT for education	13
A cooperative approach to the definition of the CEF	17
The CEF structure	18
<b>2. Teachers' values and attributes within a knowledge society</b>	<b>23</b>
Teachers' personal and professional values: a new challenge	23
The teacher's key attributes	25
<b>3. Pedagogy</b>	<b>27</b>
Teachers' interaction with <b>the self</b>	29
Teachers' interaction with <b>pupils</b>	32
Teachers' interaction with <b>colleagues</b>	37
Teachers' interaction with <b>the external environment</b>	42
<b>4. Curriculum / Subject matter</b>	<b>47</b>
Teachers' interaction with <b>the self</b>	48
Teachers' interaction with <b>pupils</b>	52
Teachers' interaction with <b>colleagues</b>	57
Teachers' interaction with <b>the external environment</b>	61
<b>4.a Curriculum / Subject matter <i>foreign languages</i></b>	<b>65</b>
Teachers' interaction with <b>pupils <i>foreign languages</i></b>	66
<b>5. Organisation</b>	<b>71</b>
Teachers' interaction with <b>the self</b>	73
Teachers' interaction with <b>pupils</b>	76
Teachers' interaction with <b>colleagues</b>	81
Teachers' interaction with <b>the external environment</b>	84

<b>6. Technology</b>	<b>87</b>
Teachers' interaction with <b>the self</b>	88
Teachers' interaction with <b>pupils</b>	90
Teachers' interaction with <b>colleagues</b>	93
Teachers' interaction with <b>the external environment</b>	95
<b>7. Professional development</b>	<b>97</b>
Teachers' interaction with <b>the self</b>	98
Teachers' interaction with <b>pupils</b>	100
Teachers' interaction with <b>colleagues</b>	102
Teachers' interaction with <b>the external environment</b>	104
<b>8. Ethics</b>	<b>107</b>
Teachers' interaction with <b>the self</b>	109
Teachers' interaction with <b>pupils</b>	112
Teachers' interaction with <b>colleagues</b>	116
Teachers' interaction with <b>the external environment</b>	120
<b>9. Policy</b>	<b>125</b>
Teachers' interaction with <b>the self</b>	127
Teachers' interaction with <b>pupils</b>	130
Teachers' interaction with <b>colleagues</b>	133
Teachers' interaction with <b>the external environment</b>	136
<b>10. Innovation</b>	<b>139</b>
Teachers' interaction with <b>the self</b>	141
Teachers' interaction with <b>pupils</b>	144
Teachers' interaction with <b>colleagues</b>	147
Teachers' interaction with <b>the external environment</b>	150
<i>Glossary of terms and abbreviations</i>	155

# About the authors

**Monica Banzato** is an academic researcher based at University Ca' Foscari, Venice. She is responsible of the e-learning system of SSIS Veneto (higher school for teacher education). Her present research activity pertains to models and processes for teachers' professional development in ICT for education, e-learning systems and cooperative learning.

**Stefania Bocconi** is a research fellow at the Institute of Educational Technology (ITD) of the Italian National Research Council (CNR). Her research interests pertain to the use of ICT in education and in teacher training; lifelong learning systems and strategies for school innovation; online education; cooperative learning; tutoring online; online communities.

**Jeffrey Earp** is a consultant at the Italian Research Council's Institute for Educational Technology, where his activities have centred on language teaching/support and on the application of ICT within language education. He has tutored in numerous pre-service and in-service teacher training initiatives at regional, national and European levels. He is responsible for foreign languages at the Educational Software Library and related online support service called Essediquadro, both run by the Institute in conjunction with Italy's Ministry of Education.

**Conor Galvin** is an academic researcher based at University College Dublin, Ireland. He has extensive experience in education policy; education ICT; school based curriculum action; continuity & change in education; and teachers' knowledge. His research interests include understanding how Information and Communication Technologies (ICT) can support research activity and in relation to teachers'/student teachers' professional preparation and development.

**Ulla Gjørting** is a chief consultant in UNI•C, the Danish IT Centre for Education and Research. She is responsible for a series of pedagogical ICT Licences – a concept of teachers' professional development in the pedagogical application of ICT in teaching and learning. She is also involved in a number of European collaboration activities, among which the international uptake of the Pedagogical ICT Licences in the eContent project EPICIT.

**Carl Holmberg**, Swedish Agency for Flexible Learning, has many years of experience of research and development work in distance education and flexible learning. Currently he is Senior adviser in the Swedish Agency for Flexible Learning (CFL). CFL is a change agent in education systems in Sweden. He is also Chair of European Experts' Network for Education and Technology (EENet) and a Member of the Executive Committee of the European Distance and ELearning Network (EDEN).

**Pieter Hogenbirk**, Dutch Inspectorate of Education, has been project manager of more than 100 projects on ICT in education. In 1997 he became process manager for integrating ICT in primary, secondary and tertiary education on behalf of the Dutch government. From 2000 on he is working as an educational inspector, with special duties in the field of ICT in education. He is vice-chair of the IFIP-Working Group on secondary education and involved in a number of Dutch, European and UNESCO ICT projects.

**Jouni Kangasniemi**, is senior adviser of the Finnish Ministry of Education.

He is the chairman of a working group preparing the national guidelines for in-service training of teachers. He has also been involved in the development of the Finnish Programme for Education, Training and Research in the Information Society. Currently he is one of the secretaries for the executive group for the programme.

**Andrea Kárpáti**, Eötvös University, is an educational researcher at Eötvös Loránd University, Faculty of Sciences and UNESCO Chair for ICT in Education. She is Chief Editor for a series of textbooks entitled “Teaching with ICT” and has been the Hungarian senior investigator of several EU and OECD projects on ICT competencies and educational programmes aimed at creating equity through ICT.

**Allan Martin**, is Director of the IT Education Unit, University of Glasgow. His main research interests: ICT and digital literacy. Led the Citscapes project (2000-2), on student ICT Literacy, is Glasgow investigator for the ULEARN (2001-3) and uTeacher (2003-5) projects, and leads the DigEuLit project (2005-6), funded from the EC eLearning initiative, focused on developing a European digital literacy framework. Editor of the peer-reviewed online Journal of eLiteracy (JeLit) ([www.jelit.org](http://www.jelit.org)), founder of the eLit conference series ([www.elit-conf.org](http://www.elit-conf.org)).

**Vittorio Midoro**, senior research fellow at the Institute of Educational Technology of the Italian National Research Council (ITD-CNR), is the project manager of uTeacher project. His present research activity pertains to online education, cooperative learning and e-learning for lifelong elearning.

**Manuela Repetto** is a research fellow at the Institute of Educational technology of the Italian National Research Council (ITD-CNR). Her present research interests concern teacher training in ICT for education, cooperative learning and the design of virtual learning environments.

**Edwin Stiller** is responsible for the section “Initial teacher training (First and second phase)” in the “State Institute for School”, Soest, NorthRhine-Westphalia. Editor and author of school books and teaching publications in the social and educational sciences.

## **Others contributors**

### **UTEACHER PARTNERS**

Umberto Margiotta - *SSIS Veneto, University of Venice, Italy*

Domenico Corcione - *SSIS Veneto, University of Venice, Italy*

John Dixon - *The University of Glasgow, UK*

### **NATIONAL INVESTIGATORS (reviewers' board)**

AUSTRIA - *Hubert Egger, PIB - bmbwk*

BELGIUM - *Armand Greefs, Karel de Grote Hogeschool*

PORTUGAL - *Cristina Novo, Escola Superior de Educação de Santarém*

### **EXTERNAL EVALUATOR**

Claire Belisle - *CNRS, France*

# Preface

At the beginning of 2000, the European Commission launched the eLearning Initiative and Action Plan to foster the adaptation of the European Union's education and training systems to the knowledge society through the effective and relevant use of Information and Communication Technologies and the Internet for learning.

The eLearning Initiative and Action Plan provide the basis for a wide debate at European level and encourage increased coordination of related actions within and between Member States.

This book is an outcome of the uTeacher project, carried out in the context of the eLearning Initiative during the period December 2003-June 2005. uTeacher aims to understand and define the professional profile of a teacher who is faced with the issues that the knowledge society and ICT pose to schools. This profile is captured in a "Common European Framework for Teachers' Professional Profile in ICT for Education" (CEF) which is the subject of this book. The CEF can be seen as a means for the exchange and transfer of experience in Initial Teacher Education (ITE) and Continuing Professional Development (CPD) across Europe. The CEF also provides an opportunity for educational administrators, course designers, teachers, examining bodies, etc. to reflect on their current practice, with a view to situating and coordinating their efforts and to ensuring that they meet the real needs of school in the knowledge society.

This is the second of two books produced by uTeacher. The first, entitled *European Teachers Towards the Knowledge Society*, is strictly linked to this one, as it examines teachers' professional profile pertaining to ICT for education that various European countries have assumed as a basis for benchmarking their ITE and CPD and their accreditation.

It should be stressed that a clear understanding of the actual professional profile currently assumed as a basis for ITE and CPD across Europe was a prerequisite for defining the Common European Framework. This understanding could only have been achieved through a participative process involving field experts from all European countries. Accordingly, this book not only describes the CEF itself but also the cooperative process that was set in motion to produce it.

The book is the result of a cooperative effort carried out by the project partnership working in tandem with the network of European experts, called National Investigators (NI), that was established in uTeacher. Some of NIs have written sections of this book, drawing on guidelines provided by the partnership, while others have acted as reviewers.

The book is divided into ten chapters. The first describes the conditions that have made it imperative to develop a Common European Framework on Teachers' Professional Profile in ICT for Education, as well as the basic aspects related to the CEF (concept, definition, structure and users) and the development process adopted. The second chapter provides a description of the teacher's values and attributes underpinning the eight sectors of the CEF. The subsequent chapters (three to ten) provide a detailed examination of the 32 areas included in the CEF structure.

### **Acknowledgements**

We are deeply grateful to the whole community involved in the production of this book. In particular we wish to acknowledge the efforts of the national investigators, some of whom have written parts of the book while others have acted as reviewers. We also wish to thank the uTeacher partnership staff, and the partners coordinators Umberto Margiotta and Allan Martin, for their enthusiastic participation in the book's production. Thanks are also due to the international uTeacher evaluator, Claire Belisle, for her stimulating comments as well as to the ITD staff members, who played a crucial role in writing the Guidelines for the NIs and in editing this book. Finally we wish to express our gratitude to Jeff Earp, for his important work of supervising all the language aspects.

---

# 1. Building a Common European Framework for Teacher's Professional Profile in ICT for Education

authors Vittorio Midoro, Allan Martin

## CONTEXT

«Improving education and training for teachers and trainers» is the first of thirteen objectives in education and training systems set out for Europe by the European Commission<sup>1</sup>. The Common European Framework for Teacher's Professional Profile in ICT for Education (hereafter called CEF) contributes towards the achievement of this objective by offering a shared basis for the definition of content domains, syllabuses and curricula in the field of ICT for education, both in initial teacher education (ITE) and in teachers' continuing professional development (CPD).

Raising the quality of educational and training systems in Europe is an important objective of the Lisbon strategy, based on the acknowledgment that:

*The fast development of Information and Communication Technology (ICT) has brought about deep changes in our way of working and living, as the widespread diffusion of ICT is accompanied by organisational, commercial, social and legal innovations.*

*Our society is now defined as the "Information Society", a society in which low-cost information and ICT are in general use, or as the "Knowledge(-based) Society", to stress the fact that the most valuable asset is investment in intangible, human and social capital and that the key factors are knowledge and creativity.*

*This new society presents great opportunities: it can mean new employment possibilities, more fulfilling jobs, new tools for education and training, easier access to public services, increased inclusion of disadvantaged people or regions.<sup>2</sup>*

1

Commission of the European Communities (2001), *The Concrete Future Objectives of Education and Training Systems*, com(2001) 59, final report from the commission, Brussels  
[http://europa.eu.int/comm/education/policies/2010/doc/concrete-future-objectives\\_en.pdf](http://europa.eu.int/comm/education/policies/2010/doc/concrete-future-objectives_en.pdf)

2

Presidency Conclusions of Lisbon European Council, 23 and 24 march 2000  
[http://www.europarl.eu.int/su-mmits/lis1\\_en.htm](http://www.europarl.eu.int/su-mmits/lis1_en.htm)

At the Lisbon European Council (23-24 March 2000), Heads of State and Government set the strategic goal for Europe to become the most competitive and dynamic knowledge-based economy in the world by 2010. To this purpose, «Europe's education and training systems need to adapt both to the demands of the knowledge society and to the need for an improved level and quality of employment»<sup>3</sup>. In 2002, the *Education & Training 2010*<sup>4</sup> programme was approved, with the ambitious aim of making European education and training «a worldwide quality reference by 2010».

The attainment of this objective requires a “mega-change” in European educational and training systems, involving a shift from teacher-centred to learner-centred instruction. Shifting the emphasis from teaching to learning is a complex process involving many variables: general aims, curriculum areas, teachers, physical structures, organisations, resources, ICT, and so on. All these variables are strictly linked and a change in one will affect all the others. In a number of countries, national policies regarding ICT in education have failed to produce the expected results, often because they have focused on only one aspect (e.g. providing computers and internet access to schools, teacher training, learning material production etc.) without regard for the impact of the various initiatives on the complex of variables. However, having acknowledged the systemic nature of school innovation, we need to recognise that the variables affecting that innovation constitute specific domains that are to be investigated in depth if we are understanding how to face the problems posed by the new educational needs.

This book deals with the question of school innovation from the point of view of the group of individuals who are central to the process: teachers. The work presented has been developed in the context of uTeacher, a project within the European Commission's e-Learning Initiative, and can be placed in the mainstream of the strategy described in the *Education & Training 2010* programme. More precisely, it aims to describe the teacher's professional profile in ICT for education within a changing education system, one which faces issues and challenges posed by the “knowledge society”. This description is called “The Common European Framework for Teachers' Professional Profile in ICT for Education”.

### LAYING THE FOUNDATIONS OF THE FRAMEWORK

In seeking the broad parameters of a framework which could have pan-European applicability, it was important first to see what could be learnt from existing frameworks. The survey of practice in the European states showed several instances of national prescriptions for developmental activity in ICT for teachers.<sup>5</sup> Although there is a certain amount of variability, it seems that most of these operated on an implicit basis of an Aristotelian method of categorising what is visible in the world. Following

**3**

See note 1.

**4**

[http://europa.eu.int/comm/education/policies/2010/et\\_2010\\_en.html](http://europa.eu.int/comm/education/policies/2010/et_2010_en.html)

**5**

Midoro V. (ed.) (2004), *European Teachers Towards the Knowledge Society*, Menabò, Ortona.

this methodology, the constructors of these frameworks took existing practice as the guide to shaping the structure and content of the framework. This process has often resulted in the creation of an implied deficit model, highlighting problems of teachers' knowledge and competence, or of the educational system. A framework is then proposed which is intended to bring teachers up to certain minima, often specified in great detail, in order to fill perceived gaps in their knowledge or address perceived problems of the educational system.

However, we know that in practice successful innovative (or pioneer) teachers are not those who replicate or imitate what is already happening elsewhere, but those who can articulate a vision, both of the nature of learning and of the learning classroom. In uTeacher it was therefore necessary to move away from the Aristotelian paradigm towards a method which would permit us to develop a more future-oriented and dynamic framework.

We set out then to capture the vision which articulates the social action of the innovative teacher, and in particular, the ICT-using pioneer teacher. We already had a model of the formation of the pioneer teacher through the work of the ULEARN project<sup>6</sup>, which moved us away from the deficit model and helped us to focus on authentically-rooted ideals rather than the detail of current practices. However, we rejected forms of idealism such as that of Plato, which suggests that the perfect form of education exists in an area of the spirit but remains only partially visible; or that of Hegel, which imagines the coming to fruition of an immanent Idea of a perfectible education; or that of Marx, which would subordinate educational action to the mechanics of a presumed engine of social change. We have preferred to adopt Max Weber's notion of the *ideal type* as an attempt to capture the intentionality of social action<sup>7</sup>. According to Weber,

*this mental picture brings together in a non-contradictory cosmos of thought-out relations specific historical relations and events. In its content, this mental picture has utopian characteristics, obtained by exaggerating mentally specific elements of reality* [Weber (1951), p. 190 quoted in Freund (1978), p. 172]<sup>8</sup>.

Adoption of this concept allows us to focus on a future orientation without losing the authentic basis of teacher innovation, and to hold to a vision, rooted in actuality, of the teacher as driver of and participant in change in learning processes and ultimately in structures of education.

The holistic nature of the outlook and formation of the pioneer teacher are hinted at by two concepts from the south and the north of Europe respectively. The French concept of *visée* underlines the importance of the inspirational image of what can be achieved and its location in a view of the world. The German concept of *Bildung* on the other hand underlines the importance of the formation of the teacher over a long period and by many influences, and of the role of the teacher as a conscious participant in the process of formation.

6

Martin A. (2003), The ICT Pioneer Teacher: Towards a European Curriculum, in Midoro V. & Admiraal W. (eds.), *Pioneer Teachers: a Key Factor in European School Innovation*, Menabò, Ortona, pp. 17-27.

7

Weber M. (1951), *Gesam-melte Aufsätze zur Wissen-schaftslehre*, Tübingen, 2<sup>nd</sup> edition.

8

Freund J. (1978), German Sociology in the Time of Max Weber, in Bottomore T. & Nisbet R. (eds.) (1978), *A History of Sociological Analysis*, Heineman, London, pp.149-186.

The vision we hoped to express is a European one. We are not convinced by the claims that there is now a global culture determined by technology and business, and by the superficial symptoms of “global culture” such as logos of big companies and wide availability of satellite TV. It is necessary to recognise that there are still major cultural differences between different parts of the world, differences engineered and shaped by natural forces and the actions of countless individuals, some more, some less, but all to some degree able to give their world its character. A tee-shirt with a logo does not efface five thousand years of human history. Even to aspire to a framework acceptable for Europe is hard enough without wishing to create one for the whole world. There are even differences between Europe and its closest comparator, the USA. The German philosopher Jurgen Habermas in a recent statement (in the *Frankfurter Allgemeine Zeitung*, 31 May 2003, reported in Garton Ash, 2004, pp. 55-56)<sup>9</sup> suggested six areas in which Europe differs from the US:

- I. the separation of religion from politics;
- II. the belief that the state should remedy the failures of the market;
- III. a political party system which encompasses and involves elements of the left, centre and right (or conservatism, liberalism and socialism);
- IV. the emphasis on solidarity and social justice and the obligation to mitigate inequalities;
- V. a moral sensibility, learned through reflection on the horrors perpetrated by Europeans between 1914 and 1945; and
- VI. an acceptance that the way towards peace and prosperity lies in the mutual limitation of the sovereignty of states.

It is not to be assumed that a European framework is necessarily applicable in the US or vice versa. Thus, while we examined US frameworks and took them into account in making our proposals, we did not assume that the success claimed for them would necessitate their adoption in the European context.

We are not therefore suggesting that we have developed “one framework to rule them all”. The CEF is intended to have a functionality at the European level, at the level of harmonisation of national actions, and to offer parameters within which differences between national and regional policies, emphases and cultures may be expressed. The notion of an oppressive standardisation, achieving a uniform practice at the expense of freedom of expression and celebration of variety and creativity, which is sadly present in some corners of the European past, is not part of our conception. We prefer to focus on positive enablement and facilitation.

### **THE TEACHER’S PROFESSIONAL PROFILE IN ICT FOR EDUCATION**

The concept of the teacher’s professional profile is related to a complex system of values, attributes, knowledge, understanding,

9

---

Garton Ash T. (2004), *Free World*, Allen Lane, London.

abilities and skills forming a teacher's identity. This identity is the key to functioning effectively in a school system that is facing the challenges and problems posed by the knowledge society. This school is no longer based on the familiar transmissive model, but still has not taken on board new learning paradigms. Since there is an enormous degree of variation throughout Europe, both at national and regional levels, such a school serves as a useful abstraction that provides a context for the definition of teachers' professional profiles. The teacher's professional profile aims to capture the identity of a teacher capable of functioning successfully in this changing school: the CEF focuses on a specific area of that profile, namely, those aspects that are in some way related to ICT and its adoption for education within the knowledge society.

The CEF was conceived, originally, in the form of a matrix. The columns of the matrix represent the areas of social action of the teacher, that is the dimensions of action in which the teacher participates, and defines him/herself and the vision of educational praxis. The rows of the matrix represent the various contexts of the vision and action of the innovative teacher, the spheres of activity within which the teacher orients him/herself and constructs patterns of relationship with the various actors within the educational field. The structure and the content of the framework are described in detail in the paragraph *The CEF structure*.

### **Using the CEF**

The overview on ITE and CPD related to ICT for Education that resulted from the first phase of the uTeacher Project revealed a very complex picture, but one which goes some way toward answering crucial questions related to teachers' professional development across Europe.

Since the content domain dealt with in ITE and CPD is a key factor affecting the professionalism of the teaching community, one of the most important issues was to understand who defines the contents related to ICT for education. This overview underlined that, in many cases, this task was performed in ITE by individual university professors. As a result, neophyte teachers setting out on their careers possess very different professional profiles in ICT, depending on the individual attitudes and approaches adopted by their university professors: this multiplicity of profiles can be seen both at national and at European levels.

The situation regarding continuing professional development is even more complex, as there is great heterogeneity: in some cases the ECDL is the principal reference point for in-service teachers' professionalism in ICT for education (e.g. in major CPD initiatives conducted in Italy and Greece), while in others national pedagogical "driver's licences" are adopted (e.g. Denmark, the Netherlands). Some countries set national standards (e.g. Scotland, France), while others leave this task to the responsible CPD bodies (e.g. Belgium, Germany and Sweden).

What emerges from the European picture derived from the uTeacher survey is that there is no common pattern related to the prescription of required teachers' competencies in ICT for Education, either regarding ITE or CPD. If we are to achieve the aim of making European educational and training "a worldwide quality reference by 2010"<sup>10</sup>, ITE and CPD processes ought to have clear reference points that can foster greater common understanding of the various needs being (and to be) addressed in the different regional, national and pan-European contexts; it is only in this way that common efforts can be undertaken and co-ordinated successfully to meet those needs. The CEF, cooperatively developed by experts from the different European countries, aims to provide exactly those reference points.

Using this tool, bodies and institutions responsible for ITE and CPD can define harmonised syllabuses. Institutions that already have their own syllabus can map it onto the common framework, thus fostering common understanding and the sharing of approaches, and helping to avoid "reinventing of the wheel", i.e. unnecessary replication of efforts. Course designers, university teachers, examining bodies can all use this framework to reflect on their current practice, with a view to situating and coordinating their efforts and ensuring that they meet the real needs of school in a knowledge society. The CEF allows the development of mutual trust between the stakeholders in national ITE and CPD systems, and encourages cooperation between these systems: education and in-service training providers, teachers, trainers and learners, within and beyond national frontiers.

The CEF is also a tool for teachers who want to take personal initiative in developing their own professionalism in ICT for education by creating and following individual learning pathways, which is the legitimate business and ambition of the ICT pioneer teacher. It helps those teachers understand the skills and knowledge they possess and/or lack, and assists them to find suitable materials to develop aspects of their professionalism in ICT for education.

An increasing proportion of teachers in the EU is aged over 50, which implies that within the period 2005-2015 more than one million teachers in Europe will need to be replaced<sup>11</sup>. Consequently ITE is gaining ever greater importance throughout Europe. High quality ITE (along with CPD) is necessary to equip teachers' communities with suitable professionalism for their role in the knowledge society over the coming decades.

In Europe, initial teacher education is largely the responsibility of the universities and other higher education institutions. The basic approach of the CEF is located in the mainstream of the Bologna Declaration process, as it aims at promoting the necessary European dimension in ITE for ICT in education, particularly with regard to curricular development, inter-institutional co-operation, mobility schemes and integrated programmes of study, training and research.

---

**10**

Presidency Conclusions of Lisbon European Council, 23 and 24 March 2000  
[http://www.europarl.eu.int/su/mmits/lis1\\_en.htm](http://www.europarl.eu.int/su/mmits/lis1_en.htm)

---

**11**

Commission of the European Communities (2005), *Progress Towards The Lisbon Objectives In Education and Training*, SEC (2005) 419, Commission Staff Working Paper, Brussels.

The Bologna process originates from the recognition that in spite of their wealth of diversity, European higher education systems are facing common internal and external challenges related to the growth and diversification of higher education itself, the employability of graduates, the shortage of skills in key areas, the expansion of private and transnational education, etc. So the Bologna process aims at creating convergence. In its realm of action, the CEF aims to harmonise the content domain and also to foster the sharing of common visions on issues and solutions. This process is not a path towards “standardisation” or “homogenisation” of European ITE or CPD, as the principle of autonomy and diversity is fully respected.

The action programme of the Bologna Declaration is based on a clearly defined common goal, a deadline and a set of specified objectives. Three of these objectives are of great interest for the CEF:

- the adoption of ECTS-compatible credit systems also covering lifelong learning activities;
- the achievement of a European dimension in quality assurance, with comparable criteria and methods;
- the elimination of remaining obstacles to the free mobility of students (including trainees and graduates) and teachers.

At present, individual universities as well as higher education consortia, networks and associations are studying and discussing the implications of the Bologna process in their particular country, subject area, or type of institution. The CEF could enter this discussion, providing a possible basis for harmonising ITE and CPD as far as ICT for education is concerned. ITE and CPD learning processes and systems based on contents derived from the CEF should meet some of the Bologna requirements. In the following some of these requirements are listed.

#### *Isomorphism between contents and methods*

As stated, the CEF supports a change of focus from teaching to learning. ITE and CPD processes and systems should be based on learning and on learners’ activities. In these processes the learner is the constructor of his/her own knowledge. S/he interacts with an environment which facilitates cooperation with peers and access to knowledge resources. In these processes the role of a teacher/lecturer/tutor is that of a facilitator of the interactions between the learner and the learning environment. This learning environment should be perceived as relevant by the learner, who ought to be encouraged to reflect on her/his activities and learning, in such a way that s/he is able to appreciate the progress being made along the learning path.

#### *Creation of learning communities*

The CEF supports the creation of teachers’ communities of practice as an important locus for informal learning. ITE and CPD based on the CEF should encourage the creation of

learning communities able to evolve into communities of practice. One significant aspect of a teacher's activity in a community of learning is systematic reflection on his/her own practice, conducted with peers.

#### *Use of ICT*

As the CEF deals with ICT in education, a natural consequence is that ITE and CPD systems based on it should allow those involved to experience the full impact of ICT both in learning processes and for inducing tacit knowledge in the ways ICT enhances learning.

#### *Use of the acquired knowledge in the practice*

As the CEF deals with the empowerment of teachers' professionalism in ICT for education, it is important that skills learnt in training be immediately applied in real situations related to teaching practice.

All these requirements can be fulfilled by e-learning systems designed according to the more advanced results of research in educational technology.

### **A COOPERATIVE APPROACH TO THE DEFINITION OF THE CEF**

In order for the framework to be accepted by users of different kinds throughout Europe, it was important that it be the result of a participatory process involving all European countries. Before that process could be set in motion, it was necessary to have a clear view of the current teacher profiles in ICT for Education underpinning ITE and CPD initiatives across Europe. Accordingly, a series of coordinated activities were launched so as to gain this picture in each of the nineteen European countries involved in the uTeacher project and to provide the opportunity for Europe-wide dialogue and comparison. These activities were the objective of the first phase of uTeacher, which saw the production of a book, *European Teachers Towards the Knowledge Society*<sup>12</sup>, written by the uTeacher partnership in close collaboration with the nineteen experts from each of the European countries involved (in the context of uTeacher these experts are called "National Investigators" or NIs for short).

As well as the publication of the book, with in-depth national reports and papers reflecting trans-national perspectives and issues, phase one of uTeacher also saw the formation of the European investigators' network, the foundations of which were laid during a week-long seminar in Venice, Italy. It is through the cooperative efforts of the NIs, in conjunction with the partnership, that the basis was laid for the on-going task of providing the framework contents.

The phases of this process were as follows:

---

#### **12**

Midoro V. (ed.) (2004),  
*European Teachers Towards  
the Knowledge Society*,  
Menabò, Ortona.

- *Identifying national information sources*  
The partnership identified an authoritative national source in each European country (representative from the Ministry of Education or national body responsible for teacher education, academic expert, etc.) who helped the partnership appoint a suitable NI.
- *Contacting the National Investigators*  
In accordance with the suggestions of the national sources, the partnership contacted and appointed the NIs
- *Supporting NI activities*  
Guidelines for producing national reports were sent to the NIs. Each national report deals with ITE and CPD related to ICT for Education in the given country.
- *Writing national reports*  
NIs produced national reports and sent them to the partnership.
- *Writing a preparatory document for the week-long seminar*  
The partnership identified key aspects that emerged from the national reports and drafted a preliminary document called *Teachers' Competencies in ICT for Education within a Knowledge Society* to serve as a guide for discussion and comparison at the week-long seminar.
- *Week-long seminar (Venice, 4th-9th October 2004)*  
The NIs came together to share and explore national viewpoints and experiences, and to identify key aspects and issues at trans-national level. At the seminar, two main activities were performed:
  - a) defining the structure of the framework and the way it is to be populated; and b) outlining the book, *European Teachers Towards the Knowledge Society*.
- *Editing and publication of the book "European Teachers Towards the Knowledge Society"*
- *Forming the board of writers responsible for populating the framework structure and the board of reviewers responsible for sending feedback to the writers*
- *Producing the guidelines for writers and reviewers*
- *Exploratory population of selected sections of the framework*
- *Meeting in Palermo (8<sup>th</sup>-11<sup>th</sup> March 2005) to co-ordinate the writing and reviewing procedures*
- *Populating the framework structure*
- *Producing the framework described in this book and in the associated hypermedia (<http://www.univirtual.it/uteacher/>)*

### **THE CEF STRUCTURE**

Table 1 shows the structure of the framework in its original form as a matrix, indicating the main realms of practice of a teacher working within a school that is readying itself to play an appropriate role in preparing children for the knowledge society. The common factor underpinning all of these areas is the teacher's orientation towards adoption of ICT as a vehicle for innovation in the

<b>INTERACTION WITH SECTORS</b>	<b>SELF</b> <i>Continuous personal construction of professional identity</i>	<b>PUPILS</b> <i>Facilitation of students' learning and development</i>	<b>COLLEAGUES</b> <i>Cooperation at school level and within teacher' community of practice</i>	<b>ENVIRONMENT</b> <i>Interaction with the external environment</i>
<b>PEDAGOGY</b>	Becoming aware of the constant impact of ICT on learning, school and society, and constructing a personal vision/philosophy of learning and pedagogy suitable for a knowledge society.	Developing and managing learning environments consonant both with one's personal vision of learning/pedagogy and with the demands and challenges of the knowledge society.	Sharing practice, repertoire, and learning/pedagogy visions. Collaborating in interdisciplinary educational activities.	Considering and using the local and global environment as a resource and as an arena for school and learning.
<b>CURRICULUM/ SUBJECT MATTER</b>	Given the rapid growth in knowledge, reflecting on the key areas and topics to address within the subject area; understanding the impact of ICT on the didactics of the discipline.	Designing and managing learning environments which take into account the opportunities and limits of ICT in the didactics of a given subject area.	Sharing practice, repertoire, and "know how" in uses of ICT in the subject area, both with colleagues and inside the teaching community.	Using local and global resources to foster learning in a given subject area.
<b>ORGANISATION</b>	Constructing a personal vision of school organisation that responds to the demands and challenges of the knowledge society.	Within the limits of context constrains, implementing an organisation of the school/classroom that responds to the demands and challenges of the knowledge society.	Sharing practice, repertoire, and organisational visions and cooperating with colleagues on classroom and school organisation.	Contributing to build a school organisation linked to the local and global environment.
<b>TECHNOLOGY</b>	Constantly pursuing technical and cognitive proficiency.	Getting the right ICT blend to facilitate students' learning.	Using technology to interact with colleagues and participate in teachers' communities of practice.	Using technology to create learning networks, bringing added value to school and society (locally and globally).
<b>PROFESSIONAL DEVELOPMENT</b>	Becoming aware of the increasing need for continuous professional development and the means to achieve it.	Planning and taking actions to develop one's professionalism regarding the education and welfare of students.	Learning to exploit ICT to cooperate with colleagues and the teaching community.	Identifying and exploiting the opportunities offered by the local and global environment to develop one's professionalism.
<b>ETHICS</b>	Making one's prime responsibility the education and welfare of all the students in one's care and accepting ICT as important for creating a knowledge society.	Gearing one's practice to the principle that the education and welfare of all the students in one's care is one's prime responsibility.	Playing a positive and active role in cooperating with colleagues and interacting inside teachers' communities of practice using ICT tools and resources in an appropriate way.	Recognising responsibility to prepare citizens able to live in harmony with the social and physical environment
<b>POLICY</b>	Critically reflecting on ICT policies and strategies pertaining to the school-ICT-knowledge society relationship and constructing one's personal vision.	Given context constrains and policy/strategy requirements, implementing actions that respond to the demands and challenges of the ICT policies of school and environment.	Critically reflecting with colleagues on policies and strategies pertaining to the impact of ICT on the school system and cooperating to implement and evaluate them.	Given the limits of one's action, contributing to the development of policies and strategies related to the construction of a school strictly linked to the environment.
<b>INNOVATION</b>	Critically engage with the need for ICT-led innovation and the transformative power of positive change.	Shaping and re-shaping ICT-led change in terms of the learning & teaching we provide.	Working with colleagues to introduce and develop innovative uses of ICT in schools and teachers' wider practice communities.	Contributing to building a culture of informed education change beyond the school; at regional, national and supra-national level.

**Table 1.** The structure of the Common European Framework for Teachers' Professional Profile in ICT for Education, in the matrix form.

classroom, and thus his/her propensity to act as an enabler of educational transformation. The underlying assumption is that in his/her practice, the teacher interacts with different classes of individuals (pupils, colleagues and entities in the external environment – be they individuals or bodies) as well as engaging in self-reflective activity. This interaction takes place within different, but interdependent, domains: pedagogy, curriculum/subject matter, professional development, organisation, policies, ethics, innovation, and the technological aspects.

In this model we proposed two axes along which teachers' action is situated. One is related to the contexts of social relationships and is oriented to the individuals and bodies involved in the interaction, while the other is related to the specific domains of educational action. Each of the cells in the resulting grid contains a brief and (necessarily) highly abstract description of specific teacher practice related to the specific context of relationships and the given domain of educational action.

However, we found that the conception of the CEF as a matrix was semiologically unsatisfactory. The form of the matrix could not convey the dynamics of the practice of the innovative teacher, and seemed to suggest a synchrony, frozen for a moment without emergence out of a past or the sense of movement forward. Nor could the matrix form capture the simultaneous processes of reflection and practice, of introspection and of communication, of parallel existence and action in the internal and external worlds. The teacher is oriented, simultaneously, towards the self, the classroom, the school and the world, having at base a concept of him/herself situated in the social fabric, and developing relationships and collaborations with fellow teachers, with pupils, with school personnel, with parents, and with other relevant actors in the worlds outside the school. All of these relationships, even with the self, create tension which stimulates change.

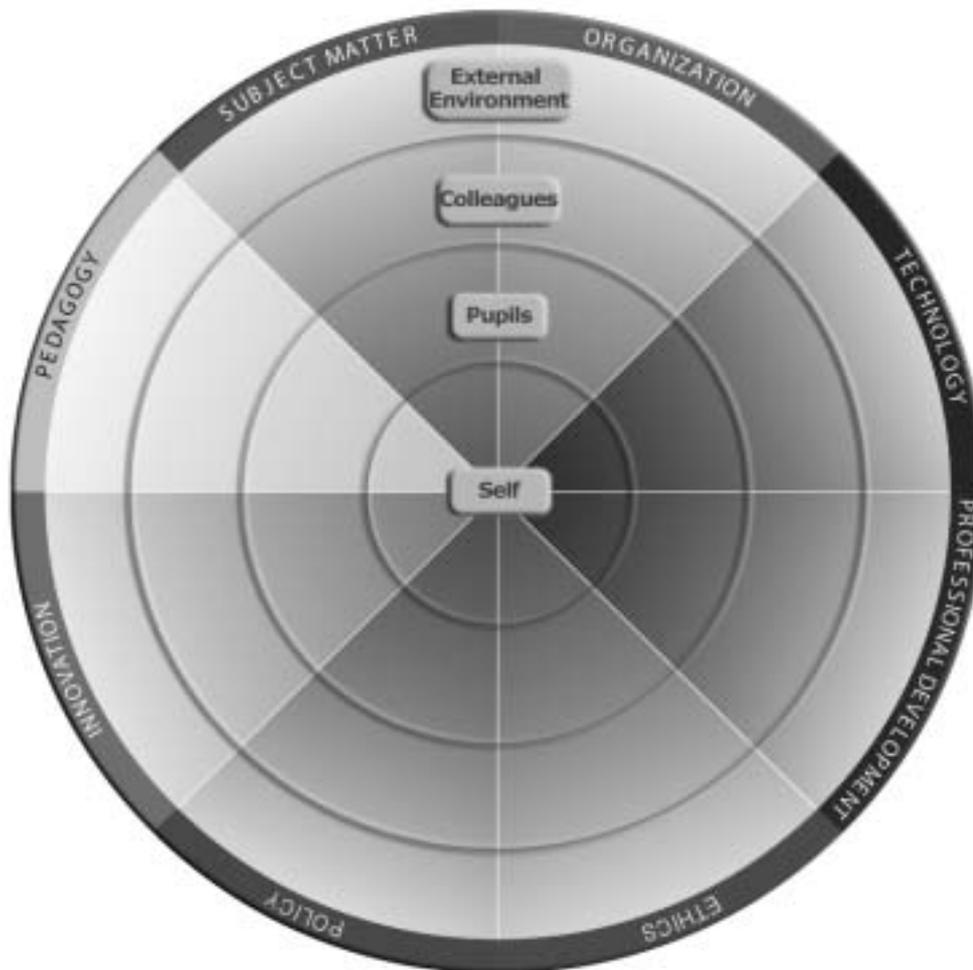
We therefore decided to transform the framework structure from a matrix to an iris. Thus the columns of the matrix, representing the areas of educational action that the teacher operates in, have become the sectors of the iris, whilst the rows of the matrix, representing the various social contexts of the innovative teacher, have become the concentric bands within the iris. The form of the iris was chosen to emphasise the layers of social orientation and action extending outwards from the individual and also extending inwards from the broadest environment. In this way we hope to have captured the never-ending tension between the shaping influence of social forces upon the individual, and the creative contribution of the individual to the ongoing re-creation of the social order. The arena in which this tension is played out is constituted by the institutions of society, including the educational system. In this perspective the innovating teacher operates within cultural parameters but can make a transformative input to the structure and functioning of the social order. The iris is shown in Figure 1.

The individual matrix cells are still identifiable within the iris. The brief abstract contained within each cell becomes a gateway to an analytical content addressing a number of different elements:

- *the context of the actions related to the practice*, describing the external conditions determining the needs for these actions;
- *the actions related to this practice*, describing some of the most relevant actions to be taken in order to face the emerging needs described in the context;
- *the knowledge areas related to the activities involved*, describing both the knowledge and the skills needed to perform the above actions;
- *references*, which deepen the domain dealt with;
- *issues and case studies*, illustrating some of relevant issues related to the cell and providing examples of good practices adopted to face those issues<sup>13</sup>.

13

Issues and case studies are described in the CEF Hypermedia.  
<http://www.univirtual.it/uteacher/>



**Figure 1.** The structure of the Common European Framework for Teachers' Professional Profile in ICT for Education, in the iris form.

The detailed description contained within each iris cell mainly focuses on the cognitive aspects of the teacher's professionalism in ICT for Education. The important affective component is considered within the description of the teacher's values and attributes (see chapter 2.). As these are shared by the eight sectors of the CEF, their description precedes that of the sectors. The task of writing and reviewing the sector contents was carried out by uTeacher National Investigators and members of the project partnership, following guidelines provided by the partnership. Although the contributions have a common structure, deriving from the indications of the guidelines, they differ considerably in the style and also in the level of abstraction of the content. This fact might be considered a weakness resulting from the cooperative production approach that was adopted, however it should be stressed that the CEF as it stands is only a first step in an ongoing process. If the CEF is accepted by the ITE and CPD community across Europe, each sector could subsequently be refined and kept up to date by groups of European experts, and enriched with more cases of crucial issues and good practices.

---

## 2. Teacher's values and attributes within a knowledge society

*authors* Allan Martin, Manuela Repetto

Values and attributes, together with knowledge, understanding, abilities and skills, belong to that complex system which forms the teacher's identity. Values and attributes in particular underpin each of the eight specific domains of teacher's educational actions that are investigated in depth in the following chapters of this framework.

Values can be classified in accordance with each of the spheres of social interaction in which the teacher engages (the self, pupils, colleagues, external environment), while attributes permeate all four areas of interaction. Both values and attributes are pervasive and can be applied at all stages of education and across all subjects and specialisms, covering teachers' practice in ICT for education across Europe.

### **TEACHERS' PERSONAL AND PROFESSIONAL VALUES: A NEW CHALLENGE**

The advent of the digital knowledge-based society has given rise to significant changes. The pervasive nature of technology, along with the rapid pace of technology-driven social change, presents new challenges to education with regard to values<sup>1</sup>. Educational problems are becoming more diverse in nature and tasks more complex. For teachers, the ability to apply workable solutions to individual situations and «the flexibility to adapt to changing environments» are aspects that are becoming more and more compelling. In order to operate effectively within this dynamic educational environment, the modern teacher ought «to possess a high degree of humanity and morality, practicality and liberal sensitivity, logical reasoning and general sensibility»<sup>2</sup>.

The concept of value includes both personal and professional values. The former are innate or belong to the general

---

**1**  
Information Society Commission (2004), *Ethics & Values in a Digital Age*, Report.

---

**2**  
Kim C. Y. (2002), Teachers in Digital Knowledge-Based Society: New Roles and Vision, in *Asia Pacific Education Review*, Vol. 3, No. 2, pp.144-148.

3

Board Of Teacher Registration, Queensland, *Ethical Standards For Teachers*, <http://www.btr.qld.edu.au/pdf/ethicspaper.pdf>

4

Reynolds M. (2001), Education for Inclusion, Teacher Education and the Teacher Training Agency Standards, *Journal of In-Service Education*, Volume 27, Number 3.

5

Crosswell L. and Elliott B. (2004), Committed Teachers, Passionate Teachers: the dimension of passion associated with teacher commitment and engagement, in *Proceedings AARE 2004 Conference*, Melbourne.

6

Jones M. (2003), Reconciling Personal and Professional Values and Beliefs with the Reality of Teaching: findings from an evaluative case study of 10 newly qualified teachers during their year of induction, in *Teacher Development*, Volume 7, Number 3.

7

See note 4.

8

See note 6.

9

General Teaching Council of England (2004), *The GTC Statement - The Statement of Professional Values and Practice for Teachers*.

10

Ropp M. M. (1998), *A new approach to supporting reflective, self-regulated computer learning*, paper presented at the Society for Information Technology and Teacher Education 98.

experiences of the individual, while the latter are acquired during training and along the career path. Even given rich social diversity, there is sufficient common ground to delineate personal values that promote the ideals of teaching. There is «broad acceptance of values such as honesty, trustworthiness, integrity, equality, impartiality, fairness, justice, caring, compassion, inclusion, commitment, the pursuit of truth and respect for one's self and others»<sup>3</sup>. Ethical principles such as these underlie most professional codes, not least teaching, a profession that expects ethical behaviour from its members and holds such behaviour in high regard.

As to professional values, these play a crucial part in teacher education. They refer to the way in which the teacher should perform his/her professional role and reflect the expectations that people have of the way in which teachers should act. They are reflected in the professional characteristics of the teacher and in the way the teacher thinks and feels about teaching and learning<sup>4</sup>. «An intimate connection could be said to exist between the personal component and the professional component of an individual's life»<sup>5</sup>, but in some cases personal values are not strictly aligned with professional ones. In order to develop a positive identity as a teacher, the newcomer to the teaching profession often needs guidance in the process of reconciling personal values and beliefs with those underpinning professional practice<sup>6</sup>.

The importance of education in society and the responsibilities of teachers in the education and development of students mean that teachers are accountable to the profession itself, to students and their families, to colleagues, and to the community. «Consequently, teachers need to be aware of their ethical responsibilities and vulnerabilities in their interactions and relationships with each of these groups»<sup>7</sup>. Below is a description of some of the most important values in relation to each of these groups. These generic - and in some cases universal and timeless - values embrace ICT in education and play a key role in shaping technology-mediated learning opportunities.

### **The teacher's values in relation with the self**

The teacher should take ownership of her own practice, be committed to reflect critically about it and be willing to engage in ongoing professional development<sup>8</sup>. She accepts personal responsibility to provide quality teaching by taking into account new findings, technologies and emerging educational trends<sup>9</sup>, and seeks available support and resources to improve teaching practice. Development of ICT skills and extension of subject knowledge are not sufficient: teacher education should also involve «changes in attitudes, values and beliefs»<sup>10</sup>, since there is evidence that these influence professional practice<sup>11</sup>.

A passion for teaching is central to on-going commitment and engagement within the profession<sup>12</sup>. It's a professional necessity for a teacher to be emotionally committed to her work, for

without it the teacher faces «the danger of burn-out in an increasingly intensified work environment»<sup>13</sup>. The teaching profession is more than a career option, as it requires a certain «dedication to the good of the student» that goes beyond the fixed schedule of a contract<sup>14</sup>. «Passion, rather than merely external rewards or recognition», is seen to be the essential element that sustains the teacher's interest in the job and her willingness to remain in the profession<sup>15</sup>.

### **The teacher's values in relation with pupils**

The teacher should «strive to make his foremost responsibility the education and welfare of all the students in his care, and to respect the uniqueness and dignity of each student»<sup>16</sup>. This means that he should provide students with equal opportunities to learn, recognise each student's individual potential and needs, and promote understanding of diversity. He should impart and nurture the values of a democratic European society: equality, tolerance, freedom, integrity, and participation. Furthermore he should provide a learning environment that is interesting, purposeful, safe, supportive, and «which promotes the physical, emotional, social and intellectual wellbeing of students»<sup>17</sup>. He is adept in the creative use and critical evaluation of ICT for supporting his teaching and in advancing the learning of his students.

### **The teacher's values in relation with colleagues**

The teacher should promote mutual respect and trust in her relationships with colleagues, acting in a way which enhances the status of the teaching profession<sup>18</sup> and ensures that the essential goals of the school as a learning community are met. She should cooperate with colleagues by sharing expertise and knowledge with them: on one hand she assists and encourages newcomers, initiating them into the profession; on the other she is always «open to learning from the effective practice of colleagues»<sup>19</sup>.

### **The teacher's values in relation with the external environment**

The teacher has professional responsibilities that exceed beyond the four walls of the classroom and even extend beyond the boundaries of the school<sup>20</sup>, reaching the community and society. He should be committed to the establishment of relationships with parents and with other educational institutions, but also with industry and government agencies, as well as with social, religious and professional organizations<sup>21</sup>. These relations are based on mutual trust and open communication, in the interest of students and the school.

## **THE TEACHER'S KEY ATTRIBUTES**

The personal and professional values described above draw on a wide range of personal and professional attributes. Attributes identify qualities of character which are deep and enduring parts

### **11**

Cox M., Webb M., Abbott C., Blakeley B., Beauchamp T., Rhodes V. (2004), ICT and pedagogy: a review of the research literature, A report to the DfES, in *ICT in Schools Research and Evaluation Series* – No.18, Becta, DfES, ISBN 1 84478 134 8. <http://www.becta.org.uk/research/index.cfm>.

### **12**

See note 6.

### **13**

Nias J. (1996), Thinking about Feeling: The emotions in Teaching, *Cambridge Journal of Education*, Vol. 26, pp. 292-306.

### **14**

See note 2.

### **15**

See note 6.

### **16**

See note 4.

### **17**

Scottish Executive (2002), *The Standard for Chartered Teacher*, Vol.26, 3, pp. 293-306.

### **18**

See note 4.

### **19**

See note 10.

### **20**

See note 6.

### **21**

See note 17.

of an individual and which a person must possess to perform a job effectively. The following is an attempt to map the crucial characteristics of the successful teacher.

To work effectively in the rapidly changing educational field<sup>22</sup>, teachers should be able to adapt to change, to be flexible, intuitive, innovative and persistent<sup>23</sup>. They should also be highly collaborative, demonstrating good interpersonal skills in creating opportunities to communicate and share knowledge, experience and ideas with others. Teachers should be problem solvers who are willing to take risks to find solutions to educational issues, and decision makers who use their experience to motivate students and enhance their learning. On the one hand teachers should be enthusiastic, creative, intellectually curious, resourceful and positive, and on the other they should be systematic and well organised, focused, determined and hardworking.

Dealing specifically with ICT for education, the use of new technologies requires and stimulates a range of specific attributes<sup>24</sup>, helping to make a teacher:

systematic and well organised, through selection and customisation of appropriate ICT resources, as well as through the use of educational management tools;

creative and imaginative, for example through the creation of suitable learning materials using productivity tools;

an effective communicator and team person, through the appropriate use of electronic communication tools that enhance cooperation and collaborative learning;

innovative, through the trialling of new strategies and approaches that involve the use of ICT.

---

**22**

See note 3.

---

**23**

See note 11.

---

**24**

These attributes draw upon the framework documents of the Scottish Chartered Teacher Standard (see note 17) and the MIICE Discussion Paper 7, *Links between the MIICE quality framework and The Standard for Chartered Teacher*, 2003, [http://www.miice.org.uk/Resources/discussionPapers/MIICE\\_Discussion\\_Paper\\_7.doc](http://www.miice.org.uk/Resources/discussionPapers/MIICE_Discussion_Paper_7.doc)

---

## 3. Pedagogy

*author* Monica Banzato

### *The changing demographics of education*

Children live in a high technological world and are serious technology consumers and users. They use technology to create, share and research things important to them, and they know how to get information when they need it. The use of all these technicalities plays a key role in their cognitive, sensitive and affective activities and it is a fact that school systems have to take seriously into consideration this new scenario. From this point of view, the knowledge society offers new possibilities to the school system, but at the same time, it opens the way to new challenges and problems and requires radical changes.

### *The mismatch of children and schooling*

The present school does reflect neither the rapid and accelerating change in social life and the economy nor the acceleration of the knowledge development. Many aspects of the traditional assumptions on which school is based obstacle the school dynamics, as for example the segregation of children by age, the linear curriculum, the school architecture and organisation, and so on. According to Papert's view, a Megachange is needed in the school system.

### *The educational change*

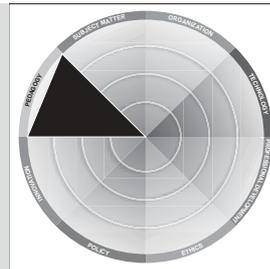
However such an educational change has to be a lengthy and in-depth process and long term objectives and strategies have to be defined. Long term objectives envisage a school focused on learning, ICT based learning environments, educational systems strictly linked to their local and global environments, different roles for teachers, and the born of teachers' communities of practice, as arenas for pedagogical knowledge management and

# Pedagogy

professional development. Introducing learning approaches and practices based on learning theories focusing on learning (constructivism, social constructivism, cognitive apprenticeship etc.) is a first step towards a transition from a teaching based school to a learning based school. Examples of ways to implement these practices in the short term are: increasing the learners' activities in the classroom while decreasing the teacher's explanations, encouraging peer interactions, changing the teacher's role, and modifying the evaluation procedures. Developing educational institutions which use the external environment as a resource for learning and are viewed as a resource for their local community, is a first step towards a school acting as an educational organisation with deep roots in its context. Examples of ways to link the school to its environment are cooperative learning projects related to issues relevant for the school's territory, virtual learning circles and outside learning activities (in museums, theatres, farms etc.). Enhancing teachers' cooperation by means of interschool cooperative projects, networking schools, encouraging the development of virtual communities of teachers, developing good practices repositories, developing resource centre are first steps toward the construction of teachers' communities of practice.

## 1 Teachers' interaction with **the self**

*Becoming aware of the constant impact of ICT on learning, school and society, and constructing a personal vision/philosophy of learning and pedagogy suitable for a knowledge society*



### 1.1 **CONTEXT OF ACTIONS RELATED TO THE PRACTICE**

There is general consensus that, in the knowledge society, there is a need for an educational paradigm in which the focus shifts from teaching to learning, from the transmission of knowledge to the construction of knowledge. In this view, students take on a more proactive role, exercising greater autonomy in the learning process and assuming greater responsibility for their own learning: and the use of ICT tools and resources plays a critical role in realising these changes.

This new paradigm obviously has manifold implications for the teacher, who, as a key player in the shift to the knowledge society, is constantly being presented with new opportunities and challenges, not least that of adjusting to change inside (and outside) the school. Once again there is a need for the individual (teacher) to be proactive in reassessing her role and modus operandi in the educational milieu.

The integration of ICT in educational practice is felt by many teachers to be an encroachment, an unwelcome development that calls into question longstanding practices and pedagogical beliefs. However, as well as having the potential for empowering learning processes, ICT also gives teachers new ways to develop their own personal vision of pedagogy, by (amongst other means) providing ready access to the latest research and trends in education, by presenting new opportunities for discussion and debate among colleagues near and far, by transcending the often stifling professional insularity of the classroom environment: in short, by giving teachers the opportunity to become better learners and therefore better practitioners in the knowledge society.

### 1.2 **ACTIONS RELATED TO THIS PRACTICE**

- Reflecting on one's overall practice as an educator, trying to identify the main elements and the relationships between them, as well as the positive and negative aspects.
- Identifying and reflecting on the new educational needs emerging from a knowledge society and how the school could fulfil them.
- Considering how educational processes can be transformed and learning facilitated.

- Investigating and reflecting on what contribution ICT makes to that change, opening the way to a new pedagogy.
- Studying and reflecting on new views about:
  - the autonomous learner
    - taking responsibility for learning
    - emotional resilience
    - motivation
  - the teacher as facilitator
    - matching teaching and learning styles
    - the personalised curriculum
    - differentiation
    - sharing learning with the learner
  - learning with pupils
    - learning teams
    - using “outside” experts
  - the learning process
    - higher order thinking skills
    - assessment/feedback/accreditation/
    - interactive resources
    - quality assured
    - individual and group activity
  - access to learning
    - anytime anywhere
    - home/school
    - digital divide
    - prior concurrent learning
    - multi-cultural issues.

### **1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Characteristics of the knowledge society.

New educational needs emerging from the knowledge society; the changing social and cultural contexts of education.

What is required of the school system so that it fulfils the requirements of the knowledge society.

Theories supporting the new views of learning processes, for example the theories of Vygotsky (Sociocultural Theory), Jean Piaget, Jerome Bruner, problem-based learning, Anchored Instruction, Distributed Cognition, Cognitive Flexibility Theory, Cognitive Apprenticeship, Situated Learning, Self-Regulated Learning, etc.

Current approaches to teaching and learning and innovative approaches.

Current research on teaching and learning.

ICT and its importance in teaching and learning.

The concept of learning environments (learning scenarios).

The role of ICT in implementing learning environments.

Successful practice adopted by other teachers.

Student’s learning styles, responses to pupil differences and to pupils experiencing barriers to learning.

Characteristics of learning processes and issues related to them.  
Educational assessment and its interpretation.

#### **1.4 REFERENCES**

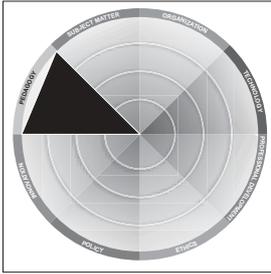
[http://europa.eu.int/comm/employment\\_social/knowledge\\_society/rodrigues.pdf](http://europa.eu.int/comm/employment_social/knowledge_society/rodrigues.pdf)

[http://europa.eu.int/comm/employment\\_social/knowledge\\_society/tuomi\\_wtech.pdf](http://europa.eu.int/comm/employment_social/knowledge_society/tuomi_wtech.pdf)

[http://www.ksg.harvard.edu/ifactory/ksgpress/www/ksg\\_news/transcripts/drucklec.htm](http://www.ksg.harvard.edu/ifactory/ksgpress/www/ksg_news/transcripts/drucklec.htm)

UNESCO, *Information and Communication Technologies in Teacher Education, a planning guide.*

<http://unesdoc.unesco.org/images/0012/001295/129533e.pdf>



## 2 Teachers' interaction with pupils

*Developing and managing learning environments consonant both with one's personal vision of learning/pedagogy and with the demands and challenges of knowledge society*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

#### The shift from teaching to learning

As technology has generated change in all aspects of society, it is also changing our expectations of what students must learn in order to function in the knowledge society. Students will have to learn to navigate through large amounts of information, to analyze and make decisions about it, and to master new knowledge domains in an increasingly technological society. They will need to be lifelong learners, collaborating with others in accomplishing complex tasks and using different systems effectively for representing and communicating knowledge to others. A shift from teacher-centred instruction to learner-centred instruction is needed to enable students to acquire the new 21st century knowledge and skills. The following table (Sandholtz, Ringstaff and Dwyer, 1997) identifies the shift that will take place in the change from a focus on teaching to a focus on learning<sup>1</sup>.

	Teacher-centred learning environments	Learner-centred learning environments
Classroom activity	Teacher-centred, Didactic	Learner-centred, Interactive
Teacher role	Fact teller, Always expert	Collaborator, Sometimes learner
Instructional emphasis	Facts' memorization	Relationships, Inquiry and invention
Concepts of knowledge	Accumulation of facts, Quantity	Transformation of facts
Demonstration of success	Norm referenced	Quality of understanding
Assessment	Multiple choice item	Criterion referenced, Portfolios and performances
Technology use	Drill and practice	Communication, access, collaboration, expression

**Table 1. Teacher-Centred and Learner-Centred Learning Environments (Unesco, 2002)**

#### ICT in education: the role of students and teachers

In the new pedagogy paradigm that goes hand in hand with ICT in education, there is a shift from 'teacher to pupils' knowledge processing to more a 'group-based' or 'pupil to pupil' process. In this scenario teachers act more systematically as advisors, guides and supervisors, as well as providers of the frameworks for the learning process of their students.

<sup>1</sup>

UNESCO (2002),  
*ICT in teacher education.*

This new approach impacts on the roles of both teachers and students in a number of aspects. As shown in Table 2 (adapted from Newby et al., 2000), the role of the teacher will change from knowledge transmitter to that of learning facilitator, knowledge guide, knowledge navigator and co-learner with the student. This new role does not reduce the importance of the teacher but requires new knowledge and skills. Students will have greater responsibility for their own learning in this environment as they seek out, find, synthesize, and share their knowledge with others. ICTs provide powerful tools to support both the shift to student-centred learning and the new roles of teachers and students. (Table adapted by UNESCO from one developed by Newby et al., 2000).

Changes in Teacher Role	
<i>A shift from:</i>	<i>A shift to:</i>
Knowledge transmitter, primary source of information, content expert, and source of all answers	Learning facilitator, collaborator, coach, mentor, knowledge navigator, and co-learner
Teacher controls and directs all aspects of learning	Teacher gives students more options and responsibilities for their own learning
Changes in Student Role	
<i>A shift from:</i>	<i>A shift to:</i>
Passive recipient of information	Active participant in the learning process
Reproducing knowledge	Producing and sharing knowledge, participating at times as expert
Learning as a solitary activity	Learning collaboratively with others

**Table 2.** Changes in student and teacher roles in learner-centred environments (UNESCO, 2002)

This implies, and can be explained by, the shift away from a teacher-oriented focus towards a learner-oriented focus. It can also be explained in terms at a number of external structures such as the political and societal tendency to emphasize the importance of the student’s capacity to work independently in later life as well as learning to learn in order to be able to keep on learning throughout their lives.

Students can take responsibility for their own learning process at several levels. For instance, they can learn to take responsibility for minor assignments that must be completed over a very short space of time, or they can be given responsibility for achieving greater objectives, either in the course of the school year or during their schooling as a whole.

Among the examples that can be cited are cases in which the teacher:

- uses ICT as a tool or medium in the design and implementation of learning environments in which students are expected to collaborate, thus helping them to increase their social participation and improve their communication and collaboration skills;

- designs classroom activities across subjects (interdisciplinary activities);
- reorganises the class so that the pupils either work together in smaller groups or individually (collaborative learning);
- constructs activities where pupils participate actively in their own learning, etc.

## **2.2 ACTIONS RELATED TO THIS PRACTICE**

- Teachers become designers, implementers and managers of learning environments by:
  - choosing teaching methods that integrate ICT into the whole curriculum
  - choosing and recommending teaching methods and ICT tools appropriate to the individual and collective learning objectives of students
  - emphasizing the quality of what students produce and the contribution to individual and collective learning goals and levels of attainment
  - planning a whole learning programme that allows a range of ICT tools and teaching methods to be used, as and when required
  - choosing tools and teaching methods that allow the teacher and student to manage their own learning.
- Teachers achieve learning objectives by:
  - managing learning environments that permit the use of different ICT tools and teaching methods
  - understanding students' different levels of ICT competencies and implementing strategies to manage differences as students progress
  - managing difficulties that can arise when using ICT and minimizing their impact on planned lesson objectives
  - creating learning situations such that students manage their own learning
  - infusing ICT-based and non-ICT-based media, such as books and video, into learning programmes
  - assessing the levels of attainment of individual students when working collaboratively.
- Teachers infuse digital presentations into teaching and learning to increase access to learning programmes by:
  - ensuring that the most appropriate media are built into learning programmes, that learning is accessible to all students irrespective of ability, special need, or preferred learning style
  - varying the kind of presentation, documents or other media according to the main goals and the chosen teaching method
  - analyzing a presentation for legibility, structure, coherence with teaching objectives, and suitability for students.
- Teachers utilize a variety of ICT tools and resources, including web-based learning spaces and environments, CD-ROMs, web sites, video and audio, courseware.

- Teachers assess the contribution that different ICT-based activities make to individual learner development and the pursuit of lesson objectives.
- Teachers help students to find, analyze and synthesize information from disparate Internet sources and school-based learning environments.
- Teachers support individual students and groups of students in performing complex web searches.
- Teachers support students in managing, appraising, synthesizing, and presenting learning processes and products using ICT tools.
- Teachers utilize a range of communication tools to collaborate with colleagues, with students, and other learning communities beyond the school.

Sources: UNESCO (2002a; 2002b).

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

The role of ICT in the learning process:

- ICT in information retrieval and sharing*
- ICT as enhancer of communication potential*
- ICT as a support for collaborative learning processes*
- ICT as a tool to enhance individual productivity*
- ICT as an enhancer of expressive skills.*

Individualised learning:

- Adaptive Systems*
- Reactive Systems*
- Conditions of use in the school.*

Collaborative Learning:

- Definition of collaborative learning*
- Collaborative learning strategies*
- Online collaborative learning*
- Conditions of use in the school.*

Interdisciplinary project-based education:

- Definition of an interdisciplinary project*
- Project design*
- Project realisation.*

Design and realisation of an ICT-based presentation:

- Preparation of an educational presentation*
- Tools for ICT-based presentations.*

Design of evaluation tests:

- Types of evaluation and tests*
- Evaluation test design*
- Content structuring*
- Item writing*
- Definition of the team delivery technique*
- Collection and processing of evaluation data.*

Computer-based systems for learning evaluation:

- Features of computer-based systems for learning evaluation*
- Design and management of computer-assisted tests.*

Quality evaluation of ICT-based formative systems:

*Quality evaluation of systems*

*Quality evaluation of educational software*

*Quality evaluation of on-line course.*

Source: ULEARN Syllabus.

## **2.4 REFERENCES**

Midoro V., Le ICT nella pratica e nello sviluppo professionale dei docenti, TD n. 30, pp. 18-24.

Martin A., Il profilo del docente pioniere nell'uso delle ICT nella propria pratica professionale, TD n. 30, pp. 10-15.

UNESCO (2002a), *ICT in Education. A curriculum for school and programme for teacher development.*

UNESCO (2002b), *ICT in teacher education.*

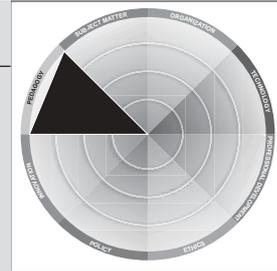
European Commission DG Education and Culture (2004), *Study on Innovative Learning Environments in School Education*, Ramboll Management, Final Report September.

Sandholtz J., Ringstaff C. and Dwyer D. (1997), *Teaching with Technology*, Teachers College Press, New York.

Newby T., Stepich D., Lehman J. and Russel, J. (2000), *Instructional technology for teaching and learning*, Upper Saddle River, Merrill/Prentice Hall, New Jersey.

### 3 Teachers' interaction with **colleagues**

*Sharing practice, repertoires, and learning/pedagogy visions. Collaborating in interdisciplinary educational activities*



#### 3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

##### The relationship among colleagues: informal and non formal learning

The development of teachers' competencies in ICT for education does not just depend on organised continuing professional development (CPD). It is also the result of informal<sup>2</sup> and non formal learning<sup>3</sup> which arises spontaneously from relationships and interactions (more or less organised) among colleagues both within the same school and from school to school.

Within the new pedagogy paradigm that embraces the use ICT in education, teachers are encouraged to collaborate together, sharing practice, repertoires, and learning/pedagogy visions.

The relationship among colleagues promotes spontaneous discussion and dissemination of ideas on a variety of different aspects such as: identifying innovative teaching methodologies and ICT use; developing subject curriculum and ICT use; developing the use of ICT in interdisciplinary activity through collaborative work in the classroom, etc.

Developing relationships with colleagues provides teachers with opportunities to experiment, to identify preferred learning styles and differentiated pathways.

Discussion on how to introduce and infuse ICT across the curriculum so as to enhance learning and the management of learning leads teachers to an understanding of how to transform their teaching practice as well as the learning of their students.

Fostering relationships among colleagues can help the teacher develop general ICT-related competencies, such as: understanding why, when, where, and how ICT tools will contribute to learning objectives; choosing the most appropriate ICT tools for stimulating students' learning; choosing ICT tools and teaching methods that integrate ICT into the whole curriculum, etc.

##### From non formal learning to a community of practice

Within the context of the new pedagogy paradigm, the first step for disseminating awareness in the use of ICT in education is that of fostering relationships among teachers (non formal learning). The next step lies in the evolution of these spontaneous and informal relationships into targeted and structured relations, such as those

#### 2

##### informal learning

Learning resulting from daily work-related, family or leisure activities. It is not organised or structured (in terms of objectives, time or learning support). Informal learning is in most cases unintentional from the learner's perspective. It typically does not lead to certification.

Source: Cedefop, 2003.

#### 3

##### non-formal learning

Learning which is embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or learning support), but which contain an important learning element. Non-formal learning is intentional from the learner's point of view. It typically does not lead to certification.

Source: Cedefop, 2003.

arising in communities of practice, which are strongly sustained and promoted by the new learning theories (constructivism, contextualism, culturalism).

In this case, a group of teachers can decide to work together to support the exchange of experience and mutual learning, for example on the implementation of a certain ICT topic in their subject area. They can communicate by means of a Virtual Learning Environment, but it also appears to be important for them to organize face-to-face meetings. The success of these teachers' communities of practice is proven, although in order to avoid potential pitfalls careful attention is required to some critical aspects:

- not too much difference between initial levels of know-how;
- equal input from participating members;
- an open mind in the sharing of experiences;
- involvement of all members;
- task orientation;
- shared responsibility, but also somebody who takes an organizational lead<sup>4</sup>.

### **Teachers' communities of practice**

Communities of practice arise out of people's natural desire to share ideas, get help, learn about new ideas, verify their thinking and hear the latest "professional" gossip (McDermott, 1998).

A community of practice is a group of people who share an interest and deepen their knowledge about it by interacting. The concept is a very old one: social structures have been based on communities of practice ever since people dwelt in caves. Recently the concept has become more and more widespread, since it has been identified as a key aspect of knowledge management matters within organizations. Creating communities of practice is a way to make pioneer teachers aware of their role within the school system and to support them in their daily practice, giving them opportunities to interact with peers and the chance to deepen their knowledge. Within their community they can find expertise, quick answers to questions, different perspectives on common problems, but also information, materials, resources and in general opportunities for collaboration. Furthermore, since teachers' knowledge is alive, dynamic and tacit, something that cannot simply be stored in a book, the informal relationships among its members represent a way of circulating best practices and lessons learnt (Bocconi S., Pozzi F., Repetto M., 2003).

### **3.2 ACTIONS RELATED TO THIS PRACTICE**

- Teachers develop and support informal and formal relationships with colleagues by:
  - establishing informal and formal processes and maintain developing relationships with school colleagues and others in the teaching community
  - undertaking and participating in a range of informal and formal professional teams, in accordance with personal

4

European Commission DG  
Education and Culture, *Study on  
Innovative Learning Environments  
in School Education*, Ramboll  
Management, Final Report  
September 2004.

- expertise and interests, school priorities, professional profile and school-management structure.
- Teachers support colleagues in using ICT in their teaching practice by:
    - proposing lines of development for using ICT by making suggestions, showing examples or providing motivation in the use of ICT
    - furthering colleagues' training, in accordance with their needs and requirements, by proposing training resources, by organising training sessions, and by enabling the sharing of knowledge and experiences between teachers (on the basis of their personal competencies)
    - accompanying colleagues on occasion within the classroom, to provide backup and to offer support
    - encouraging emerging successes arising from team projects using ICT.
  - Teachers give support to ICT team projects by:
    - helping teaching teams to make their ICT-based projects more focused, showing what is possible, setting limits, and assisting teams to specify their training needs
    - helping with the planning and scheduling of team projects
    - helping with implementation, making resources available, and even taking part in the realization of projects
    - coping with relations between teachers in a team to ensure that individuals agree with the aims of the team project, and managing any conflicts that arise
    - helping a team to evaluate process and outcomes and scheduling steps in the evaluation of projects.
  - Teachers promote ICT uses inside school and facilitate these uses by:
    - developing and supporting the use of email, and sharing communication solutions via the school Intranet
    - discussing and setting up procedures for accessing and using ICT resources, and reaching agreement with users about access
    - organizing access to ICT resources by teachers and students.
  - Teachers Collaborate with professionals, paraprofessionals, teacher aides and other community-based personnel by:
    - forming partnerships that help to support and deliver student learning experiences
    - involving external partners, where relevant, in the planning, implementation and evaluation of learning experiences and monitoring of student progress
    - implementing strategies for maintaining ongoing communication with external partners.
  - Teachers contribute to learning communities and other professional networks:
    - learning communities both within and outside the school are identified and accessed in accordance with personal professional needs

- potential to enhance teaching and learning practice through contributing to learning communities is assessed
- opportunities are pursued for involvement in collaborative curriculum planning, and learning and development activities
- opportunities are taken to participate in the work of professional organisations, syllabus and curriculum development authorities, and professional learning and development agencies.
- Teachers support specialized student activities with ICT:
  - helping any students who faces special problems in using ICT, without taking the place or playing the role of other teachers, and in agreement with those teachers
  - organizing special training sessions and arranging meetings of teachers and students to demonstrate or discuss advanced features or tools.
- Teachers collaborate with school management and administration by:
  - making clear their role, availability, and modes of intervention according to regulations
  - regularly informing management about the progress of activities and projects
  - disseminating the results of any experiments in the use of ICT undertaken inside or outside the school
  - developing a global view of needs and means with respect to ICT support for teaching and learning.

Sources: UNESCO (2002a; 2002b).

### **3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Communities of practice of teachers:

*The nature of a community of practice*

*The nature of collaboration and cooperative work*

*Mutual relationships*

*Common enterprise*

*Shared repertoire.*

Web tools which support collaboration:

*Computer Mediated Communication systems*

*Distance collaboration.*

Web based cooperative learning:

*Cooperative learning in adult education*

*Cooperative learning strategies*

*On-line education in schooling.*

Virtual learning communities:

*The nature of virtual learning communities*

*Roles in a virtual learning community*

*The role of the online tutor.*

Technology for supporting a virtual learning community:

*Requirements of a system supporting cooperative learning*

*Communication features of a CMC system*

*Synchronous & asynchronous communication.*

Materials shared in a virtual community:

*Information sharing*

*Materials for cooperative learning*

*Sharing documents.*

Source: ULEARN Syllabus.

### **3.4 REFERENCES**

Midoro V. (2003), Le ICT nella pratica e nello sviluppo professionale dei docenti, *TD*, n. 30, pp. 18-24.

Bocconi S., Pozzi F., Repetto M. (2003), Comunità di insegnanti pionieri in Europa, *TD*, n. 30, pp. 25-34.

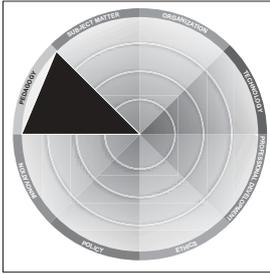
Martin A. (2003), Il profilo del docente pioniere nell'uso delle ICT nella propria pratica professionale, *TD*, n. 30, pp. 10-15.

UE, *Draft Conclusions of the Council and of the representatives of the Governments of the Member States meeting within the Council on Common European Principles for the identification and validation of non-formal and informal learning*, Brussels, 18 May 2004, 9600/04, LIMITE EDUC 118, SOC 253.

UNESCO (2002a), *ICT in Education. A curriculum for school and programme for teacher development.*

UNESCO (2002b), *ICT in teacher education.*

European Commission DG Education and Culture, *Study on Innovative Learning Environments in School Education*, Ramboll Management, Final Report September 2004.



## 4 Teachers' interaction with the external environment

*Considering and using the local and global environment as a resource and as an arena for school and learning*

### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

#### What is a learning environment in pedagogy?

The concept of a "learning environment" has become current in educational discourse in close connection with the emergence of ICT use for educational purposes on the one hand, and the new paradigm of knowledge and learning in pedagogy on the other. The concept of learning environment, in the new pedagogical paradigm,

*adds a sociological dimension to these common features as learning environments are understood as different learning situations which are characterized by activities taking place between teachers and pupils in a framework that comprises a number of structural factors consisting of resources and roles.<sup>5</sup>*

Learning environments can be defined and described in numerous ways, depending on the frame of reference being used. However, we can identify common characteristics in all the theoretical definitions, which broadly speaking see the learning environments as:

*a place or community in which a number of activities are occurring with the purpose of supporting learning and those actors can draw upon a number of resources when doing so.<sup>6</sup>*

Emphasis is also placed on the constructionist view of learning and the use ICT.

#### Global and local, real and virtual learning environment

In the new pedagogy paradigm, the community is a natural partner with the school, dynamically involved in all aspects of the staff and students' learning processes, and providing real-world contexts through which learning takes place. The school is a learning resource for the whole community, *offering access to local and global learning environments with physical visits as well as virtual visits* through the Internet. The school is as much a part of the community as the community is a part of the school: this mix relationship among community and schools creates and builds the new learning environment.

Learning environment actively involve parents and families, business, industry, religious organizations, universities, vocational schools, voluntary organizations. Global and local, real and

5

European Commission DG Education and Culture, Study on Innovative Learning Environments in School Education, Ramboll Management, Final Report September 2004, p. 5.

6

See note 5.

virtual. Community is a learning resource for the School – physically and virtually.

As a community contributes to a school, so the school can give back in many ways. The use of ICT provides an opportunity for a school and its students to interact with both local and global learning environment and communities. Interaction may range from building web sites for community organizations, to sharing projects with remote schools<sup>7</sup>.

Teachers have to be awareness of a theoretical foundation for the concept of “learning environments” in pedagogy, describing the various forms they might take and how they might be effected by organisational; cultural effect and innovative practices occurring in schools in relation to curricula (multidisciplinary approaches, basic skills, tackling school failure), time planning, new school architectures and the design of new working inside or outside the school; technology-related approaches for encouraging joint enterprises and the shared construction of knowledge; how ICT can best stimulate learning as a form of social participation local and global; good learning and teaching practices which foster closer collaboration and involve the use of new technologies for the purpose of networking among those who are directly involved in education and those who can contribute to it; identification of good practice or good models that could easily be disseminated and adapted for wider use<sup>8</sup>.

#### Networking and internationalisation learning environment

Finally, a common denominator of the cases is that the ICTs have facilitated networking and internationalisation of the schools. Schools either engage in cooperation with other schools of with cultural institutions in their own countries or abroad.

International co-operation in education is well developed in most Member States. Both teachers and pupils participate in trans-national projects that range from exchanging letters to systematic attempts to swap pedagogical practices and content.

Under the auspices of initiatives undertaken by the European Commission, primary schools from all Member States have been participating in programmes such as *COMENIUS*.

While this may represent an exchange of ideas and practice among pupils and teachers at the local level, a number of steps have also been taken at the national level to ensure international collaboration: i.e. the *European Network of Innovative Schools* (ENIS) seeks to link up schools that are recognized for their experience in the use of ICT; or *Virtual School, eSchola and myEurope*) are intended for teachers working in compulsory education. The *European Schoolnet Network*<sup>9</sup> is a framework for networking and exchanging information and projects<sup>10</sup>.

#### 4.2 ACTIONS RELATED TO THIS PRACTICE

- Twinning school:
  - twinning is a collaborative exercise in which multimedia and

---

7

UNESCO (2002), *ICT in Education. A curriculum for school and programme for teacher development*.

---

8

European Commission DG Education and Culture, *Study on Innovative Learning Environments in School Education*, Ramboll Management, Final Report September 2004, p. 3.

---

9

It was initiated following an informal meeting of education ministers in Amsterdam on 2-3 March 1997 on the basis of the Swedish minister's proposal to set up a network of European schools in accordance with the Commission action plan, *Learning in the Information Society*.

---

10

See note 8.

exchange tools (e-mail, videoconferencing, joint development of websites, etc.) are used to flesh out or establish ties and collaboration school

- twinning links in education can take various forms, such as pupil-to-pupil, teacher-to-teacher, class-to-class and school-to-school.
- Involving external parties in the learning situation:
  - create opportunities for families, caregivers, and business and community members to contribute specialist knowledge and skills to the planning and implementation of learning experiences
  - establish partnerships with business, industry, and community agencies to enhance student learning
  - propose learning environment that it is establishment of link between school and other innovative organization outside the school system, such as libraries and museums, as well as parental involvement either at home or in other contest.

Source: *Study on Innovative learning Environments in School Education*, p. 7

- Establish learning environments that acknowledge the concerns, values and priorities of students' families, cultures and communities:
  - accurate information on the concerns, values and priorities of students' families, cultures and communities is sought from a range of appropriate sources
  - plan and implement learning environment that are meaningful to students and build on the knowledge and skills developed in the home and community
  - plan and implement learning environment that acknowledge and critically examine the concerns, values and priorities of students' families, cultures and communities
  - design and provide learning environment for students with opportunities to actively contribute to the development and promotion of their local communities.
- Collaborate with the school management and administration:
  - be precise in agreement with management, about their role, availability, and modes of intervention according to act
  - regularly inform management about the progress of activities and projects
  - disseminate the results of any experiments in the use of ICT undertaken inside or outside the school
  - develop a global view on needs and means with respect to ICT support for teacher and learning.

Sources: UNESCO (2002b); Queensland Government (2002).

#### **4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Documents and project developed by European Commission, and the school, on community partnerships, vocational education and training, and pathways for students.

An in-depth reviews and analysis, together with any relevant documentation, concerning network of learning environments (family, business and community contexts and networks) which have been or are currently being implemented and evaluated.

Concrete references and analytical description of the relevant research programmes and results for all the countries involved in the studies.

Information, analysis, documentation and examples of innovative pedagogy experiments of using local and global environment.

Examples of innovative experiments, good practice and models of pedagogy project of local and global environments.

A user-friendly and practical guide to existing resources in the field (expert, institution, project).

Design and participate a project at European level (with the school and the other institution).

Source: Queensland Government (2002).

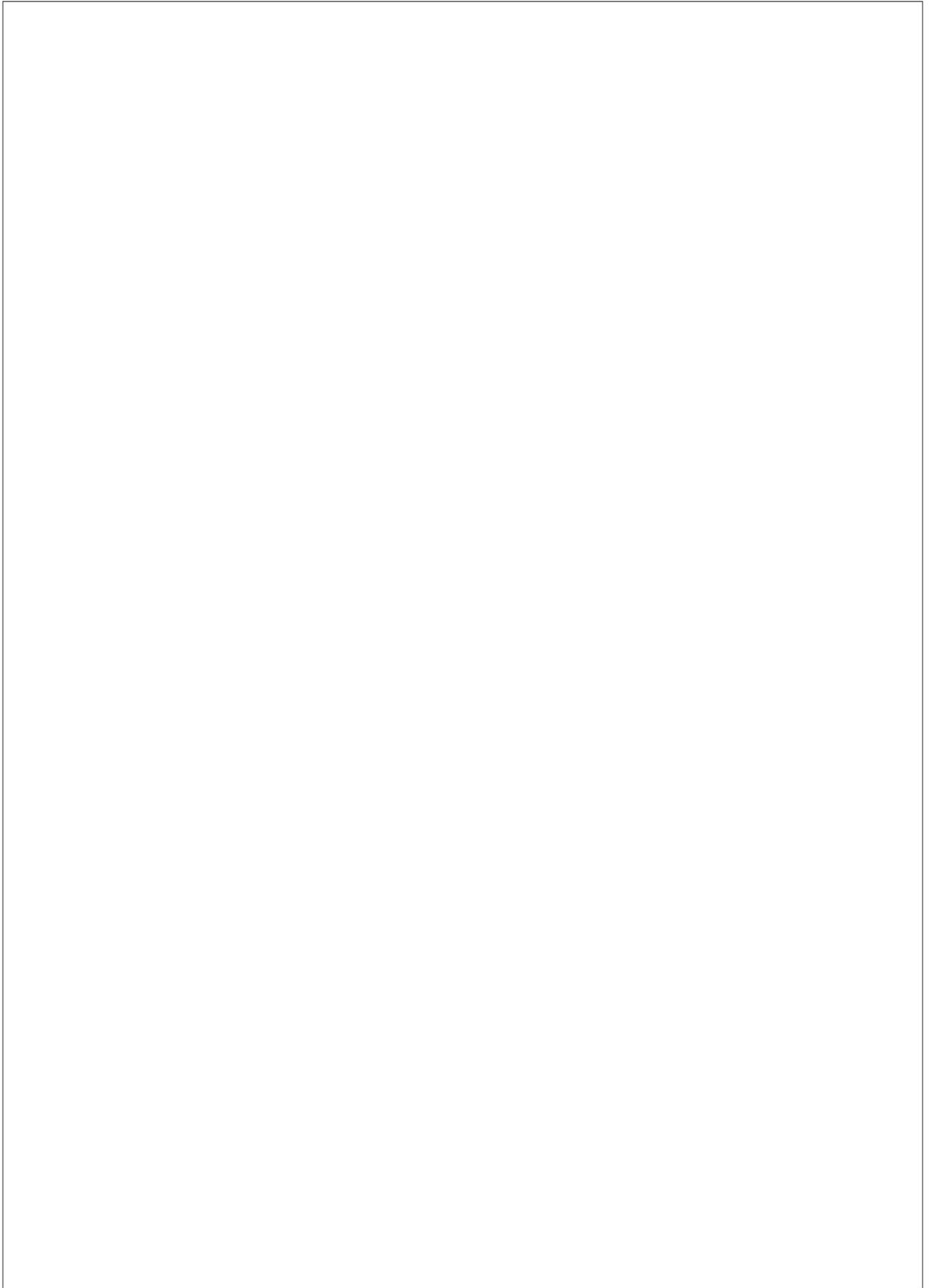
#### **4.4 REFERENCES**

UNESCO (2002a), *ICT in Education. A curriculum for school and programme for teacher development.*

UNESCO (2002b), *ICT in teacher education.*

European Commission DG Education and Culture (2002), *Study on Innovative Learning Environments in School Education*, Ramboll Management, Final Report September.

Queensland Government (2002), *Professional Standards for Teachers*, The State of Queensland (Department of Education).



---

## 4. Curriculum/ Subject matter

*author* Stefania Bocconi

The move towards a knowledge society is transforming the work of teachers. Increasingly, their work is focusing on structuring learning experiences that promote outcomes specified in system-wide curriculum frameworks. Teachers are, therefore, responsible for designing and implementing learning experiences that cater for the learning needs, styles and preferences of their students. In many cases this involves teachers working in tandem with other teachers, paraprofessionals and community members. It also means organising a variety of learning scenarios: individual and group activities that can be carried out both within and outside the school and in online and virtual environments.

Students' school experiences must help them develop the attitudes and abilities required for functioning effectively in the new social environment. Students should emerge from schooling with the capability to adapt to rapid social and economic change, with a commitment to lifelong learning, and with skills and knowledge that enable them to participate in social and community decision making.

These requirements acknowledge the pivotal role that teachers and others involved in public education play in embracing<sup>1</sup>:

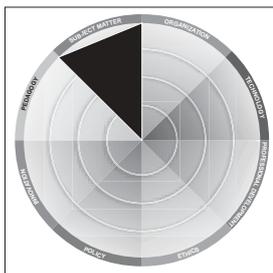
- new content and models of curriculum organisation;
- student-centred approaches to teaching and assessment;
- learning partnerships that link the school, the community and the workplace;
- technology-based approaches to learning that emphasise self-directed and independent learning.

The integration of ICT in cross-curricular activities supports processes which motivate students to experiment, facilitate comprehension of abstract concepts, develop reasoning and advanced problem-solving skills, enhance awareness of social justice and ecological-sustainability issues.

It is foreseen that the Curriculum section of the Common European Framework will include sub-sections addressing specific disciplinary areas (mathematics, languages, science, etc.). These are to focus on aspects that are of particular concern within the subject area in question. **A brief example of how a subject area (in this case foreign languages) might be addressed within the Common European Framework is provided here in chapter 4.a.**

1

Cox M., Webb M., Abbott C., Blakeley B., Beauchamp T., and Rhodes V. (2003b), ICT and Pedagogy, A Review of the Research Literature, *ICT in Schools Research and Evaluation Series*, No. 18, Becta/DfES, Coventry/London. [http://www.becta.org.uk/page\\_documents/research/ict\\_pedagogy\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf)



## 1 Teachers' interaction with **the self**

*Given the rapid growth in knowledge, reflecting on the key areas and topics to address within the subject area; understanding the impact of ICT on the didactics of the discipline*

### 1.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Information and Communication Technologies (ICTs) are a major factor in producing rapid changes in society. Within the past decade, new ICT tools have fundamentally changed the way people communicate and do business. They have the potential to transform the nature of education - where and how learning takes place and the roles of students and teachers in the learning process. These new possibilities exist largely as the result of two converging forces. The first is the rapidly increasing *quantity of information* available in the modern world. A synergistic effect occurs when important information is coupled with a second modern advance - the new *capacity for communication among people* of the world. The opportunity exists to harness this force and use it positively, consciously, and with design, in order to contribute to meeting defined learning needs. Secondly, the *content of learning is radically changing*. The power of technology-supported change is such that technological (and information) literacy are becoming ever more important; many topics that were “unteachable” in the context of pencil and paper technologies will be considered appropriate for children in the context of digital technology, which makes concrete what was previously abstract. Recognising the factor of rapid obsolescence of knowledge, learning processes should reflect the curriculum using tools and modalities that are as far as possible ‘future proof’, while not overlooking the current social context.

#### **Integrating ICT effectively into subject teaching**

The way ICT is used in lessons is influenced by teachers' knowledge of their subject and their view of how ICT is related to it. Some teachers choose ICT resources that relate to a particular topic, while others use ICT to allow their pupils to present work in an innovative way, without any direct application to the topic.

When teachers apply their knowledge of the subject and take account of the way pupils understand it, their use of ICT has a more direct effect on pupils' attainment: this is greatest when pupils are challenged to think and to question their own understanding, either by using topic-focused software on their own or in pairs, or through a whole-class presentation.

Through examination of research evidence and case studies, there would appear to be three main approaches that teachers take to ICT<sup>1</sup>:

*Integrated approach:* using ICT within the subject to enhance particular concepts and skills and improve pupils' attainment. This involves a careful and considered review of the curriculum area, selecting the appropriate ICT resource which will contribute to the aims and objectives of the curriculum and scheme of work, and then integrating that use in relevant lessons.

*Enhancement approach:* using an ICT resource for some aspect of the lesson so as to enhance understanding of the topic at hand. In this approach, the teacher plans to complement the lesson with an innovative presentation method so as to enhance the visualisation of problems and promote class discussion.

*Complementary approach:* using an ICT resource to empower pupils' learning, for example by enabling them to improve their class work by taking notes on the computer, or by sending out homework by email, or by students' word processing their homework.

All three approaches can enhance subject achievement, but the effects may be different. In the integrated approach, pupils' learning is enhanced because they are confronted with challenges to their existing knowledge and given deeper insights into the subject being studied. The enhancement approach could improve pupils' learning through presenting knowledge in new ways, promoting debate among pupils, and encouraging them to formulate their own explanations. The complementary approach suggests that learning can be improved by reducing the mundane and repetitive aspects of tasks such as writing essays and homework by hand, thus freeing the learner to focus on more challenging and subject-focused aspects.

## 1.2 ACTIONS RELATED TO THIS PRACTICE

- Teachers fully integrate ICT in all aspects of their subject teaching by:
  - recognizing the educational value and transformative potential of the technology
  - understanding the impact ICT has on specific knowledge areas, skills and processes, and how this relates to different teaching practices
  - developing a personal pedagogical vision of the specific subject that embraces teaching style, selection of resources, activities and learning objectives
  - understanding the relationship between different ICT resources and subject area concepts, processes and skills
  - evaluating the ways in which the use of ICT changes the nature of subject teaching and learning.
- Teachers reorganize the delivery of the curriculum by:
  - understanding the opportunities and implications entailed in

1

UNESCO (2002), *ICT in teacher education*  
 UNESCO (2002), *ICT in Education. A curriculum for school and programme for teacher development*

- uses of ICT for learning and teaching in the curriculum context
- employing proactive and responsive strategies in order to guide, facilitate and support appropriate learning activities within the specific subject
- identifying the ICT resources to fit/enhance the curriculum adopted
- being aware of teaching methods that integrate ICT into the whole curriculum
- becoming proactive stakeholders in curriculum reform, developing personal forms of reflective classroom practice regarding ICT.
- Teachers use their subject expertise to select appropriate ICT resources which will help students meet specific learning objectives, something that is achieved by:
  - selecting subject-specific software, as well as more generic resources
  - making confident personal use of a range of software packages and ICT devices appropriate to the subject area and students' age range
  - reviewing critically the relevance of software packages and ICT devices to the subject area and students' age range and judging the potential value of these in classroom use
  - preparing and putting into effect schemes of work incorporating appropriate uses of ICT.
- Teachers reflect critically on their personal professional practice in the specific subject area by being aware of trends, issues and innovations pertaining to the subject area and examining their impact on teaching and learning practices.

### **1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Knowledge about ways of sourcing major areas of current research in education.

Awareness of the impact of ICT on the subject area curriculum and related teaching practice:

*ICT and the curriculum area*

*ICT in the didactics of the curriculum area*

*The distinctive contribution of ICT to the syllabus*

*The contribution of ICT to the school's curriculum aims.*

Knowledge of how the use of ICT enhances learning in the subject area.

Awareness of prerequisites for using ICT in subject teaching.

Knowledge of the range of ICT resources that can enhance the syllabus adopted in the subject area.

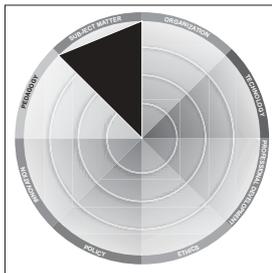
Awareness of the various views on ICT and education stemming from different approaches and attitudes to the subject area.

Knowledge of relevant curriculum frameworks, syllabuses and program documents.

Knowledge of strategies for integrating ICT skills across curriculum areas.

#### 1.4 REFERENCES

- Cox M., Webb M., Abbott C., Blakeley B., Beauchamp T. and Rhodes V. (2003), ICT and Pedagogy, A Review of the Research Literature, *ICT in Schools Research and Evaluation Series*, No. 18, Becta/DfES, Coventry/London.  
[http://www.becta.org.uk/page\\_documents/research/ict\\_pedagogy\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf)
- Hennesy S., Ruthven K. and Brindley S. (in press), Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution and change, *Journal of Curriculum Studies*.
- Education Queensland (2002), *Professional standard for teachers. Guidelines for professional practice*, Brisbane, Queensland Government, Education Queensland.  
<http://education.qld.gov.au/curriculum/learning/technology/cont.html>
- BECTA (2003), *Primary Schools – ICT and Standards. An analysis of national data from Ofsted and QCA*.  
<http://www.becta.org.uk/research/reports/ictresources.cfm>
- DfES (2002), *Transforming the way we learn: A vision for the future of ICT in schools*, London, Department for Education and Skills.
- Kozma R. and McGhee R. (2003), ICT and innovative classroom practices, in Kozma R. (Ed.), *Technology, innovation, and educational change: A global perspective*, Eugene, OR: International Society for Educational Technology.
- UNESCO (2003), *Building Capacity of Teachers/Facilitators in Technology-Pedagogy Integration for Improved Teaching and Learning, Experts' Meeting on Teachers/Facilitators Training in Technology-Pedagogy Integration*, 18-20 June 2003, Bangkok, Thailand. Available at:  
[http://www.unescobkk.org/ips/ebooks/documents/ICTBuilding\\_Capacity/BuildingCapacity.pdf](http://www.unescobkk.org/ips/ebooks/documents/ICTBuilding_Capacity/BuildingCapacity.pdf)



## 2 Teachers' interaction with pupils

*Designing and managing learning environments which take into account the opportunities and limits within the didactics of a given subject area*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Students learn complex subject matter best when they are engaged in the process of constructing meaning from information and from their personal experience to meet their own goals. The use of ICT should not only enhance learning but also transform it. For example, ICT has the potential to personalise learning in many ways: tools and information systems help teachers plan differentiated learning experiences, and online resources support learners so that they have meaningful opportunities to direct and develop their own learning where and when appropriate. Differentiated learning experiences are particularly important in realising and enhancing educational inclusion, for example by providing communication aids for learners with disabilities, allowing geographically dispersed learning communities to participate fully in the educational process, or enabling education providers to reach out to specific groups, such as children who cannot attend school owing to illness or other reasons.

#### Inventing “Digital Native” methodologies for all subjects, at all levels

Since research shows that ICT presents pupils with new representations and new ways of learning, it is particularly important for teachers to identify and understand the thinking processes of learners, as far as possible. Many of today's students are “native speakers” of the digital language of computers, video games and the Internet: they are *Digital Natives*, «they think and process information in a fundamentally different way from their predecessors»<sup>1</sup>. Teachers have to learn to adapt their practice to meet the needs of their “digital students”. This doesn't mean changing the meaning of what is important, or of good thinking skills. What it does mean, among other things, is faster pacing, less of a step-by-step and more of a parallel approach, with greater random access.

1

Prensky, M. (2001), *Digital Natives, Digital Immigrants*, in *Horizon*, NCB University Press, Vol. 9 No. 5. Becta/DfES (2003b) Education Queensland (2002)

#### Making subject learning more attractive

Using computer tools helps to de-contextualise learning, to make explicit that which is implicit, to accentuate that which is often unnoticed, to express and make visible key relationships and structures within the subject matter. The introduction of ICT has

the potential to change the system of affordances and constraints which frame activities such as writing, mathematical problem solving and scientific enquiry (these last two are considered to be situated within a social and cultural system, rather than as isolated skills).

### **Facing the age of dynamic, interactive content**

The resources now available to any student of any age on the web are current, mostly free and relatively easy to find. Students have the opportunity not only to access and consume content, but also to interact with it (e.g. wikies), constructing meaning by connecting ideas and people around that content, embellishing it with personal examples and experiences, being able to access it from home with parents and experience it together.

### **Integrating technology in assessment**

Effective ICT use should take into consideration the integration of ICT in assessment across the curriculum. ICT integration in the assessment process may lead to a greater role for formative assessment: students are increasingly responsible for their own continuous assessment, which will help to inform and delineate a personal curriculum that matches their learning styles. As a result, a holistic view of the whole learner across the curriculum is provided.

## **2.2 ACTIONS RELATED TO THIS PRACTICE**

- Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning by:
  - facilitating technology-enhanced experiences that address specific contents and develop students' technological skills
  - using technology to support learner-centred strategies that address the diverse needs of students
  - applying technology to develop students' higher order skills and creativity
  - managing learning activities in a technology-enhanced environment
  - having a mechanism in place for evaluating content developed by students.
- Teachers employ proactive and responsive strategies in order to support, guide and facilitate students' learning in specific subject areas by:
  - monitoring progress and maintaining focus on subject learning through carefully structured activities and focused tasks
  - preparing and planning lessons so that ICT is used in ways which challenge pupils' understanding and promote deeper thinking and reflection
  - integrating different knowledge and skills from other subjects into project-based curricula.
- Teachers bring ICT added value to the curriculum in order to support students' active involvement in their own learning by:

- matching the ICT resources with pupils' level of subject knowledge and competency
- balancing ICT-based activities within a crowded curriculum
- devising pedagogic strategies which focus attention on subject matter and learning objectives
- directing pupils' attention towards underlying processes.
- Teachers bring ICT added value to the curriculum in order to support student learning in authentic environments by:
  - adopting a multidisciplinary approach, blending disciplines into thematic or problem-solving pursuits, usually in the form of projects
  - supporting the transfer of learning between subjects
  - integrating students' prior knowledge and understanding of the subject.
- Teachers bring ICT added value to the curriculum in order to support student interest and engagement in learning by providing learners with opportunities to practice subject concepts and skills in exciting environments, thus helping to reinforce learning (e.g. stimulating students to create and share content in different forms such as weblogs).
- Teachers use ICT tools and resources to design performance-based assessments in specific subjects that call on students to construct their knowledge and develop real products and services (e.g. organizing events such as conferences, creating artistic works and the like for an audience that cares).

Sources: UNESCO (2004); Becta/DfES (2003).

## **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Knowledge of digital support services and learning resources provided by professionals and paraprofessionals in the specific subject matter.

Knowledge of the potential of ICT resources not only for enhancing pupils' presentation skills but also in terms of affordances for challenging pupils' thinking and extending pupils' learning in a subject:

*ICT programs and units of work that provide students with basic skills needed to achieve learning outcomes across curriculum areas*  
*ICT enhanced effective learning and teaching methodology*  
*Principles of inclusive curriculum.*

Knowledge of technology-enhanced content related to the specific subject and the trans-disciplinary area.

Knowledge of what technologies are available for subject teaching and learning.

Knowledge of the various uses of ICT in a subject matter, with the support of best practice studies that illustrate meaningful deployment of these resources and point towards future developments and possible implementations in the coming decade.

Knowledge of subject-specific software which links directly to the content and purpose of the curriculum.

Knowledge of learning and development initiatives and activities integrating ICT in the subject area.

Knowledge of how the use of ICT enhances learning in the subject area.

Knowledge of how ICT uses change the nature and representation of knowledge and of the way the subject is presented to - and engages - pupils.

## 2.4 REFERENCES

- Harrison C., Comber C., Fisher T., Haw K., Lewin C., Lunzer E., McFarlane A., Mavers D., Scrimshaw P., Somekh B. and Watling R. (2002), *ImpacCT2: The Impact of Information and Communication Technologies on Pupil Learning and Attainment*, London, DfES and Becta.
- Education Queensland (2002), *Professional standard for teachers. Guidelines for professional practice*, Brisbane, Queensland Government, Education Queensland.  
<http://education.qld.gov.au/curriculum/learning/technology/cont.html>
- Cox M., Abbott C., Webb M., Blakeley B., Beauchamp T. and Rhodes V. (2003a), ICT and Attainment, A Review of the Research Literature, *ICT in Schools Research and Evaluation Series*, No. 17, Becta/DfES, Coventry/London.  
[http://www.becta.org.uk/page\\_documents/research/ict\\_attainment\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_attainment_summary.pdf)
- Cox M., Webb M., Abbott C., Blakeley B., Beauchamp T. and Rhodes V. (2003b), ICT and Pedagogy, A Review of the Research Literature, *ICT in Schools Research and Evaluation Series*, No. 18, Becta/DfES, Coventry/London.  
[http://www.becta.org.uk/page\\_documents/research/ict\\_pedagogy\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf)
- DfES/Becta (2003), *Young People and ICT 2002*, Coventry/London.  
<http://www.becta.org.uk/research/research.cfm?section=1&id=547>
- DfES (2003), *Fulfilling the Potential. Transforming teaching and learning through ICT in schools*, Nottingham.
- Passey D., Rogers C., Machell J., McHugh G. and Allaway D. (2003), *The Motivational Effect of ICT on Pupils*, Research Report RR523, DfES, London.  
<http://www.dfes.gov.uk/research/data/uploadfiles/rr523new.pdf>
- Commission Staff Working Paper, *New Indicators on Education and Training*, SEC (2004) 1524, Brussels, 29 November 2004.  
[http://europa.eu.int/comm/education/policies/2010/doc/indicators\\_en.pdf](http://europa.eu.int/comm/education/policies/2010/doc/indicators_en.pdf)
- European Commission staff working paper (2005), *Progress towards the Lisbon objectives in education and training*, SEC (2005) 419.  
<http://europa.eu.int/comm/education/policies/2010/doc/progressreport05.pdf>
- Gimbert B. and Zembal-Saul C. (2002), Learning to teach with

technology: From integration to actualization, *Contemporary Issues in Technology and Teacher Education* [Online serial], 2(2).

Available at:

<http://www.citejournal.org/vol2/iss2/currentpractice/article1.cfm>

Oblinger D., Oblinger J. (2005), *Educating the Net generation*, Educause.

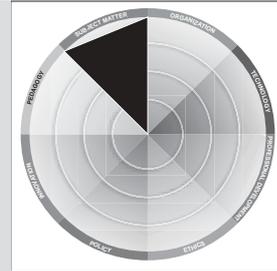
<http://www.educause.edu/educatingthenetgen>

UNESCO (2004), *SchoolNets - Integrating ICTs in Education, from Policy to Classroom*

<http://www.unescobkk.org/education/ict/resources/JFIT/schoolnet/decreport/wholedoc.pdf>

### 3 Teachers' interaction with **colleagues**

*Sharing practice, repertoire, and “know how” in uses of ICT in the subject area, both with colleagues and inside the teaching community*



#### 3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

##### Spreading effective practice

Peers play an important role in disseminating knowledge about what ICT resources and applications are available, and in demonstrating the benefits which technology can bring to the delivery and management of learning in particular areas. Teachers are usually more willing to learn and take advice from their peers operating in similar circumstances. Professional and other networks and associations, therefore, have a key role to play in developing professional practice with ICT. Given that ICT pedagogies are closely linked to subject pedagogies, especially at school level, *practitioner subject networks* have a particularly important role to play in defining, developing and spreading effective ICT pedagogies. ICT can also play a key role in supporting geographically widespread networks of practitioners and in joining together communities of professional practice aimed at developing a philosophy of pedagogy informed by the unique characteristics of their specific communities.

##### Cultural change – communities of subject ICT practice

Professional learning communities allow teachers to support the professional development of colleagues and receive support themselves. ICTs have increased the access to and reach of such professional associations. Mentorship can be fostered across geographic distances and supported by synchronous and asynchronous interaction.

Regional and international collaboration can provide ongoing mentoring and support for colleagues in the same school and in other locations.

Within these communities, teachers voluntarily develop educational use of ICTs in their own practice and in that of colleagues. They do this through the sharing of information and resources, and in discussions on the Internet. They engage in discussions on topics relevant to their needs and practices, such as ways to adapt foreign computers and software to local contexts. Such collaborative problem solving is important to many teachers who have relatively little access to technical support or opportunities to view new developments. The exchange of information is two-way, as it flows from the wealthy to the less

well-resourced and back again. The resourcefulness of colleagues in challenging situations inspires others towards better educational practices.

### **Informal support for innovation provided at a distance**

Electronic networks concerning successful use of ICT in education link teachers to others outside their own locality. These networks are something that benefit experienced teachers by providing:

- dissemination of good practice in specific subject areas
- communication and collaboration with other teachers
- increased motivation to use ICT effectively
- better access to resources and research
- improved ability to write educational materials for the World Wide Web
- greater understanding of the culture of the World Wide Web
- a sense of community and collegiality.

Sources: UNESCO (2002); Scrimshaw P. (2004).

### **3.2 ACTIONS RELATED TO THIS PRACTICE**

- Teachers encourage colleagues to work together in cross-curricular teams by:
  - sharing experiences, adopting common goals and tasks, promoting involvement and equal input from all teachers
  - sharing teacher-developed materials, i.e. freeware, materials, exercises
  - engaging in exchanges between different institutions with their material packages and classes.
- Teachers infuse ICT in their teaching practice by assuming a proactive attitude in:
  - seeking out suggestions, examples or support regarding the use of ICT
  - seeking out opportunities for training in accordance with their needs
  - searching for training resources, promoting training sessions
  - enabling the sharing of knowledge and experiences between teachers (on the basis of their personal competencies).
- Teachers contribute to the development of learning communities and other professional networks by:
  - identifying and accessing learning communities both within and outside the school in accordance with personal professional needs
  - experiencing the potential that learning community participation offers for improving their own teaching and learning practice and sharing that experience with others
  - pursuing opportunities for involvement in collaborative curriculum planning, and learning and development activities
  - discussing trends, issues and innovations pertaining to the subject area and examining ICT impact on teaching and learning practices

- taking opportunities to participate in the work of professional organisations, and in the development of syllabus and curriculum plans.
- Teachers contribute to the effective functioning of subject professional teams by:
  - participating in a range of informal and formal subject professional teams in accordance with personal expertise and interests, and school priorities
  - contributing to determine the goals, roles and responsibilities of work teams, consistent with the school's policies, procedures, planning frameworks and priorities
  - using ICT to monitor and review work teams with the aim of enhancing team performance and achieving agreed goals
  - using ICT for establishing and maintaining ongoing communication and effective cooperation with relevant professionals, paraprofessionals, teacher aides and other personnel.
- Teachers encourage long-term collegial interaction within and between subject departments by:
  - facilitating observation of colleagues' lessons, presentations at meetings, training initiatives
  - engaging with subject or specialist associations
  - developing resources and projects with colleagues
  - involving a group of enthusiasts within a school and then extending this to larger groups of teachers from other schools, and even teachers from different districts, states, or countries.
- Teachers and other educationalists take the lead in designing, developing and sustaining such communities.

### **3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Awareness of professional associations.

Awareness of professional and community networks.

Knowledge of staff/team/work-group dynamics.

Knowledge of teamwork techniques.

Knowledge of communication and negotiation techniques.

Knowledge of ways of sourcing information on educational trends, innovations and issues.

Knowledge of the characteristics and elements that underpin teachers' communities of practice:

*The nature of a community of practice*

*The nature of collaboration and cooperative work*

*Mutual relationships*

*Common enterprise*

*Shared repertoire.*

Knowledge of the characteristics and elements that underpin teachers' web based cooperative learning:

*Cooperative learning in adult education*

*Cooperative learning strategies*

*On-line education in schooling.*

Knowledge of the characteristics and elements that underpin teachers' virtual learning communities:

*Roles in a virtual learning community*

*The role of the online tutor*

Knowledge of how ICT can help in finding and communicating with subject-area professional bodies able to support learning activities.

Sources: ULEARN Syllabus (2003);  
Education Queensland (2002).

### **3.4 REFERENCES**

Pelgrum W.J. and Law N. (2003), *ICT in education around the world: trends, problems and prospects*, UNESCO, International Institute for Educational Planning, Paris.

EURYDICE (2004), Report IV: Keeping teaching attractive for the 21st century, Key topics in education in Europe, Volume 3, *The Teaching profession in Europe: profile, trends and concerns*, Brussels.

OECD (2004), *Completing the Foundation for Lifelong Learning*, an OECD Survey of Upper Secondary Schools, Paris.

Joint Interim Report of the Council and the Commission, *Education & Training 2010: the success of the Lisbon strategy hinges on urgent reforms*, outcome of the proceedings of the European Council on 26 February 2004, 6905/04, EDUC 43. COM (2003), 685 F (Brussels, 3 March 2004).

[http://europa.eu.int/comm/education/policies/2010/doc/jir\\_council\\_final.pdf](http://europa.eu.int/comm/education/policies/2010/doc/jir_council_final.pdf)

Education Queensland (2002), *Professional standard for teachers. Guidelines for professional practice*, Brisbane, Queensland Government, Education Queensland.

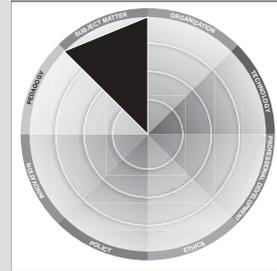
<http://education.qld.gov.au/curriculum/learning/technology/cont.html>

UNESCO (2002), ICT in Education. A curriculum for school and programme for teacher development, in Scrimshaw P. (2004), *Enabling Teachers to Make Effective Use of ICT*, Becta, Coventry/London.

[http://www.becta.org.uk/page\\_documents/research/enablers.pdf](http://www.becta.org.uk/page_documents/research/enablers.pdf)

## 4 Teachers' interaction with the external environment

*Using local and global resources to foster learning in a given subject area*



### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The changing culture of students emphasizes the need for more connections between learning inside and outside school and - at least in the industrialized countries - for the use of modern technologies (ICT). The use of ICT provides an opportunity for teachers and students to interact with both local and global communities. Interaction may range from building school web sites that address the local community to engaging in projects with schools located at a distance. Community involvement may include parents, families, businesses, industry, government agencies, private foundations, social, religious and professional organizations, as well as other educational institutions such as vocational schools and universities.

#### Learning beyond the institution

There is evidence that schools and colleges are beginning to use ICT to facilitate links with the outside world, notably with the home and the workplace, and there is a good basis for taking this forward. Young people's access to, and use of, the personal computer at home has reached fairly high levels and continues to grow; furthermore many schools provide access to computers outside school hours. In addition, teachers generally have high levels of access to personal home computers, and many institutions now have intranets and websites (though these are not always linked) which have the potential to support the process of extending learning opportunities beyond the institution.

#### Continuity of learning/home-institution links

There has been an increase in emphasis on home-school relationships. Research findings suggest that home-school links can be effective and are a significant factor in school improvement. The academic literature in the fields of educational psychology and the sociology of education and childhood have also paid particular attention to these relationships, focusing on the individual's active construction of socially and culturally situated knowledge. Research has identified that home-school links can have a range of beneficial outcomes, including:

- improved academic standards
- increased engagement with homework and other schoolwork
- greater parental involvement and building of collective social capital
- mobilising and drawing upon expertise from a wider pool of individuals and groups
- building better lines of communication between parents and schools and also the wider community
- increased feelings of empowerment and ownership amongst family members, particularly when consulted in the planning and implementation stages
- promoting of self-esteem
- reducing social exclusion
- increasing school interest in other areas of family need, and better understanding of family circumstances, needs and requirements.

As well as benefiting educational standards, these reciprocal and effective exchanges may also have affective and social advantages by increasing knowledge and cooperation surrounding learning objectives, and this in turn may help to improve school performance.

Sources: Education Queensland (2002); Becta (2002);  
DG Education and Culture (2005).

#### **4.2 ACTIONS RELATED TO THIS PRACTICE**

- Teachers use the external environment to enrich the curriculum by:
  - making use of the wealth of education resources in the local community (e.g. charities, museums, etc.)
  - providing real-world contexts through which learning takes place, thus broadening students' horizons
  - choosing holistic and sensitive approaches that consider problems and difficulties which already exist in the wider community
  - making regular re-evaluation of initiatives, their aims and means for inclusion.
- Teachers facilitate continuity between institutionally-based learning and learning elsewhere by including effective and efficient strategies for linking learning inside and outside the institution using ICT.
- Teachers promote links between school and the workplace by:
  - being involved in joint initiatives with university, businesses or business associations in order to promote *entrepreneurship teaching*
  - acting as 'innovators' within the school and identifying counterparts in the wider community to support the initiative.
- Teachers encourage schools to enter into fruitful partnerships with the private sector, particularly the IT industry, so that both can take advantage of mutual benefits.
- Teachers strengthen relationships with families and the community by:

- creating a concept of shared responsibility for students' learning
- defining clear and effective mechanisms for communication between all parties involved
- involving young people in a process of consultation and initiative development so as to increase feelings of ownership and responsibility and thus empower students
- choosing and developing a number of diverse strategies to encourage external participation.
- Teachers contribute to changes in the way schools perform internally and externally by:
  - extending the services schools offer to pupils, parents and the wider community, e.g. by offering their experience in ICT to parents, perhaps in the form of courses, so they can follow their children
  - facilitating and supporting work with groups in society who don't have access to ICT
  - increasing contact with other social support and voluntary agencies
  - moving toward a holistic approach to schooling.

#### **4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Awareness of the Digital Divide.

Knowledge of the range of factors contributing to the successful implementation of ICT-supported home-school links.

Understanding of needs, wants and cultural backgrounds, and establishing effective and inclusive mechanisms for communication.

Knowledge of effective pedagogical and instructional strategies and 'key learning concepts', and how ICT can support the curriculum.

#### **4.4 REFERENCES**

Becta (2002), *Using ICT to Enhance Home School Links*, ISBN 1 84185 655 X.

Education Queensland (2002), *Professional standard for teachers. Guidelines for professional practice*, Brisbane, Queensland Government, Education Queensland.

<http://education.qld.gov.au/curriculum/learning/technology/cont.html>

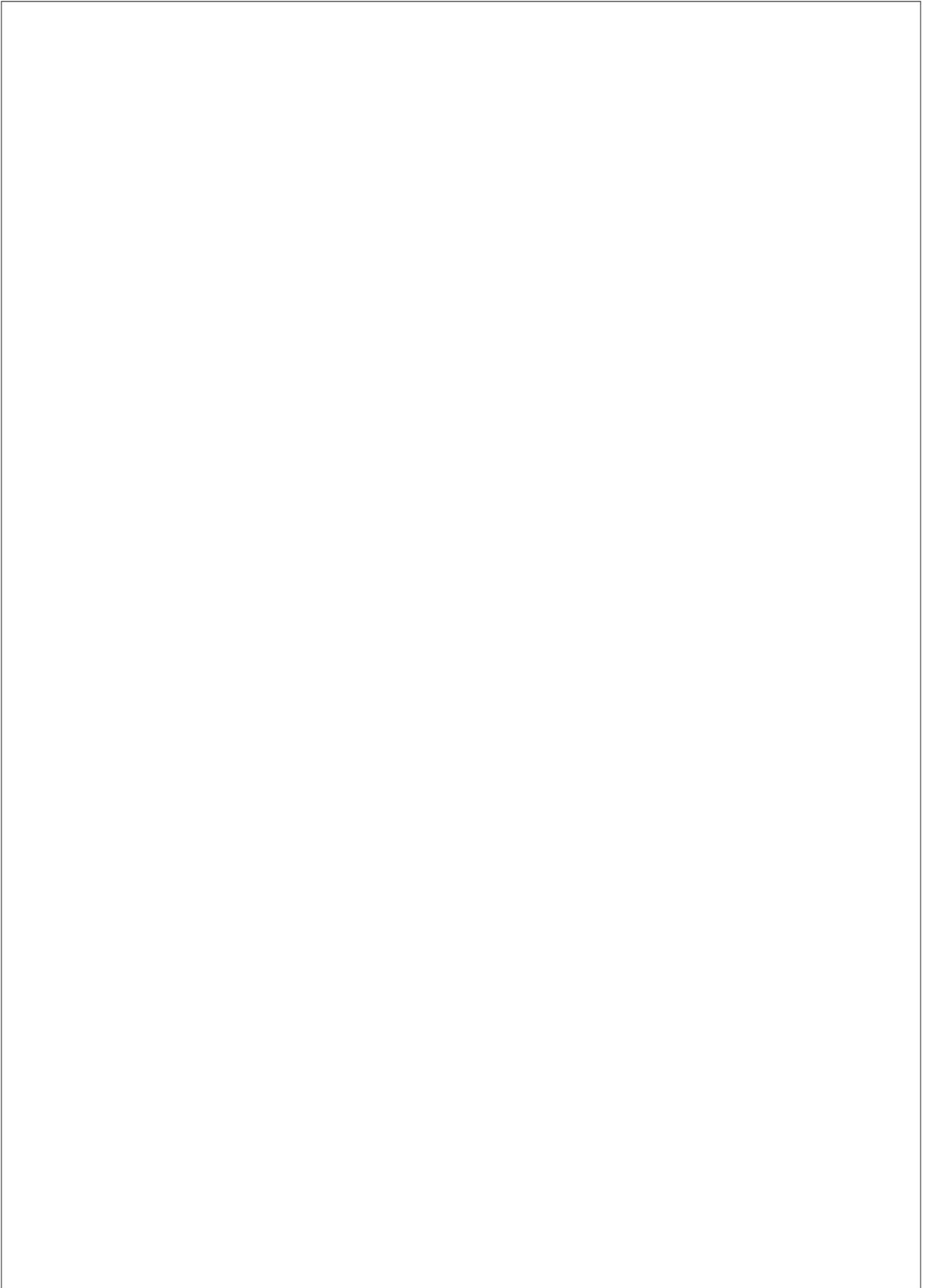
UNESCO (2002), *ICT in Education. A curriculum for school and programme for teacher development*.

European Commission, DG Education and Culture (2005), *Study of the e-learning suppliers' "market" in Europe*.

[http://europa.eu.int/comm/education/programmes/elearning/studies\\_en.html](http://europa.eu.int/comm/education/programmes/elearning/studies_en.html)

Commission Staff Working Paper, *New Indicators on Education and Training*, SEC (2004) 1524 (Brussels, 29 November 2004).

[http://europa.eu.int/comm/education/policies/2010/doc/indicators\\_en.pdf](http://europa.eu.int/comm/education/policies/2010/doc/indicators_en.pdf)

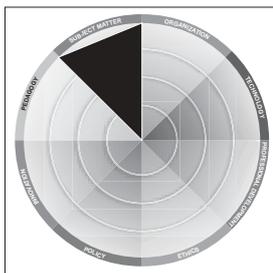


---

## **4.a Curriculum/ Subject matter foreign languages**

*The following is a brief example of how a specific subject area (in this case foreign languages) might be addressed within the Common European Framework.*

*author Jeffrey Earp*



## 2 Teachers' interaction with **pupils** *foreign languages*

*Designing and managing learning environments which take into account the opportunities and limits within the didactics of foreign language learning*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

*From "The Impact of Information and Communications Technologies on the Teaching of Foreign Languages and on the Role of Teachers of Foreign Languages" - a report from the International Certificate Conference, commissioned by Directorate General of Education and Culture.*

The use of computers in the teaching and learning of Foreign Languages (FLT & FLL) in universities dates back to the 1960s, but it was not until the advent of the personal computer (PC) in the late 1970s that computers became accessible to a wider audience. By the mid-1980s computers were in widespread use in European schools and the acronym CALL (Computer Assisted Language Learning) had been coined. Nowadays it is more appropriate to talk about Information and Communications Technology (ICT) and FLT & FLL rather than CALL, thereby emphasising the important role that computers play in enabling teachers and students of languages to communicate with one another across the globe. The growing importance and globalisation of ICT in FLT & FLL was reflected in the establishment in 1986 of EUROCALL and in 1998 of WorldCALL, European and global organisations of professional associations that aim to outreach to nations currently underserved in the area of ICT and FLT & FLL.

ICT is ubiquitous in contemporary society and permeates almost all forms of human interaction. Its presence and usage have brought about changes of paradigms in communicative behaviour, above all in the spheres of business and administration, and governments in Europe and beyond have become increasingly aware of the need to provide education and training to meet the challenges and opportunities which the global economy, fuelled by developments in ICT, presents.

The new technologies are breaking down borders and barriers at a faster rate than is possible in physical terms. Sudden, unexpected encounters with other languages and cultures confront European citizens with new choices, opportunities and challenges. Thanks to the WWW, access to authentic materials has

never been easier; vast linguistic resources and an exhaustive range of materials are available in all languages of the European Union and beyond, ready for immediate exploitation.

The aim of this report was to survey current developments in ICT, to measure its impact on FLT & FLL in Europe and to predict possible future developments. One important fact that has emerged from this study is that Foreign Languages as a subject area is “different” from most other subject areas in the curriculum, namely that it is skill-based as well as knowledge-based, and in this respect it has more in common with Music than, say, History or Geography. This has implications both for the types of hardware and software that are used in FLT & FLL, but also for FLT pedagogy and methodology.

The acquisition of new skills, referred to in the report as “the new literacies” (technical, critical, linguistic and cultural), plays an extremely important role in the acceptance, adoption and use of ICT in FLT. Teacher training is shown to be the key to the successful introduction and deployment of the new media. Special efforts are required to overcome observed gender and generation divides and to redress the balance by providing specific training programmes which encourage female teachers and older faculty to become acquainted with ICT and its attendant advantages.

With regard to pedagogy and methodology, research has shown that a “shift of paradigm” is necessary in teacher / learner roles. Co-operative, collaborative procedures are called for to harness the wide range of possibilities the new media offer. Teachers are called upon to abandon traditional roles and act more as guides and mentors, exploring the new media themselves as learners and thus acting as role models for their learners. The case studies show that there is closer interaction between teacher and students when the new media are employed.

Concerning the general availability of the necessary technology, recent statistics indicate that all Member States of the European Union are well on the way to achieving a satisfactory state of “network-readiness” which will facilitate and promote eLearning. The same is largely true of the pre-accession countries, which are making remarkable efforts to catch up and to bridge the digital divide.

Research also indicates that European teachers seem to be overwhelmingly open to technological change with an enormous reservoir of potential Internet users amongst EU teachers. Although there are few specific statistics for language teachers, what information is available indicates that, apart from ICT subject specialists, language teachers are the most open to the use of the new media.

However, the use and deployment of ICT in FLT and FLL is far from satisfactory, as ICT resources are traditionally reserved for “(computer) science” subjects, and rarely assigned to arts subjects. A general lack of appropriate training of language teachers in meaningful uses of ICT tends to strengthen this trend.

The case studies presented in this report provide samples of good practice and illustrate that the use of ICT increases motivation amongst teachers and learners alike and leads to improved performance and motivation on the part of the learners.

In their responses to the questionnaire distributed, ministries of education showed a growing awareness of the need to address the question of providing specific support for ICT in FLT. Research into this area is being initiated and teaching / learning programs are being developed for a number of languages (albeit the most frequently taught and used in Europe). Most expect a considerable increase in the use of ICT in FLT & FLL in the near future.

Experts polled about the future use of ICT in FLT & FLL are unanimous in their view that ICT will play an increasingly important role as the new media become increasingly integrated into everyday life. They predict greater co-operation and collaboration at a European and at a global level, particularly significant for the least widely used and least taught languages (LWULT). Advances in technology and increased user-friendliness of equipment will break down resistance to ICT use in and outside the classroom. The present fascination with technology will fade, giving way to an emphasis on improved pedagogy which will facilitate “blended” learning, which will become increasingly time and place independent. There will be a shift from passive consumption of ready-made programmes to independent building of content, tailor made for specific groups or individuals.

However, the experts emphasised that, although increasing use is being made of ICT for content research and immediate communication needs in foreign languages, at present, not enough attention is being devoted to questions of how the new media can systematically aid language acquisition and learning.

In summary, it can be said that the positive potential of ICT in FLT & FLL has been recognised, the technology and materials are available, but ongoing training is essential if we are to reap the benefits of the rich learning environment which ICT offers for foreign language learning.

### **2.2 ACTIONS RELATED TO THIS PRACTICE**

- Provide language learning environments and situations that:
  - allow students to interact with multimedia rich material so as to engage them on various cognitive and sensorial levels
  - afford opportunities for students to communicate in interesting and meaningful ways
  - include opportunities for reflection about language meaning and about the language learning process (learning to learn)
  - encourage learners to participate in collaborative efforts, where learners and teachers complement one another’s skills, expertise and knowledge.
- Involve students in projects of an interdisciplinary nature, where there are opportunities for collaboration and for developing target language skills in specific contexts.

- Provide students with adequate linguistic support and mediation so as to allow them to take full advantage of the opportunities made available through the use of ICT.
- Reflect on the structure and organisation of language class activities dedicated to specific topics (chosen by the students, assigned by the teacher) which call on students to use and represent their knowledge of the target language.
- Encourage students to be active creators of the target language and not merely passive recipients of it.

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Knowledge of technology-enhanced learning environments and of the opportunities and challenges they can offer within language learning and teaching.

Knowledge of the impact on the language learning process that derives from the adoption of different media within language learning and teaching.

Knowledge of different methodologies and approaches to language teaching and learning and how these are affected and enhanced by ICT.

Awareness of new types of language forms and genres, and to what extent language acquisition must be complemented by language socialisation.

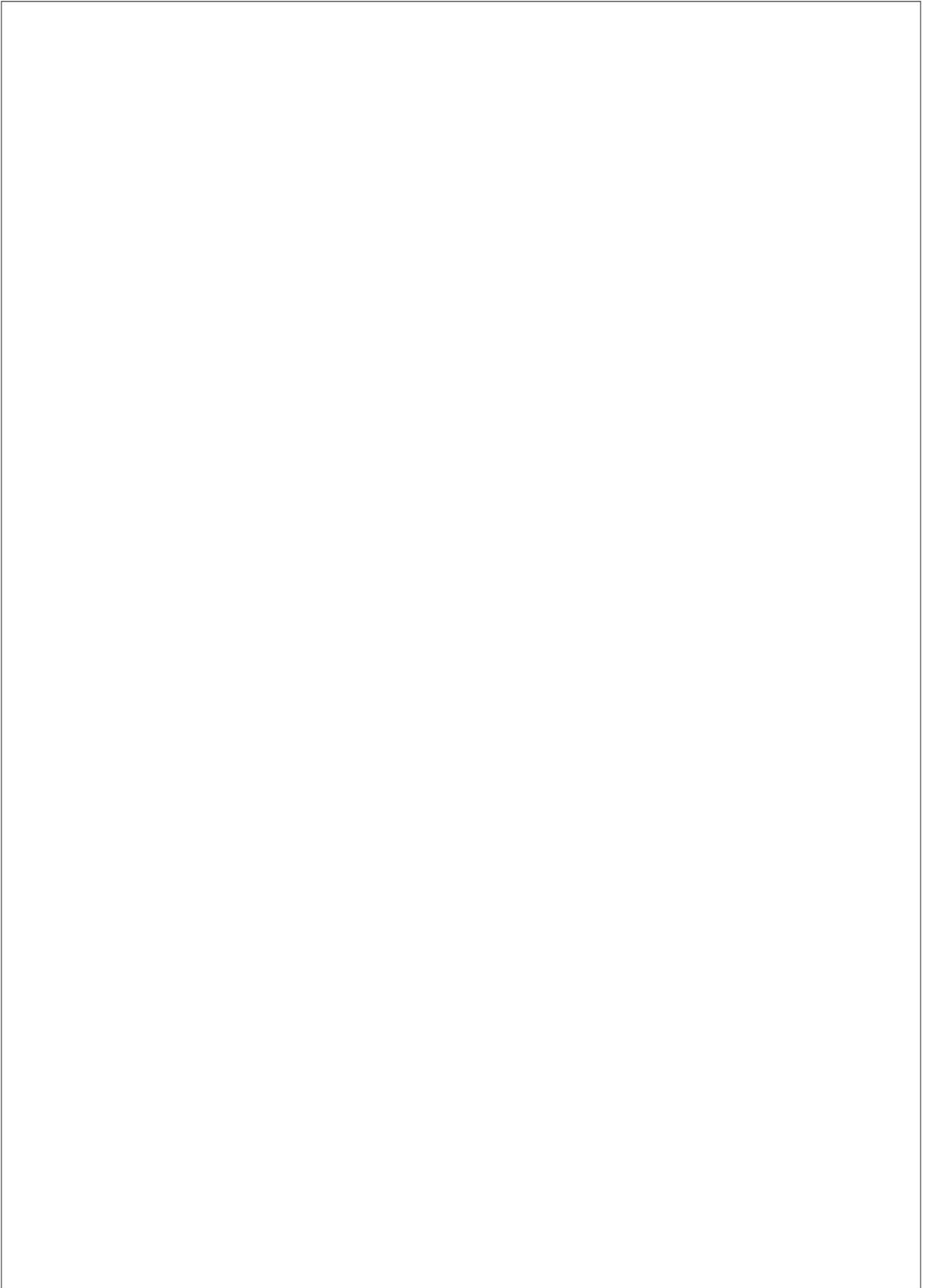
Knowledge of how ICT can change language acquisition and how paths and activities may be designed to exploit those changes for language learning purposes.

### **2.4 REFERENCES**

*The Impact of Information and Communications Technologies on the Teaching of Foreign Languages and on the Role of Teachers of Foreign Languages* (downloadable in PDF or Word format from the ICC website: <http://www.icc-europe.com>).

*Information & Communications Technology for Language Teachers.*

<http://www.ict4lt.org>

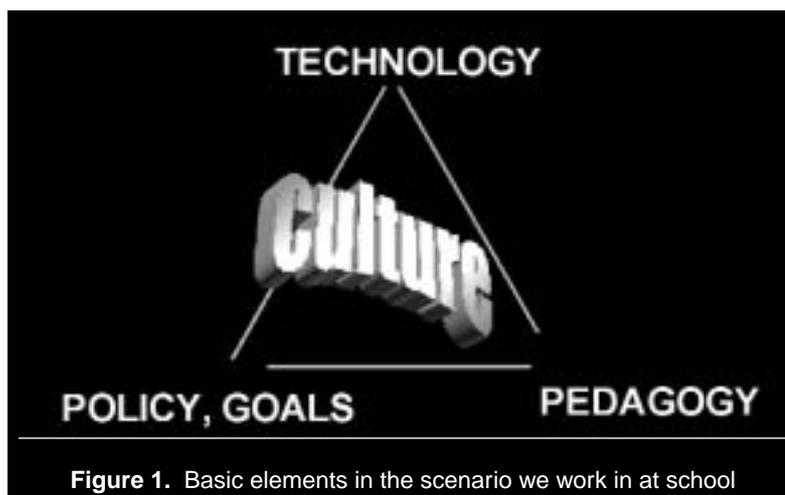


---

## 5. Organisation

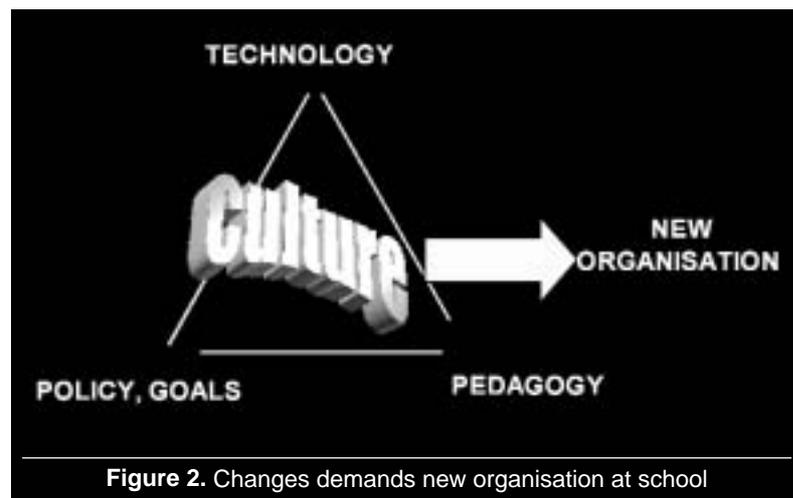
*author* Carl Holmberg

Introducing new policy, goals, pedagogy or methodological ideas in the school context nearly always has consequences for how school and schoolwork is organised. Changes in one element in the school structure have effects on almost all the others. When it comes to the introduction of new technology, this definitely has an impact on organisational issues. The scenario we work in at school can be illustrated as in the figure below. Technology or other aspects of the physical environment, pedagogy, policy and goals are interlinked phenomena. What happens in the interplay between them is to a large extent dependent on traditions and values, defined in the illustration below as “culture”. The local culture sets a framework for what does or does not happen when changes are expected to take place.



**Figure 1.** Basic elements in the scenario we work in at school

Thus the strong focus in recent decades on ICT and its introduction in schoolwork is not just a question of investing in computers and Internet access, it also has consequences for goals and pedagogy at school. The same situation appears when theories of collaboration and learning gain ground and of course when policy is changed to set a new agenda for schools. Whatever aspects in these areas are changed and however the interplay between them works, change as such must also result in new organisational solutions.



**Figure 2.** Changes demands new organisation at school

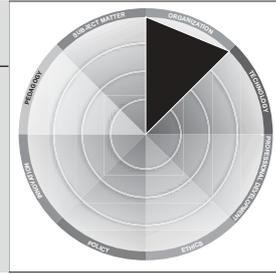
The figure above illustrates that if one changes policy, goals and/or pedagogy and/or technology, demands are always generated for creating new organisation.

This examination of organisation deals with the physical setting for teachers' work as well as the visible and not so visible structures that are built between people to perform that work. Thus organisation in this case comprises the arrangements for schooling, how classrooms and school buildings are designed, and also those aspects that can be looked up in tables and diagrams and that are identifiable as structuring elements behind activities in the classroom. It is also how people in school and the surrounding society link up to each other in networks.

It is difficult to embrace fully the complexity of the transactions needed and expected when the knowledge society, in the form of new policies, goals, pedagogies and technologies enter schools, but the examples given will hopefully provide ideas for further elaboration.

## 1 Teachers' interaction with **the self**

*Constructing a personal vision of school organisation that responds to the demands and challenges of the knowledge society*



# Organisation

### 1.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

A 100 year-old person revisiting school would most probably recognise from her childhood most of the activities and elements in the modern school setting. Most of the teachers she would meet would have undergone training to suit that very type of classroom situation. Teacher training is often based on historical facts and experiences, not on well-informed guesses or prognosis about the future. Policy developments, the developments in educational and pedagogical theory and the developments of school-related technologies call for different organisational solutions, at class-room as well as at school level.

New architectures, new professional networks, new surroundings for learning are consequences of those developments. The teacher has to be knowledgeable about these developments and to develop a personal position and share that with fellow-teachers and school management.

Many concepts are used to describe this new school and new aspects of learning. Some stress a new policy position towards schooling and schoolwork. Examples of this are lifelong learning and just-in-time learning, both of which are commonly thought of in conjunction with adult education, but the thinking behind those policies has significant consequences when applied at school level. Other concepts of the new school are more closely connected to pedagogy. Examples are individualised learning, edutainment, and learning labs. These too have strong impact on the daily work in school when they are implemented.

A concept which summarises very well the effects of new pedagogy, new policy, new technology on school organisation is *flexible learning*. Flexible learning is a concept that entails a strong student focus, catering for students' individual needs via ICT use. Aiming to achieve flexible learning has consequences above all for different organisational issues in school.

A teacher alone cannot be responsible for altering century-old school structures. But as one of the most important actors in school and the one who in the end is accountable for what actually takes place with and around the learners, she has to make the links between school organisation and the demands

from the knowledge society. And organisation concerns not just the classroom, but also the classroom environment in its wider sense.

## **1.2 ACTIONS RELATED TO THIS PRACTICE**

To gain an overview and the insights needed to find solutions to organisational issues the teacher needs to study and orientate herself about frontline thinking and research in these areas and what consequences these hold for schools and classrooms.

Accordingly, she can

- Look into the world of experiences:
  - the web offers many possibilities to visit schools virtually and study their solutions on the organisational issues discussed here
  - look for reports from teachers in the teacher press, books, etc;
  - study literature demonstrating future scenarios for individuals, schools and society
  - attend conferences
  - interview people from different fields such as distance education and organisational theory.
- Look into the world of research:
  - on classroom and school-organisation
  - on ICT
  - on flexible learning, e-learning.
- Reflect upon her own practice:
  - put her own work and classroom organisation in relation with what she finds in the literature
  - study the organisation of her own school and the structures around her school and relate that to the experiences and findings in the literature.

## **1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

It is a challenging task to study, reflect upon and maintain a critical attitude towards reports of experiences and research results. In order to do so, teachers require some training in research methodology. That already is the case in some teacher training systems, but more often than not this type of training is lacking.

Organisational theory is another extremely demanding area of related knowledge.

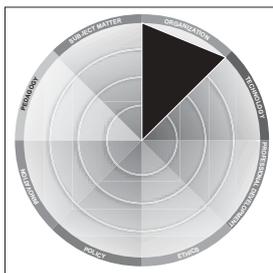
## **1.4 REFERENCES**

A very interesting scholar who writes articles and books that really communicate is Prof. Andy Hargreaves. Many of his works are of great relevance to this theme. Some recent speeches of his are available at: <http://www2.bc.edu/~hargrean/speeches.html>

Hargreaves homepage – <http://www2.bc.edu/~hargrean/>

A presentation of the concept of flexible learning and its consequences for school organisation:

- Holmberg C. (2002), *Flexible Learning - Challenges for teachers, schools and authorities*, EMINENT 2002, Stockholm 21-22 November 2002
- Tydén T. (1995), *When School Meets Science*, Stockholm Institute of Education Press.
- Jedekog G. (2000), *Teachers and computers. Teachers' computer usage and the relationship between computers and the role of the teacher, as described in international research*, Uppsala Universitet, Pedagogiska Institutionen.  
<http://publications.uu.se/theses>
- Hultman G. (2001), Leading cultures - A study of acting in context and the creation of meaning in work activities of principals, *International Journal of Leadership in Education*, vol. 4, No 2, pp. 137-148.
- Hultman G. (2002), Big change questions - Linking levels of learning, *The Journal of Educational Change* (In press).
- Granström K. (1996), Decentralization and teachers: Professional status cannot be granted, it has to be acquired, in Boyd W., Chapman J. and Lander R. (Eds.), *Quality, Equality and Control in Education: International responses along the centralization-decentralization continuum*, Cassels, London.
- Important web sites: [www.eun.org](http://www.eun.org) [www.eenet.org](http://www.eenet.org)



## 2 Teachers' interaction with pupils

*Within the limits of context constraints, implementing an organisation of the school/classroom that responds to the demands and challenges of the knowledge society*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The concept of the “knowledge society” has many connotations and embraces many aspects. Its relation to schools and schooling is manifold. Whilst in old days schooling was to a large extent focused on learning *per se* and rather strictly defined forms for the processes involved, the knowledge society puts new demands on the outcomes of schooling and therefore also on the processes and environment leading to outcomes. One could say that out of the two concepts “surface learning” and “deep learning”, schools in the knowledge society should focus on *deep learning*. Another aspect of this new era is a focus on the use of knowledge, on the idea that knowledge should be linked to the empirical world, with opportunities to marry knowledge with competence, the possibility not just *to know* but also to know *how to do*. These consequences of the knowledge society also place new demands on the environment, at classroom as well as at school level.

Focusing on the learner and putting the learner at the centre of all school activities is on everyone’s lips. Does this manifest itself in an altered or adapted setting for students? Of course in one way or another school has always to some extent been learner centred. But with higher ambitions in policy, involvement of pedagogic theory and the possibilities which come with new technologies, schools can take a big leap forward in developing organisational environments, adapting contexts that really support pupils. These aspects also have an impact on how schools are designed and how schoolwork is organised.

The knowledge society is also closely linked to the use of computers and networks. At the present rate of development, many European countries are likely to achieve a 1/1 computer/teacher ratio within a few years and a student/computer ratio varying from 1/1 to 3/1. Another change that is already happening and will certainly gather pace is the move towards wireless networks (WLAN). This will have significant effects on how, where and when students can work and study.

With computers, teachers also have new tools for performing many of the tasks within their profession: administrative matters, tutoring, commenting on students’ work, communication with colleagues and parents, etc, etc.

Thus questions could be raised about

- the architecture of school buildings
- the design of classrooms
- equipment in classrooms
- teachers' organisation of work
- schedules for students' school work.

To further illustrate these organisational aspects an example follows.

Allowing students to determine the direction of schoolwork to a considerable extent demands a school characterised by diversity. One consequence of extensive individualisation is that the majority of children will be doing different things. Each one chooses his or her own direction and maps out the path, naturally assisted by the teacher. This places tough demands on access to information and schools have not had much chance to adopt such working methods.

The school library, as well as opportunities for study visits, have played an important role but are not sufficient resources for achieving that diversity. Schoolbooks contain answers to ready-made questions that may well be entirely different from the questions that are of interest to students. Having access to ICT means children themselves can gather information on different topics that interest them. They can more easily peruse library resources and employ them more effectively. Via networks and computer screens they can visit different environments and obtain material from information databases.

In a process of this type the teacher will face many tasks that are wholly or partially new. Perhaps the most important task will be to give pupils the tools to analyse the information they gather. Seeing relationships between material from different sources and maintaining a critical attitude to assertions, factual information and images is difficult. These complex tasks require knowledge and training. At the same time, these are the types of skills needed by every individual in a society abounding with information. This type of knowledge is usually referred to as meta-knowledge, knowledge of how to develop knowledge. The teacher naturally plays a very central role in this work. The teacher's focus will be to provide support in difficult selection processes and to train the students in criticism and analysis of the collected material. The core features of the teaching role do not change however, namely to accept responsibility for and contribute to the intellectual development of each pupil.

## **2.2 ACTIONS RELATED TO THIS PRACTICE**

Working together with colleagues, teachers need to create a realistic future scenario for schooling, with classrooms functioning for flexible learning, and then strive to realise that scenario. This could be thought of as highly ambitious, but the basic idea behind it is that teachers have to be empowered and need to exercise broader responsibilities in education.

In the following, organisational issues will be explored at three different levels.

- **Aiming at organising teachers' own work in the school of the knowledge society**

In almost all fields of working life computers and networks have dramatically changed working conditions, especially for those engaged in intellectual tasks. Making and documenting long-term plans, keeping track of different events, organising one's own material and material from students, producing and reporting statistical information: all these things have been enormously simplified. The critical issues here is to select software that is easy to learn, easy to use and which is adaptable to teachers' varied work situations. The software should also be acceptable to colleagues so it supports cooperation. A wide variety of tools are available on the market for these purposes. What software to select is of course a local decision.

Investing time in exploring the software and then getting used to it could represent a totally new work scenario for a teacher.

- **Aiming at organising a classroom in a school of the knowledge society**

The ongoing transformation of education has also put new demands on classrooms or, should we say, study-environments. Today's cutting edge schools feature totally reorganised settings for students. When students are granted an increasing degree of freedom to pursue their own interests, to set their own course of progress and to individualise their studies - all made more possible today with the use of computers and networks - , this places demands on the social and physical organisation of a study environment. They must have the possibility to work undisturbed alone or in small groups. The environment must also allow close and undisturbed interaction between teachers and students for advice and guidance, for content related and more pastoral (moral) support. So the teacher must have access to an environment which allows for the formation of different study groups, social organisations, choice of learning styles, and so on.

In this scenario, physical environments – group rooms, library and study cells - are equipped with technical infrastructure: high-speed access to the Internet (WLAN) and availability of technical support, software, up-to-date technology. This makes special computer rooms obsolete. An important tool for both teachers and students is the use of the ePortfolio. An ePortfolio allows students to document what they have done in and outside (informal learning) school over the school year. Teachers integrate some of their comments and use the portfolio as a basis for grading students.

- **Aiming at organising the school**

A single teacher has of course limited power when it comes to issues regarding school architecture and the overall organisation

of the school. Still, she needs to be an advocate for advances in adapting buildings and overall work structures to the new scenarios. A school building in the knowledge society ought to be adapted to working styles that are characterised by high degrees of interplay between students, with different resource centres available for use both in school and in the local community; individual work should also be supported.

What does this mean? The new schools are not just on the drawing boards of architects; one can also find them in reality. One of the most striking features in the evolving examples of new school buildings is perhaps the absence of traditional corridors and the presence of many group rooms or other spaces for individual or small group work. There are also examples of buildings with lots of open space, furnished with tables and chairs and with the ambition to promote spontaneous meetings between students from different age groups or following different study-paths. In these cases one of the prerequisites for good functionality is the computerisation.

For ages, school days and intermissions at school have followed a general “one-size-fits-all” pattern. Such an approach is quite clearly in contrast with the thinking we are discussing here. Study is a process that varies in the time and context required for fulfilment, between subject areas and between students. School days thus need to have flexible schedules.

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

#### **The relation between physical settings and learning**

In the literature there are demonstrations of how to organise schools and classrooms. There are close links between different pedagogical approaches and/or different goals for schooling and how buildings and study environments are designed. This is a specialist field for architects, but at the same time teachers are the ones with the “classroom-floor-level-knowledge” and they should take part in the processes where alternative solutions for school design are discussed.

There are also links between environment and learning from another perspective. The situation where knowledge is gained is of high importance. This is also demonstrated in the literature. From those theories stems the idea to move learning from artificial milieus, like a traditional school, into situations closer related to what is to be learned. Moving study activity to offices, factories, laboratories, museums are examples of this thinking.

#### **Knowledge about applicable software**

The world of computer software is expanding into a manifold of applications. A teacher in the knowledge society needs some orientation in what is available and how different applications work. When specific software is chosen, she needs to develop her knowledge on how to use it and how to adapt it to her work situation.

## 2.4 REFERENCES

Angus Max, Chadbourne R. and Olney H., School Innovation: Pathway to the Knowledge Society, Chapter 7, *Instructional Flexibility*.

[http://www.dest.gov.au/sectors/school\\_education/publications\\_resources/school\\_innovation/chapter\\_7.htm](http://www.dest.gov.au/sectors/school_education/publications_resources/school_innovation/chapter_7.htm)

Bergqvist K. (2001), Discourse and classroom practices. Reflectivity and responsibility in learning and instruction, *Nordisk Pedagogik*, 21, nr. 2, pp. 82-91.

Granström K. (1997), Classroom management in Sweden: Rhetoric and practice, in Shimahara K. (Ed.), *Classroom management: A crosscultural perspective*, Garland Publishing, Hamden.

Granström K. (1996), Private Communication between students in the classroom in relation to different classroom features, *Educational Psychology*, 16, pp. 349-364.

Open Classroom initiative

<http://www.eden-online.org/eden.php?menuId=89>

Rüschhoff Bernd and Andreas Lund, *New Technologies and Language Learning: theoretical considerations and practical solutions*.

[http://www.ecml.at/projects/voll/rationale\\_and\\_help/theory/menu\\_theory.htm](http://www.ecml.at/projects/voll/rationale_and_help/theory/menu_theory.htm)

Säljö R. (1999), *Learning sites: Social and technological resources for learning*, Pergamon, Oxford (Published in association with the European Association for Research on Learning and Instruction).

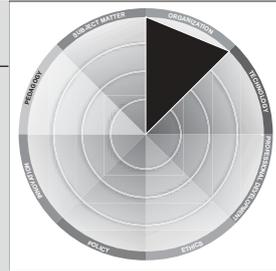
Säljö R. (1982), *Learning and understanding: A study of differences in constructing meaning from a text*, Acta Universitatis Gothoburgensis, Göteborg.

Westlund I. (1995), *Searching for temporal autonomy*, paper presented at ASSET (Association for the Social Study of Time) conference, Dartington, England.

Westlund I. (1996), *Three dimensions of time. The perspective of children*, paper presented at Nordic Youth Research Symposium, NYRIS 5, Tönsberg, Norge.

### 3 Teachers' interaction with **colleagues**

*Sharing practice, repertoire, and organisational visions and cooperating with colleagues on classroom and school organisation*



#### 3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

More and more of teachers' work is shifting away from situations where a single teacher solves all issues around students' learning and towards work in teams. This teamwork has different facets.

In the school situations that are now becoming a thing of the past, teachers were instructors, tutors, often multi-subject specialists and the sole person in the classroom for the students to relate to. In the evolving scenario teachers work together, contributing with different subject area knowledge, but also with different personal attributes. When it comes to learning at school, academic disciplines are increasingly being replaced by multi-disciplinary approaches. The areas of study are more holistic and closer to real life. To perform such activities at school, teachers with different backgrounds have to work together, forming temporary or long-term teams.

Using new media at school also calls for teamwork. One can see examples where teachers are expected to master all new technologies. My belief is that a position like that is not sustainable. The teaching profession is already complex and broad-ranging enough as it is; expanding it to include advanced media use is not a realistic way forward, but for the few. Networks, computers, digital equipment for documentation etc. all need technical support. Teachers may be knowledgeable users, but for the more advanced applications and for technical matters involved in running systems, specialists need to be on hand to support teachers.

Another example of media use is local production of learning material. This is also a growing application area for the new technologies, and on that has many advantages. The material used by students can be adapted to local contexts, to individual needs and kept up to date. Many software tools are available to help the teacher with these production processes, but in order for learning material to meet high quality standards it is important that there is support from people with knowledge in graphic design and/or similar professional areas.

Librarians often have a set role in schools. However, when students work with a plurality of sources in order to collect information. greater demands will be made of this professional category. The same could also be true of curators and educationalists at museums.

People with competence in information gathering and scrutiny of information quality should support students and teachers.

When schoolwork branches out into new contexts as illustrated above, teachers will also gain new colleagues. Thus new professions will move into the sphere of schools, and so teamwork for teachers will not just entail working together with other teachers, but also with people from other professions.

Well functioning teams are not just a prerequisite for learning at school in the knowledge society, they are also a basis for innovation processes in schools.

### **3.2 ACTIONS RELATED TO THIS PRACTICE**

The keywords for teachers' work in the new school scenario are terms like sharing ideas, team cooperation, increased responsibilities for pedagogical organisation, and seizing and exercising power to change the organisational settings. If these action lines are in place, the foundation for interesting developments in school organisation is laid.

#### *Examples*

Teachers working in teams can share responsibilities between them so as to raise quality or, say, use time more efficiently in order to maximise time for reading, personal study visits and the like.

Interest groups comprising students, parents, teachers and others are formed to discuss and plan for changes in the physical school environment so it better suits schoolwork in the knowledge society. Provision is made for open dialogue with school management about demands on classroom work.

An activity which could be very productive is that of scenario building together with colleagues. This type of exercise involves learning about present developments and making forecasts about the present situation. In the next step the group makes an inventory of hoped-for developments, a wish list. In the final step the group blends the forecast and the wish list to create a realistic idea about the near future. Working actively with scenario building makes it easier to integrate new knowledge and could be a good foundation for developing a personal position on these aspects.

### **3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Clearly, the most important aspect is to develop competences and abilities for working in teams. This can challenge earlier experiences and perhaps in some cases also the repertoire the teacher was furnished with during her teacher training.

Gaining knowledge of the decision structure, economy, laws and regulations of the institution one works in is empowering. If teachers' responsibilities are to include active involvement in the change processes of school organisation at institutional and classroom level, they have to gain this type of knowledge. Knowing these things will increase their power to get involved in directing change.

### 3.4 REFERENCES

A rich variety of information sources is available. Try entering the keywords *teachers teamwork* in Google. Examples:

Ellström E., Ekholm B., Ellström P.E. (1998), *Talking Problems: A study of knowledge creation and learning in Teamwork*, paper presented at the ECER-98 Conference, Ljubljana, Slovenia, Sept. 1998.

Teamwork for School Improvement

<http://www.standards.dfes.gov.uk/ts/publications/list/Teamworkforschoolimprovement/>

Teams and Teamwork for Teachers

[http://activated.decs.act.gov.au/reading/curr\\_jour\\_hotlists\\_teamwork.htm](http://activated.decs.act.gov.au/reading/curr_jour_hotlists_teamwork.htm)

Teamwork: Parent/School Success Stories

<http://lhsparent.org/GettingInvol-TeamworkSucc.html>

Son J.-B. (2002), Computers, learners and teachers: Teamwork in the CALL classroom, *English Language Teaching*, 14 (2), pp. 239-252.

Scenario building:

<http://www.infinitefutures.com/tools/sb.shtml>

<http://www.arkitekt.se/s10693>

[http://www.danderyd.se/DanderydTemplates/Page\\_\\_\\_\\_221.aspx](http://www.danderyd.se/DanderydTemplates/Page____221.aspx)

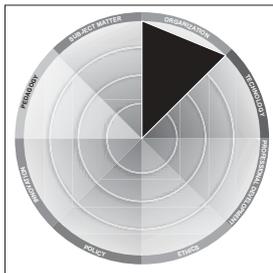
<http://architecture.about.com/cs/socialconcerns/a/schooldesign.htm>

<http://classrooms.com/cost.html>

<http://ikit.org/>

<http://ikit.org/kbe.html>

<http://www.aace.org/DL/index.cfm>



## 4 Teachers' interaction with the external environment

*Contributing to build a school organisation linked to the local and global environment*

### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The school is one of society's most important institutions and is therefore constantly the focus of analyses and discussion. It is in a good sense firmly integrated in social life and therefore there is intimate interplay between society and school. Changes in the way school functions are likely to have an impact on many other segments of society. Most changes in the surrounding society also have consequences for the school.

Political trends, the cultural climate, economic development and the growth of knowledge in scientific disciplines are all phenomena which have a major impact on the education system. The relationship between the economy and circumstances at school is often mentioned as an example of this interplay.

Thus school is not an isolated entity; it is, willingly or not, affected by changes in the surrounding world. School must also actively interact with the local and global environment and adjust its organisation for that purpose.

This thinking is concretised in the following example:

#### The school as base camp

When small children start school they constitute in several respects a more homogenous group than they will ever be later. The overwhelming majority needs to acquire fundamental skills in arithmetic and require training in reading and writing. They also need to encounter and understand education and learning as phenomena. The first few years of schooling that most children undergo in today's schools will not change much in the future. As children begin to master the most elementary tools for working in a world of information they will exercise an increasing degree of influence in the direction of their schoolwork.

As the goals of schoolwork vary, children will leave the fixed format we are accustomed to seeing in today's school. The school and classroom will become a base camp for undertakings that are spread to many places. Some children will be at home doing self-study, others will be studying special topics at libraries and museums. Many children will visit environments that illustrate the fields of knowledge that interest them. Instead of encountering knowledge in its abstract form, children will go to the information, to places where knowledge of different phenomena is formed. A substantial number of these visits will be made with

the help of computers and networks. Children can exploit reality like a textbook, search extensive databases and go to other study environments.

When students are together with data, with the objects to be studied, they can meet people who complement their teachers. These people may be librarians, museum curators, farm managers or nursing assistants. The schoolteacher is available to respond to questions and reply via the network and can be together with the students by “looking over their shoulder” via the network.

In other words, we will have a school with distributed study situations where the children meet now and again in the “old classroom” for dialogue and interaction with school-mates and tutors, for the exchange of experience, to demonstrate collected material, and similar activities. The students return to “a sense of being at home in the base camp for enriching encounters around the campfire”.

## **4.2 ACTIONS RELATED TO THIS PRACTICE**

There are immense possibilities for working on the issues of linking school to the environment.

### **• The local perspective**

A school is situated in an environment, which to a large extent affects the life of the children. They need to experience and understand those links. Teachers could organise study visits via the web or, if possible, in person to local companies and organisations. To give students deeper insights into the activities of one or two local companies, teachers could explore the option of having those companies “adopt” a school class. Other possibilities for linking up with firms could be to make use of parents’ connections.

Another possibility is to organise panels of experts coming from local firms, museums or other societal institutions. Students could interact with these experts on specific topics.

### **• The global perspective**

A common activity is searching for partner schools in different areas of the world. Cooperation in language learning is one obvious asset of an activity of this kind. Comparing and discussing living conditions, social structures, climate, topography, etc. might be other avenues of exploration. The Internet provides excellent opportunities for these kinds of cooperative work.

Via the Internet the students can easily explore and study organisations working globally. UN/UNESCO, OECD, EUROSTAT are examples of organisations which publish facts and figures on different issues. Social dimensions are covered by organisations such as Sister Cities International: such organisations make it easy for students and school classes to find counterparts in sister cities all over the world.

### **4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Knowledge about the technologies supporting:

*Virtual study visits*

*Communication between groups*

*Discussion fora.*

Knowledge about the local environment:

*The infrastructure of the town, municipality of the school  
(commercial life, business and industry, transport)*

*Cultural institutions*

*Demographic situation*

*Common and important work profiles within the local environment.*

Knowledge about the global environment:

*Relevant international organisations*

*Organisations financially supporting exchanges between schools*

*How to get in touch with schools in different countries*

*International school cooperation programmes (e.g. school twinning).*

### **4.4 REFERENCES**

Globalisation - what's it all about?

<http://www.globalisationguide.org/sb02.html>

<http://www.tidec.org/Globalisation/globmain.html>

<http://globalvillageschool.org>

<http://www.globalschoolbus.com/index.php>

UNESCO

[http://portal.unesco.org/en/ev.php-URL\\_ID=15006&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=15006&URL_DO=DO_TOPIC&URL_SECTION=201.html)

Education for all. The quality imperative:

[http://portal.unesco.org/education/en/ev.php-URL\\_ID=35980&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/education/en/ev.php-URL_ID=35980&URL_DO=DO_TOPIC&URL_SECTION=201.html)

<http://www.sister-cities.org/>

<http://friendshipthrougheducation.org/sister.htm>

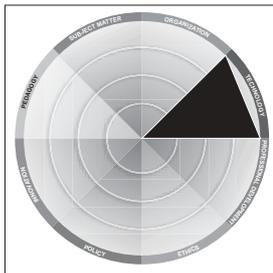
---

## 6. Technology

*author* Ulla Gjørling

The everyday life of the teacher is changing rapidly. Ten to fifteen years ago teachers produced educational resources using tools like paper, scissors, photocopying machine, glue and adhesive tape. The digital tools now at the disposal of the modern teacher, however, include word processors, image processors, the digital camera, scanner, digital video recorder, presentation tools, interactive multimedia presentations, the internet, databases, etc. Years ago the teacher would go to an educational resource centre to peruse the most recent educational books from professional publishing houses – now she can visit the school media centre to browse the internet for databases of educational resources produced both by professional publishing houses and by fellow teachers. Contacting a teacher in a different country would mean travelling, using the telephone or putting ads in newspapers. Now he can go to a web-based partner finding forum to find teachers in other countries that are interested in online collaboration activities.

The role of the teacher has changed, too. She has become a designer both of educational resources and of learning activities. She builds and manages both face-to-face and virtual learning environments: by applying process-oriented working methods, where problem-based learning and project-oriented methods are more predominant, the teacher is increasingly fulfilling the role of process consultant and guide, and is not merely administering knowledge but facilitating the acquisition of knowledge.



## 1 Teachers' interaction with **the self**

*Constantly pursuing technical and cognitive proficiency*

### 1.1 CONTEXT

ICT skills can be defined at three different levels:

- handling the technology
- understanding the technology
- reflecting upon technology.

Handling the technology means being able to perform functions using ICT and media tools.

Understanding the technology is the ability to use ICT and media tools to their full potential. This includes being able to select the right tool in any given context. It also means understanding and applying the working methods and processes in which the tools are relevant.

Reflecting upon technology is the ability to assess and put into perspective the consequences of using ICT and media tools both for at a personal level and in teaching and learning. This also means reflecting upon personal, educational and societal consequences of the application of ICT and media tools.

The teacher needs to acquire ICT skills on all three levels to be able to use ICT in teaching and learning to its full potential – and to be able to teach the students adequate and relevant ICT skills.

### 1.2 ACTIONS RELATED TO THIS PRACTICE

It is of utmost importance that the modern teacher should not be alienated from technology, that she should approach ICT with an open mind and develop personal values and attitudes to ICT and new media.

The teacher operating in the digital age becomes aware of the impact of ICT on her practice, on educational systems and on the classroom, and wants to improve her professionalism by means of systematic use of ICT in her practice.

Digital literacy is the ability to use digital technology, communication tools or networks to locate, evaluate and use and create information. The digitally literate teacher is aware of the potentialities offered by the ICT for designing, implementing and using learning environments, and uses ICT when preparing learning projects and educational resources. These are sometimes be produced from scratch and are sometimes the result of a design and production process that combines material from colleagues and/or external material.

In this process the teacher uses a variety of digital equipment available to her in the school. In addition to computer-based ICT tools, this may include digital cameras, video recorders, scanners, webcams, etc. The digital elements are combined and used to meet the teacher's particular professional needs.

In every stage of this process, the teacher reflects about the use of technology so as to be able to plan balanced, relevant and adequate use of technology in the learning process. And to be able to decide which ICT application is adequate and relevant, some screening of students' ICT skills is necessary.

### **1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

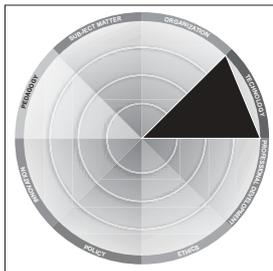
The teacher operating in the knowledge society has overall command of generic ICT tools related to educational use. Which tools are relevant to the teacher depends upon the subjects and levels taught, but generally speaking tools that can be defined as fundamental are those for text, for images, for simulation and monitoring, for calculation, for layout/design, for presentations and for communication. This last category includes the use of Virtual Learning Environments (VLEs) and Learning Management Systems (LMS).

When preparing learning projects and educational resources, the teacher draws on the internet and databases to search for elements, learning objects, inspirational material etc. This entails searching and browsing skills, including the ability to handle search criteria, search strings and search operators, and knowledge about where to find relevant pedagogical resources, inspirational material and ready-to-use educational resources.

Getting the ICT blend right in the preparation of a given learning project means knowing about and being able to exploit relevant digital educational resources. This includes being able to evaluate and assess educational resources in digital format.

The preparation of learning projects and learning resources entails a command of a series of digital tools and equipment available in the school, such as the digital camera, scanner, digital video, sound recording, etc. and calls for the ability to import/output to other ICT tools.

Being digitally fluent also means being able to maintain one's personal computer. This includes general computer maintenance, the installation of new software and necessary plug-ins etc., general computer security, virus control and data security, and understanding of networks and file handling.



## 2 Teachers' interaction with pupils

*Getting the right ICT blend to facilitate students' learning*

### 2.1 CONTEXT

In the past when the teacher introduced a new learning activity to his class, he would give an oral introduction, perhaps show an overhead slide or a photograph on a projector. Today the slide is produced using a presentation tool, the overhead projector has been substituted by a data projector or a whiteboard, and the introduction to the new learning activity may not even take place in the classroom but rather in the virtual collaboration area/virtual learning environment (VLE), in the class conference area or on the school's intranet.

ICT can be regarded in teaching and learning in at least three different ways:

- ICT as a compensatory and/or supporting tool where ICT supports the functions, skills and competencies that the student does not fully command. For instance digital and synthetic speech, reading tools, speech recognition tools, scanner pens, prediction tools.
- ICT as a teaching tool, where it is used in the learning process – digital educational resources, presentation tools, generic software tools, Internet as a collaboration tool (for instance VLEs), as a resource and as a publication tool.
- ICT as the object of learning. Teaching students appropriate use of ICT tools.

Obviously the digital age teacher is familiar with all the possibilities and opportunities that ICT presents as a compensatory and/or supporting tool, and is able to determine student needs and suggest relevant tools.

In terms of ICT as a teaching tool, the teacher seeks to achieve the blend right so that ICT tools are put into their proper use and that the right tool is used for the right purpose.

In addition to this, the teacher seeks to familiarize students with the variety of ICT tools and methods available so that the students themselves gradually develop the capacity to select the appropriate tool for the task themselves.

### 2.2 ACTIONS RELATED TO THIS PRACTICE

The teacher implements learning activities that entail the use of ICT tools for, among other things, the production and handling of text and images, for simulation and monitoring, for

calculation, for layout/design, for presentations and for communication. This last category includes the use of virtual learning environments (VLEs) and learning management systems (LMS). In the classroom context, data projectors and monitoring and sampling equipment may also be used.

In an effort to get the ICT blend right, to select the appropriate tool for any given context and to ensure adequate, relevant use of ICT that can develop over time, the teacher screens and assesses students' ICT skills. This can be done through testing, observation, screening tools, face-to-face discussions and evaluation of existing student products.

When applying ICT in a learning project, a number of additional tools present themselves as relevant. Of utmost relevance are electronic learning environments, which are becoming increasingly widespread in educational contexts. The electronic learning environment functions both as a publishing platform for learning resources and as a communication tool linking students and teachers outside face to face contexts.

The application of ICT in teaching and learning leads to a change in working patterns, with students becoming more independent. In this regard, digital portfolios and logbooks can be used as a means to help the student reflect about the learning process and to gather a body of digital output for the teacher to assess.

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

The teacher reflects upon ICT as a compensatory and supporting tool to be applied so as to ensure equal access to information and learning resources on the part of each individual student.

Selecting the appropriate tool for a given context means possessing ICT skills at three levels:

- ICT as compensatory and/or supporting tool
- ICT as a teaching tool
- ICT as the object of learning.

The teacher is aware of the difference in personal skills required when teaching ICT as a subject and using ICT as a teaching tool.

The teacher is aware of the need for progressive development in students' computer use and is able to reflect upon the physical working environment around ICT and media use.

The teacher has the ability to reflect upon student ICT use and gives appropriate feedback – this entails the capacity to assess students' ICT products.

Applying ICT with students requires general knowledge of ICT and the computer (maintenance, security, download /installation, terminology). This includes competency in new communication and collaboration media such as chat, VLEs, learning management systems, electronic communication, video chat and digital telephony.

When implementing learning projects that involve the use of digital tools, the teacher is called upon to instruct the students

not only in how to handle and manage the tools themselves but also to foster understanding and reflection on the use of each tool. This may entail preparation of written instructions and illustrated manuals for specific tools.

Potential student use of digital technology is vast and covers many areas, including:

- the Internet, information searching, portals, web-based resources
- electronic communication and collaboration, netiquette, differences between written and oral communication
- word processing, design and layout for print
- production, editing and manipulation of digital images
- off- and online presentation genre, design and layout for the screen
- production and publication of web pages, design, layout, security
- production of spreadsheets, formats, graphics, presentations, modelling
- production of databases, formats, difference to spreadsheets
- educational learning resources, functionality, differentiation potential.

In explaining, instructing and contextualizing technology use by students, the teacher draws upon her own command of the technology.

## **2.4 REFERENCES**

Making computer-based tests (Hot Potatoes):

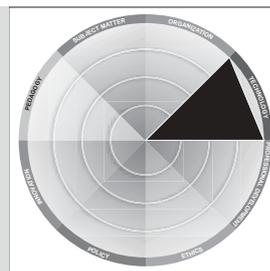
- international site  
<http://web.uvic.ca/hrd/halfbaked/index.htm>
- German site  
<http://www.hotpotatoes.de>

Links in Dutch:

- <http://www.klascement.net/>
- <http://www.digikids.be>
- <http://ond.vlaanderen.be/ict/>
- <http://www.ivobrugge.be/cursusweb/>
- <http://www.ictonderwijs.nl/>
- <http://onderwijs.pagina.nl/>
- <http://onderwijs.startpagina.be/>

### 3 Teachers' interaction with **colleagues**

*Using technology to interact with colleagues and participate in teachers' communities of practice*



#### 3.1 CONTEXT

Teachers have always participated in more or less formally constituted communities of practice. Nowadays, with the advent of electronic communication, presence on the Internet and new collaboration tools, teachers are seizing the opportunities provided by new information and media technologies to participate in virtual communities of practice parallel to their participation in traditional communities. Virtual communities offer flexibility both in terms of time (participation when it fits the individual's personal schedule) and in terms of space (participation in communities of practice that are geographically distant).

Collaboration with colleagues is taking place in different forums than before. In many schools, news and information from the management is not put on a wooden bulletin board in the teachers' common room but on an electronic bulletin board on the school intranet, which teachers may reach both from a school computer and from their computer at home.

Teachers can post messages in the intranet forums about a specific class, a subject or a specific student. Messages appear in relevant private conferences especially attributed to a specific use.

Collaboration with colleagues abroad was once based solely on face-to-face conversation and telephone calls, while now it can be done via e-mail, the school VLE, a personal website, text messages, newsgroups, text or video chat.

Most electronic communication works not only as a real-time communication medium, it also serves as a communication log: whereas a telephone conversation is history once the receiver has been put down and can only be reconstructed from memory (unless purposely recorded), an electronic conversation is often logged in the communication tool and can be saved and presented in its entirety both for the benefit of those who were unable to participate but also as a log for those who participated.

Where ICT is the object of student learning, a coordinated collaborative effort on the part of teachers is required to ensure that the individual student/student group acquires sufficient and broad ICT skills and competencies at all levels during their education.

#### 3.2 ACTIONS RELATED TO THIS PRACTICE

In the school, electronic communication allows the teacher to engage in new practices for keeping up to date with what is

happening both in individual classes and in the school in general. Learning management systems often contain a school intranet functionality that allows part of the communication among teachers and between teachers and management to be shifted from the teachers' common room to the school's learning platform.

Teachers use electronic communication both as an alternative, but also as a supplement to face to face meetings with colleagues, as electronic communication is flexible in time and space and thus convenient for the teacher who often has to prepare for work at home or during off-hours.

Electronic communication and collaboration areas (VLEs or LMSs) for teaching colleagues are convenient not just because they allow teachers to communicate asynchronously but also because the conference can serve as the collective memory of the discussion and as the inventory of discussions and resources concerning a specific pupil, a class or a group of teachers.

Teachers share learning resources, learning objects and best practice, uploading these to databases, VLS or other relevant platforms.

### **3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

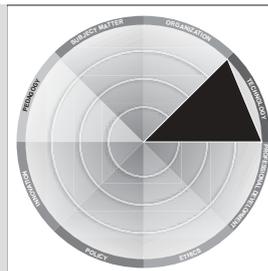
Beyond possessing practical skills in the field of electronic communication, the teacher reflects upon the difference between written and oral language and understands and commands the bridge form that electronic communication represents.

The teacher masters a number of different communication forms and tools such as VLEs, LMSs, e-mail, sms, chat, newsgroups, webcam, video chat, intranet, private conferences and open conferences. She understands the differences between the tools and is able to select and suggest the appropriate communication form in any given context.

Planning the progression of students' ICT development calls for awareness of current national policies, of definitions and frameworks of students' ICT competencies and of activities related to these. This includes knowledge and reflection upon the related assessment procedures and how these are planned in collaboration with colleagues.

## 4 Teachers' interaction with the external environment

*Using technology to create learning networks, bringing added value to school and society (locally and globally)*



### 4.1 CONTEXT

Ever increasing demands are being made for transparency and openness in school activities, grades, learning objectives and goals etc., not just by parents and other interested parties, but also by national and/or regional authorities. This means school life is increasingly becoming the focus of public attention and this influences the patterns of collaboration between the teacher and the surrounding world.

Compared with the past, there is now a wider range of communication channels for teacher-parent contact and school-parent contact.

Schools communicate with the outside world through their website, learning objectives of individual classes are communicated on the class website, the “note-to-the-parents” can be published on the class website (on the Intranet) and sent to (all?) parents via e-mail or by offering special parent access to the Intranet.

### 4.2 ACTIONS RELATED TO THIS PRACTICE

The teacher is able to use ICT to enhance communication and dialog with the external environment. For example she assists school management and colleagues in the production, design and maintenance of the school website in order to meet national and regional requirements, as well as the informal demands of parents and society to learn about school activities etc.

Teachers use technology to communicate with parents. This includes written communication prepared with generic ICT tools, used to their full potential. It also includes online communication (mail and conferences) and using technology such as internet, multimedia presentations and data projectors when arranging seminars and parent-teacher meetings.

The teacher communicates with the outside world, participating in electronic learning communities with colleagues, educational authorities and teacher training institutions.

She is able to use ICT to identify and communicate electronically with educational authorities, subject experts, with potential students and with teachers in feeder schools.

### 4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

The teacher knows how ICT can enhance interaction between the school and the external environment and is able to participate in

the design and implementation of means to accomplish those ends. For example, the teacher is knowledgeable about the legal demands of the school website. Assisting in its production calls for skills in the design and layout of websites as well as in producing and publishing web pages. In addition to this, the teacher understands and reflects upon what information is suitable for posting on the site and what is not, for reasons of pertinence and for data security.

The teacher possesses communication skills applicable to the field of electronic communication, not just general communication skills but to the ability to structure and organise electronic communication and to moderate an electronic discussion.

#### **4.4 REFERENCES**

*The European Pedagogical ICT Licence* - [www.epict.org](http://www.epict.org)

*The Pupils' ICT Licence, Danish reference material developed by the Danish Ministry of Education* - [www.junior-pc-koerekort.dk](http://www.junior-pc-koerekort.dk)

Teachers' ICT skills and Knowledge needs, Robert Gordon University, Scotland.

<http://www.scotland.gov.uk/library/ict/append-title.htm>

ICT Portal for teachers, UNESCO Bangkok.

<http://www.unescobkk.org/index.php?id=787>

Teachers ICT-skills Framework, European Education Partnership.

<http://www.eep-edu.org/InnService/InnHome.htm>

---

## 7. Professional development

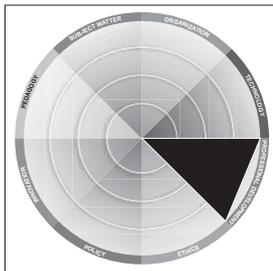
*author* Edwin Stiller

In the “Europe of knowledge” we are faced with rapid change in all sectors of society. Lifelong learning is required in all professions and particularly in the teaching profession. In the learning society, school has to be a learning institution and so teachers need to remain life-long learners and action-researchers in their own sphere.

The teaching profession is to be regarded biographically. The competencies of teachers can only be fully built up in a long process of professional development.

Teachers’ professional development starts with recruitment and continues with initial training, induction (including classroom apprenticeship), in-service training and further education. Competencies ought to be build up systematically, in a cumulative manner.

There is a need for the teaching profession to create a new professional profile which reflects the increasing heterogeneity of students, the provision of individualised support for every student, implementation of new methods in motivating and activating students, participation in building up learning organisations. Teachers are shifting away from their old role as the sole providers of knowledge towards helping students to learn on their own.



## 1 Teachers' interaction with **the self**

*Becoming aware of the increasing need for continuous professional development and the means to achieve it*

### 1.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The central role in school innovation is played by the individual teacher. She is the starting and ending point of change – the change-agent in this process. Her professional self is the centre of taking control. It is the outcome of a self organising process in which personal impulses and an ideal picture of the self are balanced. Self-reflection, self-exploration, self-efficacy and self-assessment are the key words in this concept. The teacher's knowledge, abilities, beliefs and attitudes are the basics of effective change. The context of this personal development is related to the structure of the education system, which gives teachers more or less professional freedom and authority. So change is not the result of an isolated individual effort, but rather is mediated by dialogues, collegial exchange, collaborative work and participation in a community of practice.

Professional development therefore has to be individual and flexible, socially and institutionally integrated.

### 1.2 ACTIONS RELATED TO THIS PRACTICE

- Being aware of trends, changes and opportunities.
- Placing value in critical thinking and self-directed learning as habits of mind.
- Understanding methods of inquiry that provide a variety of means for self-assessment.
- Using technology to enhance productivity and professional practice.
- Assessing, reflecting and documenting individual personal development.

These actions can be facilitated and fostered by the use of a teaching portfolio that accompanies the individual teacher throughout his personal development. As a tool for self-reflection, for assessment and individual presentation of one's special profile, the portfolio can document changes and any required improvements: it can form part of a standard based reform of teacher education that balances teachers' autonomy and accountability.

### 1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

The role of professional development in the context of school and educational development.

The professional profile of the teacher in the knowledge society.

Theories and approaches regarding the professional self (self-reflection, self-efficacy).

Types and functions of portfolios and other instruments in the area of teacher education.

Possibilities and limits of the use of different media (video, ICT) in teacher education and professional development.

### 1.4 REFERENCES

Bauer K.-O. (2005), *Pädagogische Basiskompetenzen. Theorie und Training*, Juventa, München.

Buchberger F., Campos B.P., Kallos D., Stephenson J. (2000), *Green Paper on Teacher Education in Europe*, Umea, Sweden.

Landesinstitut für Schule (Hrsg.) (2001), *Portfolio: Medien. Lehrerbildung*, Soest.

Landesinstitut für Schule, Bertelsmann Stiftung (Hrsg.)(2002), *Portfolio: Medienkompetenz*, Soest.

<http://www.learn-line.nrw.de/angebote/portfoliomedien>

OECD (2004), *Teachers matter: Attracting, developing and retaining effective teachers*, Paris.

Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (2004), *Standards für die Lehrerbildung: Bildungswissenschaften*.

<http://www.kmk.org>

Seminar Lehrerbildung und Schule 4/2004, Dokumentation Soest 2003 – Videogestützte Unterrichtsreflexion, mit DVD, Hohengehren, Schneider Verlag.

Terhart E. (2004), Standards für die Lehrerbildung, in Berntzen D. and Gehler M. (Hrsg.), *Forum Lehrerbild – Standards und Evaluation*, Münster, Zentrum für Lehrerbildung, S. 17ff.

UNESCO (2002), *Information and Communication Technologies in Teacher Education. A Planning Guide*, Paris.

<http://unesdoc.unesco.org/images/0012/001295/129533e.pdf>

UNESCO (2002), *Information and Communication Technology in Education. A Curriculum for Schools and Programme of Teacher Development*, Paris.

<http://unesdoc.unesco.org/images/0012/001295/129538e.pdf>

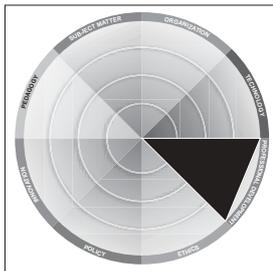
Video als Instrument der Lehrerbildung und Unterrichtsentwicklung (2005), *Journal für LehrerInnenbildung*, Vol. 2, StudienVerlag, Wien.

[http://www.kbl.unizh.ch/seiten/TYICT/TYICTK\\_Expertenbericht.pdf](http://www.kbl.unizh.ch/seiten/TYICT/TYICTK_Expertenbericht.pdf)

[http://www.kbl.unizh.ch/seiten/TYICT/TYICTK\\_Broschuere.pdf](http://www.kbl.unizh.ch/seiten/TYICT/TYICTK_Broschuere.pdf)

<http://www.eep-edu.org>

<http://www.epict.org>



## 2 Teachers' interaction with pupils

*Planning and taking actions to develop one's professionalism regarding the education and welfare of students*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Nowadays learning is seen as an individual, active, self-regulated, holistic process with personal, social, cognitive and acting dimensions. Self-regulated learning is a necessary goal for life-long education. Learners, including teachers, need to develop a professional self. Knowledge, beliefs and attitudes of learners are fundamental for effective learning.

The process of self-regulated learning (goal-setting, planning and selection of strategies, evaluation etc.) calls for self-awareness, self-monitoring, motivational and metacognitive self-regulation.

The new role of the teacher is to support and facilitate individual, self-regulated learning and to balance instruction and construction in the learning process. New competencies in diagnosing, assessing and supporting learners need to be developed in teacher education and professional development.

ICT offers both opportunities and risks in supporting learning environments for self-regulated learning. The successful implementation of ICT depends largely on staff competence in the integration of ICT into lessons and the holistic learning process.

### 2.2 ACTIONS RELATED TO THIS PRACTICE

- Focusing on, discussing and reflecting about the question of learning, both in teacher education and in school so that ideas and strategies for enhancing professional practice can be identified, assessed and incorporated into personal teaching and learning practice.
- Addressing the areas of monitoring, diagnosing and supporting students' learning as a part of theoretical and practical teacher education:
  - acting competently with ICT
  - understanding the role of ICT in the socialisation of children
  - using ICT as educational technology
  - using ICT for administration and school development
  - analysing the personal, organisational and institutional conditions for effective use of ICT.
- Taking an active part in the development of a school policy on ICT.

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Learning theory, including new approaches from neuro-science and constructivism.

Pedagogical diagnostics and support.

Standard-based testing and assessment.

Research in teacher-training-concepts based on these new approaches.

Research in CDP to support diagnostics, support and assessment in the daily work of teachers.

### **2.4 REFERENCES**

Hayon-Kremer L., Tillema H.H. (1999), Self-regulated learning in the context of teacher education, in *Teaching and Teacher Education*, Vol. 15, pp. 507-522.

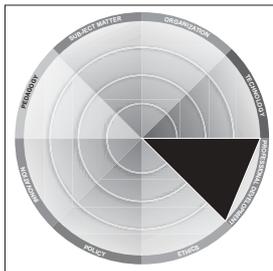
Helmke A. (2003), *Unterrichtsqualität erfassen, bewerten, verbessern*, Kallmeyer, Seelze.

Learning Working Group (2005), *About learning. Report of the Learning Working Group*.  
[www.demos.co.uk](http://www.demos.co.uk)

Ministry of Education and Science (2000), *Future of learning – learning for the future: New Media in initial teacher training*, Düsseldorf.

<http://www.chancen-nrw.de>

<http://www.learn-line.nrw.de/angebote/foerderdiagnostikonline/>



### 3 Teachers' interaction with **colleagues**

*Learning to fully exploit ICT to cooperate with colleagues and the teaching community*

#### 3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The willingness and capacity not just to engage in critical self-reflection, but also to cooperate and reflect in discourse is a fundamental element in the professional profile of teachers. Autonomy must be balanced with the ability to work as a team with other staff members. Teachers and teacher-trainers are models in self-regulated learning, cooperative learning and action-research in their everyday work.

David Hargreaves points out that innovation needs the right climate, discipline, and lateral paths in peer-to-peer communication, supported by ICT and with the spirit of an open-source culture.

*ICTs provide powerful new tools to support communication between learning groups and beyond classrooms. The teacher's role expands to that of a facilitator of collaboration with local and global communities. (UNESCO, 2002).*

#### 3.2 ACTIONS RELATED TO THIS PRACTICE

- Exploiting opportunities to use methods of collaborative learning in situations of face to face communication.
- Participating in professional learning communities with the aim of managing quality development and aspects of self-supervision.
- Embedding individual and collaborative processes in school-based professional development.
- Engaging in mentoring to support the collegial dimension of professional development.
- Using CSCL tools to support collegial cooperation and to build up innovative networks.
- Creating shared digital portfolios as repositories of material, experience and reflection from a community of practice.
- Using video-based techniques as a means for realising cooperative approaches to teacher training.

#### 3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

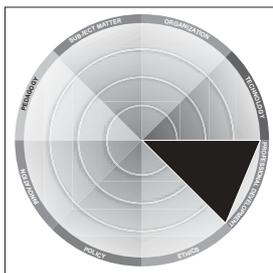
The relationship between autonomous, collegial and institutional learning in teacher education.

Methods of cooperative learning, and cooperative forms of self-evaluation and self-supervision.

Methods and institutional forms of mentoring-processes.  
The effects of ICT-support and other media in enabling and increasing collaboration.

### 3.4 REFERENCES

- Bocconi S., Pozzi F., Repetto M. (2003), Towards a European community of pioneer teachers, in Midoro V., Admiraal W., *Pioneer Teachers*, Menabò, Ortona, pp. 43-56.
- Clement M. and Vandenberghe R. (2000), Teachers' professional development: a solitary or collegial (ad)venture?, in *Teaching and Teacher Education*, 16, pp. 81-101.
- Hargreaves D.H., *Working laterally: how innovation networks make an education epidemic*.  
[www.standards.dfes.gov.uk/innovation-unit](http://www.standards.dfes.gov.uk/innovation-unit)
- Tolsby H., Sorensen E.K., *Designing Virtual Portfolios for Communities of Practise*.  
<http://www.kommunikation.aau.dk/ansatte/es/publikationer/designing.pdf> (07.04.05)
- Niggli A., *Standard based 3-level mentoring in teacher education*.  
<http://www.hepfi.ch/dyn/bin/45715-47350-1menzoringkonzepthepfi.pdf>
- UNESCO (2002), *Information and Communication Technologies in Teacher Education. A Planning Guide*, Paris.  
<http://unesdoc.unesco.org/images/0012/001295/129533e.pdf>  
<http://www.mint-mentor.net/>  
<http://ulearn.itd.ge.cnr.it>



## 4 Teachers' interaction with the external environment

*Identifying and exploiting the opportunities offered by the local and global environment to develop one's professionalism*

### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Personal professional development must be embedded in the general development of the school and of education. Sharing responsibility for teacher education and professional development among schools, universities and teacher-training ought to lead to a collaborative-based learning and teaching community and network.

Local environments can be draw upon to bring life into schools and schools into life. Networks of schools and local partners help to develop education, teacher professionalism and students' competencies in all dimensions.

Professional development may also be enhanced by public or private partnerships with the community. Such partnerships may be particularly appropriate for the professional development of those teaching ICT as a subject, with financial and technical support contributed by ICT companies or by local communities.

The Internet is a vital means for disseminating concepts, exchanging experience and discussing national or international standards.

*The expansion of the learning community beyond the classroom also requires respect for diversity, including inter-cultural education, and equitable access of electronic resources. There is growing evidence that communities learn through collaborative activities that reflect diverse cultures in authentic projects that serve society. Both local and global understandings can be enhanced using ICTs... (UNESCO, 2002).*

ICT tools can prove extremely helpful for organizing knowledge management and engaging in discourse about improving professional development.

### 4.2 ACTIONS RELATED TO THIS PRACTICE

- Participating in networks of schools and local partners, so as to help develop education, teachers' professionalism and students' competencies in all dimensions.
- Developing «a critical understanding of the added value of learning networks and collaboration within and between communities and countries» (UNESCO, 2002).

- Building up learning networks and participating effectively as a learner and as a teacher.
- Using ICT tools and blended learning concepts to support knowledge management and the discussion of professional development and standard-based reform of teacher education.

#### **4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

The influence of local environments on learning in schools and teachers' professional development.

The role of schools in their local environment.

Institutional and network -learning: common ground and differences.

Opportunities and risks posed by web-based teacher education and professional development.

#### **4.4 REFERENCES**

Stephen Downes (2005), *Learning networks: Theory and Practise*, Presentation at ICMTL, Palermo.

<http://www.downes.ca/files/palermo.ppt>

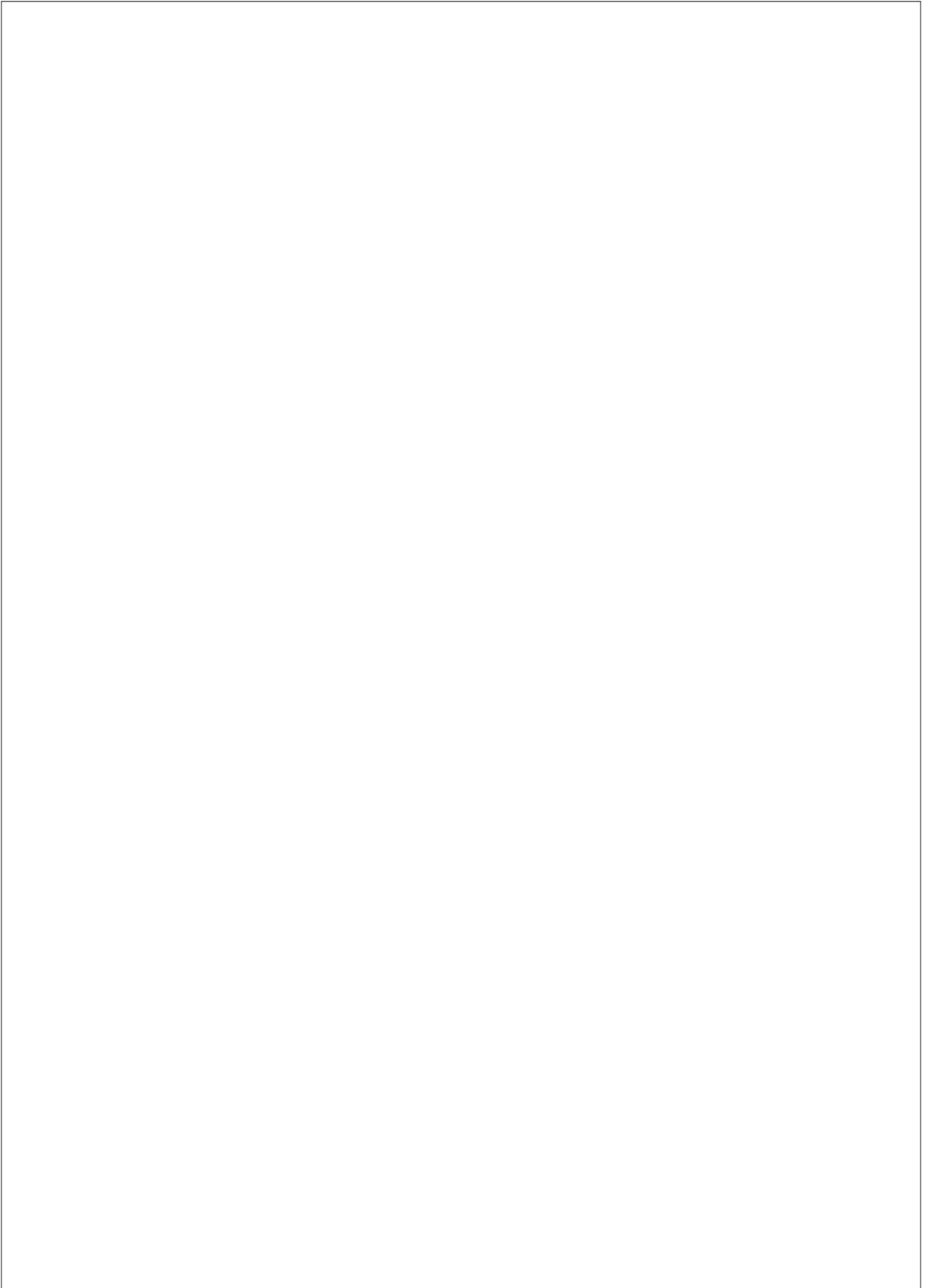
<http://www.chatderwelten.de>

<http://www.agenda21schulen.nrw.de>

<http://www.cct-germany.de>

<http://www.lehrerforum.uni-lueneburg.de/forum/index.php>

[http://www.standards.dfes.gov.uk/innovation-unit/communication/innovation\\_in\\_practice/?version=1](http://www.standards.dfes.gov.uk/innovation-unit/communication/innovation_in_practice/?version=1)



---

## 8. Ethics

*author* **Andrea Kárpáti**

Computers<sup>1</sup> have become almost as widely used as telephones, therefore related ethical issues have become more democratically defined. More people have more to say about computer ethics simply because so many people are computer literate. The *diffuseness of the impacts and the wide distribution of the technology* mean that recognizing impacts, let alone solving an ethical dilemma, is much more difficult. Ethical principles applied to millions of computer users effectively become the equivalent of common law. When teachers reflect on ethical issues with regard to ICT and the Internet, these reflections will be grounded in the general system of moral and ethical values of education in general and their school in particular. Issues should be openly discussed, a multitude of opinions considered and several possible actions envisaged and judged.

This challenge is particularly difficult given the *traditional mindset of technically trained professionals* who view social impact and ethics issues as topics auxiliary to the foundation material in computer science. However, the development of an ethical framework at the freshmen level, followed by the integration of social impact and ethics topics throughout the curriculum, should be viewed as fundamental to the development of competent teachers.

It is evident that ethical use of digital resources cannot and should not be taught by one subject specialist only: it is a *multidisciplinary issue*. Even in those countries where IT or ICT is a compulsory discipline, ethical and moral issues arising from computer technology and Internet use should be included in all subject areas where computer is one of the tools / catalysts / facilitators of instruction. A complex, case-based approach seems to be ideal for students to understand, for example, freedom of expression versus Internet privacy, pirate and open source software, legal copying and copyright, and the digital divide.

---

**1**

Original source: Martin and Holz, 2004.

*Societal and technical aspects* of computing are interdependent. Technical issues are best understood (and most effectively taught) in their social context, and the societal aspects of computing are best understood in the context of the underlying technical detail. Far from detracting from the students' learning of technical information, including societal aspects in the curriculum can enhance and deepen teachers' understanding. It is important not to separate computer practice from studying ethics. The message should be that whenever ICT is used, one should think about the consequences at the same time. ICT should be analyzed not as an autonomous force, but first and foremost as a part of our culture, its values and goals. One should also ask critically how it reflects our social values and the goals and aspirations that they reflect.

*Information welfare ought to be promoted by extending (information quantity), improving (information quality) and enriching (information variety) in the infosphere.* (Floridi, 1998).

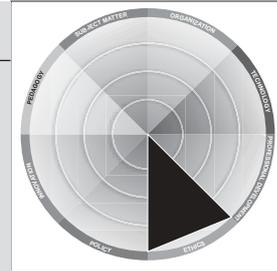
This involves issues of equal access as well as catering for differences related to gender, age and socio-cultural background. The challenge to educators is to develop strategies that will raise the awareness of students regarding ethical and moral issues related to computer technology at the same time that they are developing their discipline-based expertise. We should not delude ourselves into thinking that simply teaching about ethics will be a panacea for the problems now faced by society due to computer technology, but we should demonstrate our commitment to ethical behaviour by incorporating ethics education into education at all levels.

*The fact that we are discussing ethics in the context of human-human and human-machine interactions will require some innovative ways to apply ethical principles, but it is a necessary task to be undertaken if we are to mature into a true profession.*

(Martin and Martin, 2004, p. 32)

## 1 Teachers' interaction with the self

*Making one's prime responsibility the education and welfare of all the students in one's care and accepting ICT as important for creating a knowledge society*



### 1.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Computer ethics education is made more complicated because there are computer users at all levels throughout our society. Twenty years ago computers were not nearly so numerous or networked together as they are today. Individuals who controlled computers functioned strictly as computer professionals or computer scientists serving other people by providing them with computer output. Now, because of the widespread use of computers, distinguishing between specialists who work only with computers and those who use them as tools for other disciplines lacks significance.

ETHICSWEB – the portal for web sites on computer ethics – was developed in answer to promote “*information welfare*”, the growing need to share international experiences on fair ICT use. Teachers at all levels of education are among the users of the site and often contribute to discussions with stories illustrating the lack of student knowledge in this area. Using such an internet-based and frequently updated resource for forming sound moral judgments seems to be frivolous, although very appropriate in our case. The rapid growth of information technology provides challenges on a daily basis that are a concern for programmers only until the product with questionable moral implications reaches the market. *Intelligent agents*, for example, these astonishingly servile software products that are able to learn the habits of their user, may pose a threat to those whose thinking and acting characteristics are gathered and stored by these “robots”. Therefore, *ethical issues of programming* these agents – and, in general, of distinguishing what *should* be done from what *can* be done, ought to be included in the curriculum of IT specialists. Awareness of ethical issues related to computer software, on the other hand, should form part of the ethics curriculum of teachers who use ICT while teaching their discipline, whatever it may be. (Eichmann, 1994)

For example, the American *Computer Science Accreditation Board* (CSAB) which has accredited over 50 institutions since it was established in 1984, requires instruction in the social implications of computing as a criterion for accreditation. The need to teach a methodology of explicit ethical analysis in all decision-making related technology is also emphasized in a comparative study of higher education curricula by Martin and Martin (1990). It

seems imperative to devise strategies for incorporating *professional ethical codes* into the core of teacher education curricula.

## **1.2 ACTIONS RELATED TO THIS PRACTICE**

- Understanding the educational / social context ICT is embedded in.
- Being open and flexible to accept technology for teaching:
  - changing teaching behaviour to make maximum use of individualized instruction offered by computer culture
  - modifying methods to better exploit ICT tools
  - developing skills to be ready and able to teach with ICT.
- Developing awareness of educational issues related to authentic and effective ICT use.
- Being aware of special needs in ICT .
- Accepting students' different skill levels and planning to teach accordingly with the use of ICT as a curriculum issue. Being aware of the value of cultural diversity and representing it in your practice.
- Being open to student autonomy.
- Respecting the privacy of students and demand the same from them.
- Learning about and practising fair ICT use.
- Observing copyright and creative common standards.

## **1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Privacy in a wired world: fake personalities, spam, spying.

Communication: rules and regulations of Internet conduct.

Accuracy of information published and used: recognizing reliable sources, making appropriate use of knowledge gained.

Intellectual property rights: observation of national and international copyright regulations.

Equal access: providing equal access to ICT resources and ensuring the ability to use them.

Security: maintaining and protecting a safe digital environment and not harming that of others.

Reliability of software and hardware resources: accessing resources in a fair way and providing reliable resources lawfully.

## **1.4 REFERENCES**

### **Portals**

ETHICSWEB – a portal for web sites on computer ethics.

<http://www.ethicsweb.ca/resources/computer/index.html>

Cyberethics: <http://cyberethics.net>

### **Institutions for consulting and research on ICT ethics**

Australian Institute of Computer Ethics: [www.aice.swin.edu.au](http://www.aice.swin.edu.au)

Centre for Computing and Social Responsibility:

[www.ccsr.cse.dmu.ac.uk](http://www.ccsr.cse.dmu.ac.uk)

Cyber Angels (“Internet Safety Organization”):

[www.cyberangels.org](http://www.cyberangels.org)

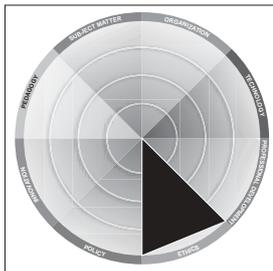
Electronic Frontier Foundation: [www.eff.org](http://www.eff.org)  
 Electronic Privacy Information Center : [www.epic.org](http://www.epic.org)  
 International Center for Info Ethics (ICIE): [www.icie.zkm.de](http://www.icie.zkm.de)  
 LoGIC (The Legal Group for the Internet in Canada):  
[www.catalaw.com/logic](http://www.catalaw.com/logic)  
 Information Highway Advisory Council (Canada):  
<http://strategis.ic.gc.ca>

#### **Civil organisations for cyber-rights**

Peacefire (Teen Net anti-censorship alliance): [www.peacefire.org](http://www.peacefire.org)  
 CRADLE: The Cyber Rights And Digital Liberties Encyclopedia:  
[www.peacefire.org/craddle](http://www.peacefire.org/craddle)  
 PFIR: "People for Internet Responsibility": [www.pfir.org](http://www.pfir.org)  
 Privacy International: [www.privacy.org/pi](http://www.privacy.org/pi)

#### **Papers**

Bynum T. W. (ed.)(1985), *Computers and Ethics*,  
*Metaphilosophy*, October 1985 issue, Blackwell, New York  
 Eichmann D. (1994), *Ethical Web Agents*.  
<http://archive.ncsa.uiuc.edu/SDG/IT94/Agents/eichmann.ethical/eichmann.htm>  
 Ermann D. M., Williams M. B., Shauf M. S. (eds.) (1997),  
*Computers, Ethics and Society*, 2nd ed., Oxford U.P, New York.  
 Forester T. and Morrison P. (1994), *Computer Ethics: Cautionary Tales and Ethical Dilemmas in Computing*, 2nd ed., the MIT Press, Cambridge.  
 Johnson D. G. and Nissenbaum H. (eds.)(1995), *Computer, Ethics and Social Values*, Prentice Hall, Upper Saddle River N. J.  
 Johnson D. (1988), *The Ethics of Computing*, Edutech report, 4/5, p.1-2  
 Langford D. (1995), *Practical Computer Ethics*, McGraw-Hill, London.  
 Floridi L.(1998), *Information Ethics: On the Philosophical Foundation of Computer Ethics*.  
<http://www.wolfson.ox.ac.uk/~floridi.ie.htm>  
 Martin C. D., and Martin, D. H. (1990), Professional codes of conduct and computer ethics education, *ACM SIGSAC Review*, Vol. 8, issue 3, p. 1-12  
*The Tavani Bibliography of Computing, Ethics, and Social Responsibility*, page maintenance: David Vance, Southern Illinois University.  
<http://www.siu.edu/departments/coba/mgmt/iswnet/isethics/biblio/complete.htm>



## 2 Teachers' interaction with pupils

*Gearing one's practice to the principle that the education and welfare of all the students in one's care is one's prime responsibility*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The National Educational Technology Standards developed by ISTE (International Society for Technology Education), accepted internationally as one of the major frames of reference for curriculum development (ISTE NETS, 2000), addresses ethics in the chapter about major knowledge areas students should master:

*Social, ethical and human issues*

- *Students understand the major ethical, cultural and societal issues related to technology.*
- *Students practice responsible use of technology systems, information and software.*
- *Students develop positive attitudes towards technology uses that support life long learning, collaboration, personal pursuits and productivity (ISTE NETS, 2000, p. 14).*

Defining ethical issues in this context is no easy task. *Internet search*, for example, is among the most frequently assigned tasks in education, but is it only the screening of retrieved data that we have to make our students aware of? In a recent survey on the value-laden indexing system of Google, Buu-Hoan (2003) remarked that simply by virtue of its popularity, Google's power to influence where people go on the internet and what content they see is enormous (Buu-Hoan, 2003).

Teachers should be prepared to guide students through *moral dilemmas and perils of free time Internet communication*. This problem has been researched since the start of massive e-mail use in the eighties.

*These media are quite different from any other means of communication in terms of speed (of initiating contact, and of transmitting information once contact is established); permanence of the message; cost of distribution, to individuals and to groups; an organization's desire and ability to filter, channel, record, and control messages; experience of both an individual and of our culture in dealing with this new medium. Misinterpretation of messages may result from several attributes of the medium that allow casual and formal, or near-instantaneous, rather than reasoned messages to look superficially the same. A related phenomenon is "flaming," in which emotions are expressed via electronic mail, sometimes labelled as such, and sometimes not. A further very important phenomenon is the non-*

*controllability of who will see a message. Electronic messages seem quite evanescent, but in fact they can live on for years on disk archives, to reappear later in a variety of printed forms, some of which might be much more formal than was ever intended or foreseen* (Shapiro and Anderson, 1985).

Ethics also concerns *rights*. Students must understand their own rights and those of others in order to demand and respect them. At Columbia University, Jay and Ronda Hauben kept a netbook on the history and impact of the Net from its beginnings as Arpanet and UseNet. The introduction to this digital chronicle contains a “*Proposed Declaration of the Rights of Netizens*” inspired by Thomas Paine’s Declaration of Independence (1776), the Declaration of the Rights of Man and of the Citizen (1789), NSF Acceptable Use Policy, Jean Jacques Rousseau, and the current cry for democracy worldwide (Hauben and Hauben, 2001). Some of the most important rights include universal access at low or no cost, freedom of electronic expression to promote the exchange of knowledge without fear of reprisal, universal and equal access to knowledge and information, volunteer contribution and no personal profit from the contribution freely given by others.

*Intellectual property and plagiarism* are also issues of utmost importance to be included in teacher training programmes to ensure up-to-date knowledge of laws and regulations on the publication and use of digital information. In addition, rules of fair use should be mastered through analyses of published cases. These studies should not only form part of ICT training but be present in all subject areas where digital information is made use of. Images, texts, music, and even software products such as learning objects and tests are very often duplicated, even altered and taken out of context without the author’s consent. Many teachers consider the Internet a smorgasbord of potential educational resources and, through their examples, unintentionally teach their students to disregard copyright. (Sinko & Lehtinen, 1999, p.218)

It is not only public education that needs to address ethics while teaching about ICT use. User ethics are important, but *developer and trader ethics* in the field should also be considered in vocational education. Therefore, the teacher active in a technical college or university should be equally prepared to focus on ethical issues while teaching computer skills.

## **2.2 ACTIONS RELATED TO THIS PRACTICE**

- Using methods for individualized instruction:
  - providing a variety of contents and tasks through ICT tools to suit individual interests, abilities and needs
  - using responsive, formative assessment facilitated by ICT
  - initiating collaborative models for learning.
- Providing platforms of communication for students’ (self) expression and S-T, S-S T-T dialogue:

- ensuring privacy
- responding in an informative, unbiased manner
- being a guide/mentor, not a guru.
- Helping to close the digital divide:
  - providing fair/equal/adequate access to ICT for all students
  - using ICT to achieve equity in education.
- Teaching about and practising fair/ethical ICT use:
  - creating/adopting netiquette
  - being a role model for fair use. Considering race, gender, age, religion etc. as issues related to teaching practice and acting as a role model.

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

Ethical issues embedded in ICT technology that are relevant for education.

Reliable, varied and adaptable digital information resources.

Different views/content/styles suitable for students' gender, race, age, religion, intellectual level, interests, abilities etc.

ICT materials inspired by youth (sub)cultures.

Rules of fair/ethical ICT use.

Netiquette rules and practices.

Issues of race, gender, age, religion etc. in teaching practice.

### **2.4 REFERENCES**

Buu-Hoan C. (2003), *The Power of Google, A Search Ethos Report*.

<http://www.searchet>

Core Rules of Netiquette: [www.in.on.ca/tutorial/netiquettehos.com/power-of-google.html](http://www.in.on.ca/tutorial/netiquettehos.com/power-of-google.html)

ISTE NETS (2000): National Educational technology Standards.

[http://cnets.iste.org/students/s\\_book.html](http://cnets.iste.org/students/s_book.html)

Hauben M. and Hauben R. (2001), *Netizens. On the History and Impact of the UseNet and the Internet*.

<http://www.columbia.edu/~hauben/netbook>

Martin C.D. and Holz H.J. (2004), *Non-Apologetic Computer Ethics Education: A Strategy for Integrating Social Impact and Ethics into the Computer Science Curriculum*, Research centre on Computers and Society, USA.

Miller K. (1988), Integrating Computer Ethics into the Computer Science Curriculum, *Computer Science Education*, Vol. 1, pp. 37-52, reprinted in Terrell Ward Bynum et al. (eds.) (1992) *Teaching Computer Ethics*, Research Center on Computing and Society.

Sinko M., Lehtinen E. (1999), *The Challenge of ICT in Finnish Education*, The Finnish National Fund for Research and Development, Jyvaskyla.

Shapiro N. Z. and Anderson R. H. (1985), *Toward an Ethics and Etiquette for Electronic Mail*, Report of the RAND Corporation.

<http://www.rand.org/>

*Agencies safeguarding children's safe access to the Web and consultation services on moral issues concerning Internet use:*

CyberPatrol: [www.cyberpatrol.com](http://www.cyberpatrol.com)

Peacefire Censorware Pages: [www.peacefire.org/censorware](http://www.peacefire.org/censorware)

Net Nanny. [www.netnanny.com](http://www.netnanny.com)

SurfWatch: [www.surfwatch.com](http://www.surfwatch.com)

*Copyright issues:*

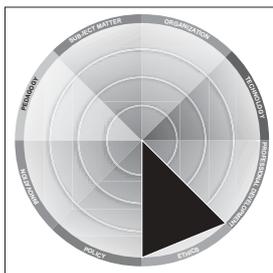
Copyright WebSite: [www.benedict.com](http://www.benedict.com)

Copyright & Fair Use Site at Stanford University.

<http://fairuse.stanford.edu>

The Customer's Guide to Ethical Search Engine Optimisation.

[www.bigmouthmedia.com/search\\_engine\\_information/customer\\_guide](http://www.bigmouthmedia.com/search_engine_information/customer_guide)



### 3 Teachers' interaction with **colleagues**

*Playing a positive and active role in cooperating with colleagues and interacting inside teachers' communities of practice using ICT tools and resources in an appropriate way*

#### 3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

*Advancements in computer technology were made under the naive assumption that efficiency was the main purpose or thrust, not moral values. The application of ethical principles to computer technology must take its proper place so that the ethical dimension is integrated into the concept of managing technology and the human relationships that accompany technological advancements. Our belief is that ethics cannot be taught; rather what can be taught is a framework for evaluating ethical dilemmas and making decisions. In accepting the premise that technology is value-laden, we stress the need to teach a methodology of explicit ethical analysis in all decision-making related to technology. (Martin and Holz, 2004)*

Computer ethics codes for teacher communities do not appear to exist – even the culturally grounded but internationally applicable rules of Internet use, the *netiquettes*, refer to teachers as safeguards of fair practice who are “naturally” aware of regulations. When we try to formulate ethical and moral considerations in educational computing, we are inclined to refer to ethics codes developed for professional users and creators of digital culture. Here are some sources that teachers may assume as a basis of discussion. A number of organisations have codes of ethics that may be used as important resources: the Association for Computing Machinery (ACM), which represents computer scientists; the Institute of Electrical and Electronic Engineers (IEEE), which represents computer engineers; the Data Processing Managers Association (DPMA), which represents managers of computer systems and projects; and the Institute for Certification of Computer Professionals (ICCP), which provides a voluntary certification mechanism for computer professionals.

Some of these rules directly concern practising teachers. Communities of practice develop and share ideas and, while doing so, make constant use of a variety of digital resources. During their pre- and in-service training, teachers are encouraged to use digital tools for the alteration, customization and multiplication of materials made available in educational portals or “found” on the web. *Copyright*, an issue of concern previously confined to authors, musicians, painters, filmmakers and other professionals, has only recently become a widely considered issue

in society. (The photocopier and the fast tape and disc multiplier as publicly available devices were the first intrusions into the publishing industry by not always well-meaning laypeople.) The first writable floppy disks opened up the possibilities of *software piracy*. The development of the Internet has increased and broadened the importance of the issue of intellectual property rights as they became less and less easy to defend.

McDougall (2003) analyses a range of American and Australian curricula for higher education and finds that social and ethical issues related to computing are not adequately represented.

*Teachers know, and students must understand, that simply using the technology to find something to “cut-and-paste” into an electronic project is at least as intellectually vacuous as the occasionally practiced pre-technology activity of copying two paragraphs from an encyclopedia and pasting a photocopy of the accompanying illustration onto a poster or work book. And once material from several sources has been selected and put together, the final product can appear to be very different from any of the original sources and may be perceived as the student’s own* (McDougall, 2003, p. 8).

The same rules should apply for practising teachers.

The final product – for example, an educational tool - may convey a message alien to its “elements” – work by others who unintentionally became “co-authors” of an unknown and unscrupulous individual. Focusing on the potential and power of the technology for classroom research activities, and on the technical skills involved, must not overshadow issues of *intellectual property*. The skills entailed in acknowledging sources and analysing information also have to be mastered. The unlimited and hardly ever legalized use of student work by teachers also poses questions. Are schools entitled to publish on the web, put on CD, show or even sell drawings, writings or musical performances by their students? These issues also have to be dealt with according to national copyright laws designed to protect “adult” productions.

The willingness to share ideas, educational methods, examples of student work is, however, a very important part of professional life that should be encouraged. In this way, the ethical use of resources made freely available by their authors can be promoted and made standard practice in the teaching profession.

### **3.2 ACTIONS RELATED TO THIS PRACTICE**

- Being a role model in competent ICT use for colleagues:
  - manifesting flexible, multifaceted use
  - proving the value of ICT through assessment and evaluation of student performance, software, Internet services etc.
  - modelling ethical use of resources
  - helping those in need of advice but not letting the system exploit you.
- Being ready to share and accept:

- providing relevant /inspiring teaching materials and experiences
- being open to criticism and constantly develop skills
- searching for good practice to adapt – broadening your educational perspective in ICT use.
- Being active in communities of practice:
  - stimulating discussion: being ready/willing to ask
  - disseminating knowledge gained among colleagues.
- Being informed of and developing a critical stance towards national and international ICT policy:
  - analysing ICT policy in terms of educational relevance
  - identifying ethical issues (e.g. equality of access)
  - formulating and sharing practice-oriented opinion.

### 3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

Educational methods of flexible, multifaceted use of ICT for teaching, assessment and evaluation of student performance.

Rules regarding ethical use of resources (software, learning environments, Internet services etc.).

Teachers’ rights and obligations in the ICT culture of their school  
 Knowledge about the location and use of “best practice” databases of relevant and inspiring teaching materials and experiences:

*Learning object repositories*

*Test databases*

*Image, text and sound banks*

*Reliable media-based information resources etc.*

Knowledge about significant national and international communities of practice.

National, regional and local ICT policies, major policy documents of the international ICT community:

*Educational relevance of ICT policies*

*Ethical issues in ICT policies*

*Practice-oriented actions taken by ICT policy makers at school and at higher levels, and their relevance for the teaching community.*

### 3.4 REFERENCES

- McDougall A. (2003), Social and Ethical issues in School IT Curricula and Use: The Case of Intellectual property and Plagiarism, in *Proceedings, SEC III*, Dortmund.
- ICCP, *ICCP Code of Ethics*, 2200 E. Devon Avenue, Suite 268, Des Plaines, IL 60018.
- IEEE (1979), *IEEE Code of Ethics*, 345 East 47th St., New York, NY 10017.
- IEEE (1981), *Ethics Source Sheet*, 345 East 47th St., New York, NY 10017.
- ISTE (1987), Code of Ethical Conduct for Computer-Using Educators, *The Computing Teacher*, Vol. 15, No. 2, pp. 51-53 (ISTE, University of Oregon, 1787 Agate Street, Eugene, OR 97403 – 9905).

Codes of Ethics Online: Computing and Information Systems.  
[www.iit.edu/departments/csep/PublivWWW/codes.computer.html](http://www.iit.edu/departments/csep/PublivWWW/codes.computer.html)

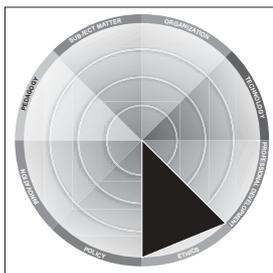
Computer Ethics resources from Keith Miller.  
[http://www2.ncsu.edu/eos/info/computer\\_ethics](http://www2.ncsu.edu/eos/info/computer_ethics)

The Ethics of Technology in Education.  
<http://rgfn.epcc.edu/programs/trainer/ethics.html>

The “Hacker Ethic” page at the Massachusetts Institute of Technology (MIT).

<http://fishwrap.mit.edu/Hacks/misc/ethics.html>

Multimedia Law Page: [www.batnet.com/oikoumene/](http://www.batnet.com/oikoumene/)



## 4 Teachers' interaction with the external environment

*Recognising responsibility to prepare citizens able to live in harmony with the social and physical environment*

### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

This section examines ICT-related ethical issues in terms of the social, cultural and natural environment. The *social environment* involves interaction with *educational policy makers* who may not be aware of educational needs related to ICT and therefore initiate action that is counterproductive to their benevolent aims. The massive purchase of software unrelated to curriculum content and current teaching strategies, or hardware donations that are not followed by funds for maintenance and upgrade, make government ICT policies highly ineffective. Teachers who consider the promotion of the welfare of students in their care cannot ignore misguided national ICT policies and should interfere as active participants of the social environment.

*E-government* is becoming more and more a reality in countries whose citizens are invited to communicate digitally with national and local government agencies. These procedures involve an array of ethical issues like privacy and fair use of data coming from different data collection efforts. "Fair use" in this case starts with data collection: who is entitled to do it, and for what purposes? Most e-government efforts are based on the (bureaucratic) assumption that the ease of using online services makes "*e-citizenship*" worthwhile for us, so we submit our data and consent to their storage in different government databases. Storage may eventually lead to re-use, and the combination of several online databases may make the life and habits of a citizen far more transparent than he or she could have foreseen when the data were collected. The right of retrieval and combination of data is a politically, commercially, and also morally sensitive issue that has to be explored when teachers confront our ICT-enriched environment.

Teachers are increasingly creating their own "*microworld*" of *e-government at school*, informing parents, students and fellow teachers about events and activities – but also about student progress. Data of the last kind are just as sensitive for students as tax return forms are for their parents. Many schools compile "digital diaries" with grade marks that are accessible to the student and his/her parents, and sometimes also to teachers of other disciplines. In some schools, students are given time to tell their parents in the traditional way – orally, with tears,

explanations and excuses, when necessary – the results of their less than satisfactory performance. Other, less emphatic educational institutions, however, even have software that sends an SMS to parents' mobile phones as soon as the grade is registered by the teacher in the digital database. Whichever solution is preferred (we may opt for not having an Internet-linked database at all) clear ethical rules of conduct have to be specified to ensure mutual respect of privacy.

ICT in our *cultural environment* means that when making computer purchases a sensitive approach to the abilities and requirements of our students is required. Special needs must be considered, though it may not always be easy to provide the visually or hearing impaired or those with psychomotor handicaps with an ICT-enriched environment that is responsive to their needs. However, it is both a pedagogical and a moral issue not to leave them behind, as research indicates that they benefit greatly from intensive ICT use.

Arts and cultural institutions in the local community – another aspect of our cultural environment – contain a rich array of digital resources that can be used in combination with the invaluable material they exhibit or make available through performances. ICT-supported instruction here assumes a habit-building character. While making our students (and colleagues) aware of these institutions through their Internet presence, we can also invite our students to regularly scan these cultural “hotspots” for sensible and exciting free-time activities.

Ethical issues related to ICT are linked to our *natural environment* in many ways. The preservation of the natural environment involves the sensible, environment-friendly use, storage and destruction of computer hardware. The best way to get rid of obsolete equipment is to hand it down to those who may still make good use of it (in schools, one-time computer lab PCs may end up in first grade or in day care as operational machines). Recycling is largely advertised and practised by those computer companies that are aware of the damage discarded parts may cause to our environment. Teachers should act as models of “green” behaviour and make sure students and colleagues are aware of what millions of computers may mean when turned from tool to garbage.

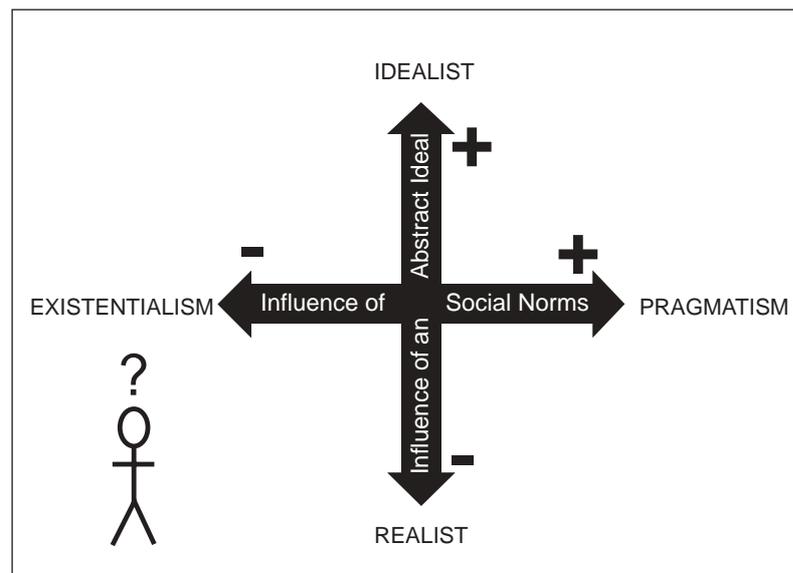
Useful links between our natural environment and the world of ICT may be forged through projects involving computer-related activities in natural settings. Observation of the quality of water, the temperature and pollution level of the air or more sophisticated tasks such as documentation of wildlife or minerals found in a given area may demonstrate how ICT can be put to the service of mankind – and contradict those who think computer-related, virtual activities prevent children from experiencing the real world around them.

An excellent strategy for discussing ethical and social impact issues is the *case study approach*, also called *scenario evaluation*.

# Ethics

Cases can be fictionalized scenarios, news items, book excerpts, or interviews on issues related to the cultural, social or natural environment. Ideally, participants are asked to question assumptions and to identify the values at stake in the cases. The case studies can show that technical computer science concepts are intertwined with questions society must ask and answer when people use computers. The scenario evaluation establishes the philosophical framework of the process, helping teachers identify their own ethical positions relative to a theoretical framework, to each other and to the professional ethics codes of the field. (Miller, 1988, p. 39)

When confronting ethical issues of the environment, a firm theoretical basis should be established. Robert Barger (1989) divides metaphysical theories into four camps: idealist, realist, pragmatist, and existentialist. When these are presented within a Cartesian coordinate space, teachers can determine where their values fit. The framework visualises how theories differ from person to person and culture to culture, enables teachers to identify how their viewpoint relates to those of others, and provides a personalized metaframework of ideas.



**Figure 1. Cartesian Ethics Space (Martin and Holz, 2004).**

When analysing environmental dilemmas, five questions in ethics suggested by bioethicist Robert Veatch may form a basis for addressing and providing justification for moral dilemmas: (1) What makes right acts right?; (2) To whom is moral duty owed?; (3) What kinds of acts are right?; (4) How do rules apply to a specific situation?; (5) What ought to be done in specific cases? (Veatch, 1977, 2). This framework can be used and updated by teachers as ethics codes are updated in the future.

#### 4.2 ACTIONS RELATED TO THIS PRACTICE

- Interacting with the *social environment* in order to promote efficient and ethical use of computers:
  - interacting with policy makers to ensure equity of access and resources to support fair and efficient school use of ICT
  - interacting with administrators to ensure e-government observes human rights, especially privacy.
- Interacting with the *cultural environment*:
  - informing others about cultural institutions in the locality through ICT resources and using their cultural resources to contribute to better teaching and learning
  - when using ICT in communication, acting in the interest of both children and adults
  - being a model for fair and respectful communication and respecting privacy
  - considering issues of race, gender, age, religion etc. in teaching practice.
- Creating a fair *school environment* for ICT use:
  - developing a school netiquette together with colleagues
  - teaching about ICT related privacy rules and practices (e.g.: Internet content filters, e-mail privacy)
  - teaching about Internet safety rules
  - teach about ethical behaviour on the Internet
  - considering the needs and abilities of children when making computer hardware and software purchases.
- Interacting with the *natural environment* in order to prevent colleagues and students using digital equipment in a harmful way:
  - creating a safe and clean ICT environment - teaching about and eventually practising recycling of hardware
  - observing/teaching about medical suggestions for healthy computer use
  - using and disposing of computer hardware in an environmentally-friendly manner
  - using digital information to teach about the natural environment
  - providing a link between computer-related activities and nature-oriented activities - using ICT tools to understand nature better and searching for environment-related models and inspiration to be utilised in the knowledge society.

#### 4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

Professional codes of conduct (e.g. netiquettes).

Regulations of the social environment influencing ICT use.

Knowledge about the functions of e-Government institutions in one's country and the ethical issues involved.

Knowledge about e-Commerce and the ethical issues involved.

Political and ethical perspectives on the history of computing.

ICT related privacy rules and practices (e.g.: Internet content filters, e-mail privacy).

Information about cultural institutions in the locality, their cultural resources and related ICT resources that can contribute to better teaching and learning.

Environmental issues regarding use, recycling and ultimate disposal of computer hardware.

Information resources about the preservation of nature.

Information about ICT tools that assist students' environmental learning activities.

#### **4.4 REFERENCES**

Bynum T. W. (ed.) (1985), *Computers and Ethics, Metaphilosophy*, issue of October 1985, Blackwell, New York.

Forester T. and Morrison P. (1994), *Computer Ethics: Cautionary Tales and Ethical Dilemmas in Computing*, 2nd ed., the MIT Press, Cambridge.

Johnson D. G. and Nissenbaum H. (eds.) (1995), *Computer, Ethics and Social Values*, Prentice Hall, Upper Saddle River N. J.

Johnson D. (1988), *The Ethics of Computing*, Edutech report, 4/5, pp. 1-2.

Martin C. D. and Holz H. J. (2004), *Non-Apologetic Computer Ethics Education: A Strategy for Integrating Social Impact and Ethics into the Computer Science Curriculum*, Research centre on Computers and Society, USA.

Miller K. (1988), Integrating Computer Ethics into the Computer Science Curriculum, *Computer Science Education*, Vol. 1, pp. 37-52, reprinted in Terrell Ward Bynum et al. (eds.) (1992), *Teaching Computer Ethics*, Research Center on Computing and Society.

---

## 9. Policy

*authors* Pieter Hogenbirk, Jouni Kangasniemi

Society is rapidly changing. From an industrial society, the emphasis is shifting towards a knowledge society (also called the information age). ICT can be considered as the driving force behind this shift. ICT influences society in all of its fibres: the professional field (content and competencies for jobs and work), the social environment (politics, integration, segregation, family, recreation, sport, etc.), the cultural sector (art, media, performance, music, etc.) and personal well-being (health, sports, spirituality, religion, etc.).

Since the mid 1990s the concept of the information society has been the subject of wide discussion among educational staff. Countries have invested heavily in ICT within their education systems over the past decade. Most information society policies in the field of education have shared the same elements: providing high-speed access to internet and a good technical infrastructure; extending basic ICT and pedagogical skills of teachers and other educational staff; building partnerships among schools and between schools and communities; and developing electronic learning resources (content) as well as electronic services for administration.

In describing the importance of ICT in education the following issues are often mentioned: the economic importance of possessing a high level of ICT skills in working life; ICT as a tool to help create equal opportunities for learning; ICT as a catalyst for a change; the use of ICT in education to improve the quality of learning (empowering and enabling students to learn themselves); a shift in pedagogical thinking where ICT tools fit like a hand in glove (collaboration, constructivist thinking, problem-based learning, process-oriented working methods).

So the aim of information society policy in education is twofold: to provide good general knowledge and a basis for active citizenship on the one hand, and to improve the quality of educational processes in general on the other. The former aim involves students acquiring the knowledge and skills they need in working life when they enter the labour market, an opportunity that all students should have in the information society.

The latter aim is about efficiency, about providing more time and space for independent learning, enriching the learning environment, bringing greater individualisation of learning and competence driven learning.

Governmental efforts to overcome the possible digital divide has given teachers a key role. Policies define the conditions under which the teacher works and acts. So far, basic teacher training in Europe has yet to provide teachers with adequate practices, competencies and skills for enhancing education by using ICT in a pedagogically justified way.

The information society is neither a positive nor a negative factor. It is essential, within a changing environment, that we deal with mental and physical well-being and with problems and challenges that come along with it. One of the challenges is finding a balanced, flexible relationship between school organisation and the external environment.

Many trends can be identified: from the national to the international level, from closed to open systems, from learning for life to life long learning, from top down to bottom up, from reproducing to creation.

Developments are placing the education system under considerable pressure. In order to prepare children for the future and for changing society, educational organisation has to change, educators have to change and methods and learning environments have to change. ICT could well act as the motor for such change in education .

It is therefore vital that teachers should be aware of the influence and impact of ICT on all areas of education, as this reflects the true nature of society and the environment.

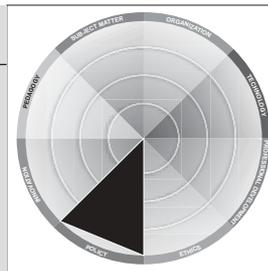
A shift is taking place in the underlying paradigm for education from [logic (positivism)] behaviourism towards social constructivism and contextualism. In many respects, this means a redefinition of educational functions. The learning environment and learning tools are moving towards ‘ambient learning’ and, what is more important, the children and young people to educate are themselves changing: rather than adopting a passive listening-and-consuming attitude, they are becoming more communicative and active ; they use their own language and vocabulary and have new interests and demands. Some even believe that their learning style and abilities are changing. The notion of learner centeredness has become very important.

To cope with the challenge of reforming education in response to all these changes, a range of policies have been developed that address different levels: environment level (international, national, local), school level (school heads, ICT-coordinators, colleagues) and personal level.

Teachers should be aware of the policies at the different levels and should be able to redefine them into strategies which contribute to the goals set by policy makers and continuously improve their own professional behaviour.

## 1 Teachers' interaction with **the self**

*Critically reflecting on ICT policies and strategies pertaining to the school-ICT-knowledge society relationship and constructing one's personal vision*



### 1.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Teachers' motivation to use ICT in teaching and learning is all about personal adoption to the new working environment and about changing traditional working habits dominant in teaching situations. The development of information and communication technologies is placing new demands on teachers' expertise. Their personal attitudes and beliefs need to reflect the new working environment. Teachers face new situations in which they must accept the fact that aspects of their everyday work that they have been performing for many years needs to be changed. They must start re-thinking what the new working methods are about, how ICT can be brought into the classroom to enhance learning, and what strategy they should follow to achieve that purpose. They should be aware how learning is changing and how ICT is an ideal support tool for implementing the new learning paradigm.

### 1.2 ACTIONS RELATED TO THIS PRACTICE

At the intrapersonal interaction level teachers reflect on policies and strategies set by their environment and translate these into personal strategies and actions. It is important to understand why government and the local administration wish to support schools to purchase ICT and support teacher training programmes for personal professional development.

In developing a personal vision, an idea of how to operate within the new environment, teachers at all levels reflect on the influence exerted on their personal behaviour by ICT policy and strategies at national, local and school levels.

Teachers reflect and comment on ICT school policy and external policy in order to help improve the definition of that policy. To these ends, teachers need to have an understanding of how policy changes are monitored in their own work environment.

In this respect teachers construct (relevant parts of) their personal vision on ICT and ICT policy and understand that the introduction and active use of ICT to support instruction and study may provide encouraging results.

Teachers translate school policy and external policy into feasible personal objectives and actions and know how to encourage and guide additional developments in their own teaching practices.

In general they reflect on the quality of their teaching and performance with respect to the actions resulting from ICT policy, and understand the possible negative attitudes that some colleagues or students might have towards using ICT.

### **1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

#### **National policy**

In most European countries central governments play a prominent decision-making role in developing, planning, implementing and coordinating ICT policies. The context varies from country to country. Often the responsibilities are shared between broader sets of ministries, agencies and levels of administration. The development of ICT policies is a constant interplay between the central, local and regional governments and education providers. The most important role for central government is to promote the opportunities that the information society makes available to all. The focus of Information Society programmes in all (European) countries is to help improve education (and the use of ICT) through a more co-ordinated approach to policy making.

#### **Local policy**

In addition to the national education administration, the municipalities play a crucially important role in funding and maintaining educational institutions. Therefore they need to ensure that all those involved will carry out national policy. Teachers need profound understanding of administration and national policy directives. Since municipalities often play an important role as financiers of information society infrastructure, teachers need to be able to influence decision makers to improve their ICT resources to the levels set in their plans. The appropriate level of resources must be constantly monitored.

#### **School policy**

Close collaboration between all actors in teaching and learning plays an important role in safeguarding skills, knowledge and educational quality. ICT is often involved in cross curricular activities and networked projects. The use of ICT in education strategies needs to be integrated into curricula and where national guidelines fail, teachers should develop such integration themselves. Networking between schools requires a defined set of responsibilities – something that is new to many schools.

#### **International policy**

The focus of Information Society programmes in all (European) countries and in the European union is to help improve education (and the use of ICT) through a more co-ordinated approach on policy making. Insight into European projects and policies may help teachers to develop their own strategy towards ICT in education.

#### 1.4 REFERENCES

A full list of references is published in the Dutch review study about:

The development of ICT-competences of teachers

Edith van Eck, Andriani Kraan, Monique Volman, Eeeltje Dijk,  
SCO-Kohnstamm Instituut, Universiteit van Amsterdam;  
Afdeling onderwijspedagogiek (FPP), Vrije Universiteit.  
Published 2002.

At <http://www.lerarenweb.nl/bekwaamheid/english.html> the Dutch Foundation for the Professional Quality of Teachers has published several document (also in English) about general competencies of teachers. Several of these competencies can be 'translated' into the field of ICT.

The relevant documents are:

[http://www.lerarenweb.nl/bijlagen/SBL\\_Introduction.pdf](http://www.lerarenweb.nl/bijlagen/SBL_Introduction.pdf)  
(English introduction)

[http://www.lerarenweb.nl/bijlagen/SBLcompetence\\_primary.pdf](http://www.lerarenweb.nl/bijlagen/SBLcompetence_primary.pdf)  
(competences for teachers in primary education)

[http://www.lerarenweb.nl/bijlagen/SBLcompetence\\_s\\_and\\_v.pdf](http://www.lerarenweb.nl/bijlagen/SBLcompetence_s_and_v.pdf)  
(competences for teachers in secondary and vocational education).

In the inspectorate publication ICT 3 Information and Communication Technology for Teacher Training; pedagogic benchmarks for teacher education, carried out by five international experts:

<http://www.onderwijsinspectie.nl/documents/pdf/ict3>), five benchmarks are defined for comparing teacher training curricula with respect to ICT.

Standards for teachers from the ISTE are published at:

<http://www.iste.org/Template.cfm?Section=NETS&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=17&ContentID=824&CFID=422689&CFTOKEN=91337966>

A short description of a Finnish program called OPE.FI designed to improve the ICT skills of teachers and other personnel.

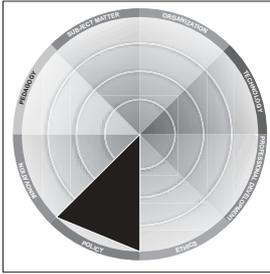
<http://www.edu.fi/english/page.asp?path=500,572,6011>

Example of Finnish national Information Society Programme for Education, Training and Research.

<http://www.edu.fi/english/SubPage.asp?path=500,572>

A web journal on e-Learning issues (In Finnish only).

<http://www.valt.helsinki.fi/piirtoheitin/index.htm>



## 2 Teachers' interaction with pupils

*Given context constraints and policy/strategy requirements, implementing actions that respond to the demands and challenges of the ICT policies of school and environment*

### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

At the level of interaction with students, teachers should be able to act according to the policies which are to be implemented. Accordingly, they should be able to develop a strategy in which policy is translated to the full so as to meet the demands and capabilities of the students involved.

One other aspect of this level is the way policies and strategies are evaluated. In this evaluation students should play a significant role because they are not only the objects of educational developments and policies but also the subjects. They are the carriers of the policy and, in the special case of ICT, they play an even more important evaluating role because in many cases (e.g. collaboration tools, chatting, games and specialized tools like web editors), they know more about ICT and how to use it than the average teacher.

### 2.2 ACTIONS RELATED TO THIS PRACTICE

Teachers reconcile their personal vision with the context of action in which they operate, responding to the demands and capabilities of the students involved. They redefine ICT school and external policies into feasible strategy and actions, taking into account the capabilities of their students, their social environment, their personal interests and their learning styles.

ICT should be more closely tailored to students' needs and expectations, to enable them to participate more readily in socially fulfilling and culturally creative virtual communities. This involves a way of teaching where the student's own wishes and needs are paramount. Flexible learning arrangements give students the opportunity to choose the time, place, pace and structure of their studies.

ICT policy is often accompanied by examples of good practice. By becoming acquainted with those practices, teachers exploit the opportunities presented by ICT policy and implement this policy into a vivid and challenging learning environment, choosing the right ICT equipment and the right software.

Developing a personal policy and strategy towards ICT does not relieve teachers from a certain obligation to support actively the ICT policies towards students agreed upon at school, regional or

national level. Instead students should be involved in evaluating the results of ICT policies in a neutral way.

### **2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

In the future, schools will exercise greater responsibility in operating in an open environment and preparing students for future life. ICT has made it possible to facilitate support for individual learning as well as collaboration among learners.

In a broader context, the teacher needs to know the basic assumptions of policies regarding the main output of school: the citizens of the future. The “future citizens” need social and technical skills (including security), critical understanding of media and content as well as ethical and cultural skills. By the time students finish their studies they need to be competent in basic ICT skills (ICT literacy) and have the knowledge and skills to use the internet in a responsible way. They need to understand the benefits of co-operation, collaboration and networks, and be able to develop personal learning skills concerning the use of new information and communication technologies, social, cultural and ethical skills.

#### *Good practices*

Good practices play a major role in many policy making areas: good practices from experimental showcases, from ordinary school and teachers, from special projects on professional development. Awareness of sources of good practice is part of the professional attitude of a teacher.

#### *Quality assessment*

In some countries tools available for assessing the quality of ICT use in the classroom through pupil are questionnaires and interviews. As part of the activities of the school’s ICT department or school management, individual teachers may be required to participate in ICT quality assessment, offering support and active contribution.

### **2.4 REFERENCES**

Numerous sources are available providing examples of good practices. The Dutch inspectorate has made over 120 portraits of successful ICT practice within schools and subjects, and of school heads, teachers and pupils. Most of these portraits are from Dutch situations, while others derive from Scotland, Ireland, France, Sweden and Canada. Some are available in English. They can be found at:

[www.onderwijsinspectie.nl/themas/ICTbranche/](http://www.onderwijsinspectie.nl/themas/ICTbranche/)

The procedure of making portraits has been taken up at European level by English, Scottish, Northern Irish, Austrian and Flemish inspectorates. The portraits have been developed and published as part of the Ernest project.

They can be found at <http://schoolportraits.eun.org>

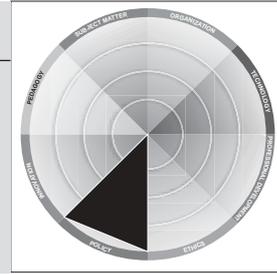
The Scottish Inspectorate publishes good practices at

## Policy

[www.hmie.gov.uk/hmiegoodpractice/](http://www.hmie.gov.uk/hmiegoodpractice/)  
Finnish practices can be found on a page maintained by the National Board of Education: <http://www.edu.fi>. This page provides access to several sub-services such as regional virtual school services, subject or thematic materials, materials for minorities, special education and other languages.

### 3 Teachers' interaction with **colleagues**

*Critically reflecting with colleagues on policies and strategies pertaining to the impact of ICT on the school system and cooperating to implement and evaluate them*



#### **3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE**

In the interaction level between the teacher and his or her colleagues the main issue should be the translation of policy into objectives and actions. It follows that implementation and evaluation should be carried out in a collaborative and co-operative way. There should also be co-operation to formulate policy and strategy with respect to their subjects, the pupils under their responsibility or other topics where teachers collaborate. In this professional contact there should be a mutual understanding of the ICT policy of school and environment.

Different stakeholders (teachers, administrators, technical support personnel and other personnel) need to work in co-operation to form a common vision for the development of ICT policy for the school in order to work with the wider context and environment.

The aim of ICT plans at school level is to solve technical, pedagogical, social, administrative and statutory problems involved in the adoption of new forms of studying and ICT. Every member of the school organisation needs to ask the same questions: How do we as teachers and school leaders see the relevance of ICT? What is the role and meaning of using ICT in education to guarantee equal opportunities for learning for all students? Where or in which situations does the use of ICT serve educational aims best? How do we support schools in making the cultural change required to make the best use of new information and communication technologies throughout school work? How do we change and reform the school to meet the needs of today's children as well as the expectations of today's parents and politicians?

#### **3.2 ACTIONS RELATED TO THIS PRACTICE**

In schools, it is important to raise awareness about the need for entire teams (of teachers, school leaders and support personnel) to change their behaviour (from working individually) so as to make good use of ICT in education. Building a supportive base for education requires plenty of informal meetings with peers, clear instructions, and training through the setting of examples and good practices. School policy and external policy need to be translated into feasible group objectives, strategy and actions. Training and development of teams is also needed.

Using ICT in new learning situations is often a novel experience for teachers and head teachers alike. Therefore working in the new (ICT) environment requires new ways of networking, communication and negotiation skills, as well as problem solving skills and the ability to ask for and understand when external help is needed. One of the aims is to provide communicative skills and change management skills for teachers. They also should be able to share responsibility and divide the workload, to implement the different policies. They should share personal action plans and personal results with other colleagues.

School organisations (a collective of knowledge) need, among other things, to learn how to issue calls for tender, negotiate, make purchases, agree on contracts and build new partnerships in a new kind of environment and with new kinds of (business) partners, and to discuss matters in business and technology oriented language.

School organisations need to develop a culture of collaboration amongst all its actors (teachers, students, support personnel and administrators). Lack of proper information provides fertile ground for rumours and fears - and in the end, under-use of ICT in education. "Promoting collaboration" places the emphasis on encouraging co-operation within educational institutions and between different kinds of organisations (education and training, training organisations and working world, schools and homes).

There is a need for a shift in school culture towards participatory management (open discussion, taking the views of others into account and questioning them all). Open reflection on the influence of ICT school policy and strategy is needed.

This means that reflecting on the influence of ICT policy at the national and local level should be performed with colleagues without prejudices or preconceptions. Teachers should be able to reflect on the quality and performance of the group with respect to the actions resulting from the ICT policy.

Furthermore, there is a need to provide support services for teachers and other educational actors at school, regional and national levels. Most of the current information society programmes fund project based structures. There is a need for permanent and semi-permanent structures for support organisations. These new structures will assist with the integration of ICT into teaching and learning.

### **3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

#### *Team collaboration / Team building*

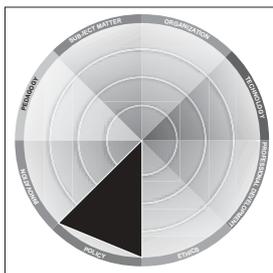
Both individual and social skills are needed. Interpersonal competencies comprise all forms of behaviour that must be mastered in order to enable an individual to participate in an efficient and constructive way in co-operating with colleagues and in school life. Interpersonal skills are necessary for effective interaction on a one-to-one basis or in small groups.

To manage change, teachers need to know how to

- motivate others
- strike a balance between different beliefs and attitudes
- build bridges between new partnerships and network
- develop problem solving techniques
- co-operate constructively with colleagues.

### **3.4 REFERENCES**

There are many case-studies which focus on the role of the team in developing common objectives and actions.



## 4 Teachers' interaction with the external environment

*Given the limits of one's action, contributing to the development of policies and strategies related to the construction of a school strictly linked to the environment*

### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

At the interaction level between the teacher and his or her environment, there should be mutual understanding for the reasoning behind and impact of the ICT policy. In professional contact with local and perhaps national policy-makers, teachers should be able to discuss policy, give examples and counter-examples of implications, show results and evaluative data.

The use of ICT in education is not institution based but rather resource based and open to anyone interested. Already in the initial stages of the debate concerning the Information Society, one of the central changes in education foreseen has been the shedding of limits of time and place. Both teachers and students can access learning anywhere. The use of ICT in education (virtual education) is often seen as a good and in many cases cheap way of running flexible learning programs and problem based learning.

### 4.2 ACTIONS RELATED TO THIS PRACTICE

The Internet (web) can be used for communication and collaboration at all levels; local, national and international. The focus of collaboration is not on content but on conversation, services and interaction.

Teachers reflect and comment on school ICT policy and external policy, engaging with policy makers both at local and national level. From the teacher's point of view it is important to be familiar with the different national policies (in one's own country and elsewhere in European) in order to be able to contribute.

Teachers understand the driving forces behind the ICT policy and are able to comment on them. Teachers contribute to the fulfilment of the overall purpose of the policy and encourage themselves and colleagues to be pro-active towards such policies.

In discussion with national and local policymakers, they can demonstrate the impact of their policy statements. They can explain school ICT policy and ICT policy at the national and local level to parents and other interested people.

Teachers keep up to date about the influence, strategies and impact of corporations on ICT in education. They are aware of their policies (for example Microsoft's Partners in Learning) and

have a clear view on to the desirability or otherwise of contributing to such policies.

In addition teachers can contribute to reducing the gap that exists between what is going on in schools and what researchers in the field of education report, especially by taking appropriate steps to be better informed about research results on the use of ICT in education.

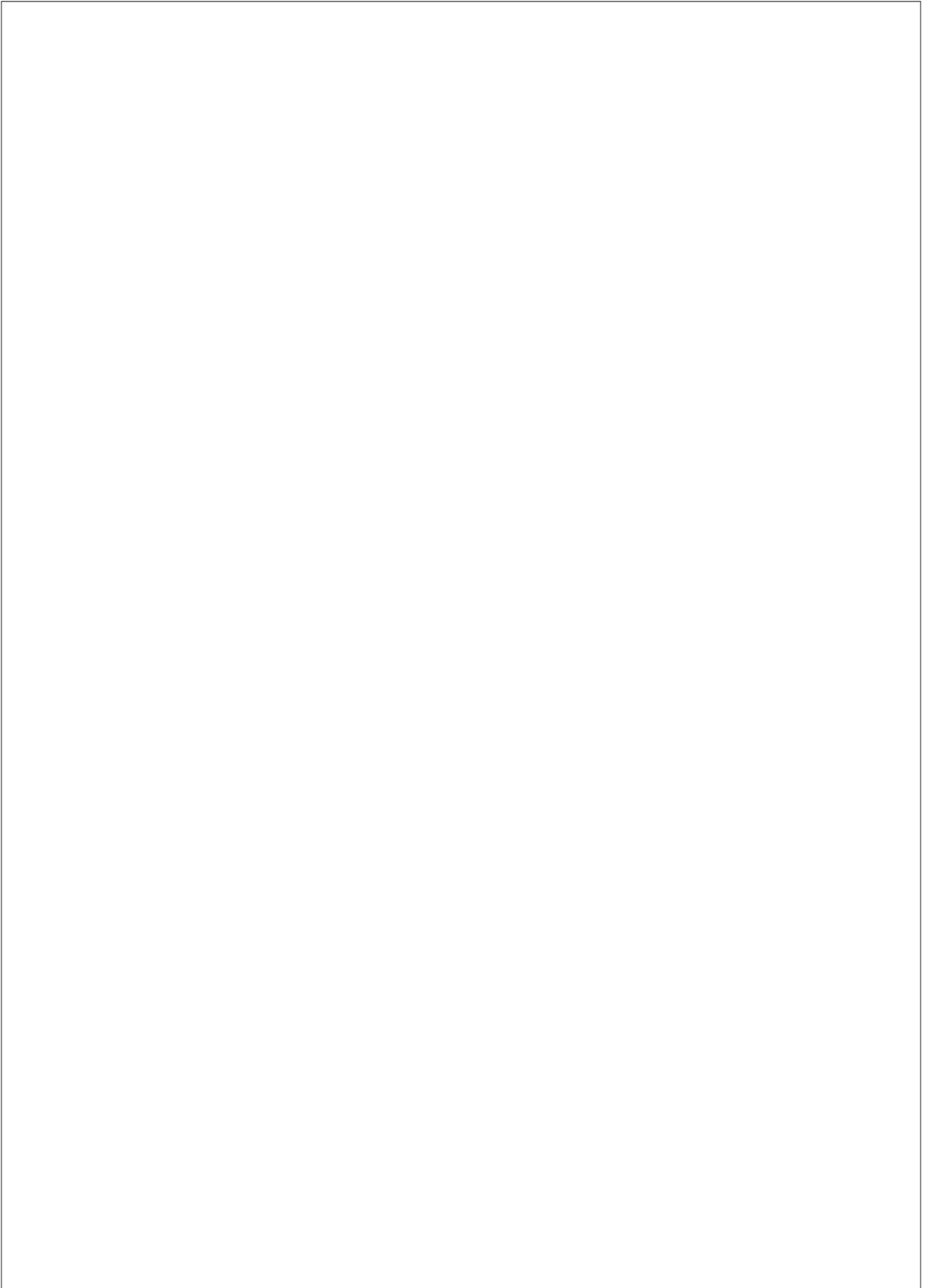
#### **4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

##### *Lisbon agenda*

Some years ago European ministers agreed upon an ambitious agenda for moving towards the information society in the coming years. That agenda includes objectives for education, knowledge about national and local policies, and about local resources (research centres, cultural foundations etc.).

Strategies need constant updating at all levels and at all times. This process should be established as part of normal teaching and administrative activities in daily school life.

In addition to the national education administration, the regional authorities or governing bodies play a crucial role in funding and maintaining schools and other educational institutions. In order to promote equality in the information society, all players need to co-operate towards the mutually shared vision of future education.



---

# 10. Innovation

*author* Conor Galvin

## **The importance for teachers of engaging with innovation and developing understanding in relation to the innovation and education ICT policy processes.**

Innovation is widely misunderstood in relation to education. The term is frequently taken simply to mean change/introducing new practice. And this is particularly true of any ‘innovation’ involving ICT. However, it is becoming increasingly clear with time that the value of innovative educational ICT usage is unlocked only when supported by substantial complementary investments in new work practices, the development of new teacher skills, and the establishment and support of new organisational structures to position and sustain transformation. The digital era therefore raises deep issues of strategic reorientation for all involved – for schools, for teachers and school leaders, for teacher training institutions, for regional and national departments of education. This points towards an innovation agenda. But it is not an innovation roadmap. The roadmap involves comprehension of the knowledge society imperative and the deep nature of innovation.

As teachers we need to develop awareness of where we are in relation to the Lisbon Agenda and to the knowledge society which it advocates. This includes awareness of all the changing functions and opportunities the agenda represents. We need to become the engineers of change and the innovators of a new ICT-leveraging pedagogy – not unthinking consumers of some outside vision of what we are and what we should be doing in our schools.

True innovation in the education area is not the type of activity often presented within classic policy-driven education change. It is systemic rather than linear. That is, the processes of innovation are

# Innovation

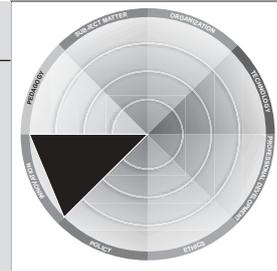
multidimensional and multi-stakeholder. True innovation involves many different players and often takes place across extended periods of time. And while innovation in relation to educational ICT usually involves a transfer of technology, this is never an isolated event. It requires a context and necessary supporting structures and arrangements. Teachers need to understand this.

To be successful, innovation requires the development of adequate networking and knowledge transfer mechanisms. Without these, most initiatives can and will fail. Experience from the ongoing Information Society actions of the Commission's DG Enterprise strongly suggests that functioning innovation systems work best when they ensure the free flow of information and expertise across the interfaces between business, research, entrepreneurs, intermediaries and other actors. Such systems, it is argued, may have technical components but are – above all else – networks of individuals. Teachers and other educationalists with an interest in innovation, across all of the sectors of our activities, need to begin engaging this problem. The reasons for doing so are strong, and the rewards worthwhile.

## 1 Teachers' interaction with **the self**

### ICT, Innovation and the Teacher

*Critically engage with the need for ICT-led innovation and the transformative power of positive change*



Innovation

#### 1.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

*Innovation* is often understood as a technical or scientific activity related closely to the information society's way of doing business. It involves *invention* and takes place at a distance from the daily lives of ordinary people, then impacts society profoundly in the form of a constant stream of new gadgets, software and technologies.

But it is more than this. Increasingly innovation is less concerned with inventing and more concerned with assembling or bringing together leading edge ideas and technologies in ways that elegantly address issues faced by the knowledge society. This point has been well made by Alec Broers in a recent lecture on the relationship of science, society and technology.

*In the last decade of the 20th century we lived through what was in effect a new industrial revolution. Companies ceased to make entire products themselves and became assemblers of the world's best, and to do this they had to know the world - both its technologies and its peoples. And these trends are only going to accelerate as the emerging powers of India and China enter the world of innovation as powerfully as they entered high technology manufacturing.<sup>1</sup>*

Broers' point is a powerful one: innovation is better understood as a mindset, a way of interacting with the world that seeks out, brings together and engineers novel uses of novel technologies, to deal more effectively with change and the challenge that change brings. Innovation in this view is about creativity based on developing familiarity with new ideas and new technologies.

For teachers, this understanding of innovation can provide a way of responding to and redirecting change at the personal and school level. But it involves us in a way that we are only beginning to understand – individually and as a profession – in deep-level changes in the bases and principles of our pedagogical and didactic activity.

Thought leaders within and from outside the world of education have begun to address this challenge. Part of becoming an innovation-aware teacher is to engage with this discourse around ICT-led innovation and the transformative power of positive change for education.

1

*Innovation & Management.*  
Lecture 3 in the Reith Lecture series, 2005; accessible at <http://www.bbc.co.uk/radio4/reith2005/lecture3.shtml> .

As teachers we need to develop awareness of where we are in relation to the knowledge society and of the changing functions and opportunities it presents. We need to become the engineers of change and the innovators of a new ICT-leveraged pedagogy – not unthinking consumers of some outside vision of what we are and what we should be doing in our schools.

## 1.2 ACTIONS RELATED TO THIS PRACTICE

- Reflecting on the influence of ICT on our society and the way we live. There are new forces and institutions driving change at the supra-national, national and local level. Understanding these will require reading beyond traditional pedagogical and discipline interests: we need to become more familiar with discourse and debate around notions of educating for 21<sup>st</sup> century life.
- Developing and deepening personal understanding of the changes and choices facing teachers in the knowledge society. This will involve searching out and becoming familiar with examples and articulations of ICT-enabled transformation of practice.
- Engaging with the problematics of leading successful change in the school and classroom. This is a far from simple undertaking – as anyone who has ever been involved in activity at this level will know.
- Contributing to the development of new cultures of educational practice and better understandings of the professional roles and responsibilities of teachers enabled – and in some cases demanded – by the knowledge society.

## 1.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

There are at least three key areas of teachers' knowledge and understanding impacted by activities associated with becoming more critically engaged with ICT-led innovation and the transformative power of change within education systems across the EU:

1. Teachers' pedagogical content knowledge<sup>2</sup> – the core expertise engaged when teachers mediate learning for their students. This is likely to need re-envisioning so that ICT is more intuitively blended into the knowledge mediation process.
2. Teachers' understanding of the activism<sup>3</sup> at the heart of their professional practice. There is a strong case to be made that the emergence of the knowledge society has changed our central professional remit: teachers need to drive this debate if our core professional values are to be safeguarded.
3. The nature of schools and schooling<sup>4</sup> and their purpose in the knowledge society.

Beyond these, there is also an emerging need to understand more fully the process of education directed change – as agent and as participant. And in particular to develop knowledge and capacity relating to the practice of innovation as this has been sketched above.

**2**

The mediation of content through the lens of a developed pedagogy. See Shulman (1987) for a full discussion of this concept.

**3**

See Judith Sachs (2003) or Day and Sachs (eds) (2004).

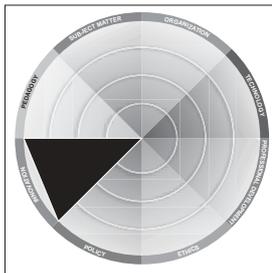
**4**

See McCluskey, Hofer and Wood (2004).

In short, the degree and nature of change in education and educational activities precipitated by the rise of the knowledge society means that teachers are faced with the need to study the extraordinary human capacity to engage in very complex problem solving and practice-directed inquiry in a way that has not been the case for several generations, if ever.

#### 1.4 REFERENCES

- Broers A. (2005), *Innovation & Management*, Lecture 3 in the Reith Lecture series.  
<http://www.bbc.co.uk/radio4/reith2005/lecture3.shtml>
- Day C. & Sachs J. (eds) (2004), *International Handbook on the Continuing Professional Development of Teachers*, Open University Press, Buckingham.
- McCluskey A., Hofer M, and Wood D, (eds) (2004), *Schooling: a sustainable learning organisation?*, CITE, Bern.
- Sachs J. (2003), *The Activist Teaching Profession*, Open University Press, Buckingham.
- Sachs J. (2004), *Teacher Activism*, British Educational Research Association, London.
- Shulman L. and Wilson S. M. (2004), *The Wisdom of Practice: Essays on Teaching, Learning, and Learning to Teach*, Jossey-Bass, San Francisco.
- Shulman L. (1987), Knowledge and teaching: Foundations of the new reform, *Harvard Educational Review*, Vol. 57, pp.1-22.



## 2 Teachers' interaction with **pupils**

### Innovation and the immediate teaching context

*Shaping and re-shaping ICT-led change in terms of the learning & teaching we provide*

#### 2.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

The way teachers respond to the challenges and opportunities of ICT in their immediate teaching context is in some ways the easiest of the contexts of innovation to understand. Better teaching is all about finding ways to extend our practice – to build on what we already do and so improve the learning experience of our students.

ICT has long been seen as a significant catalyst for pedagogical change: the rhetoric around its power as a radical force in altering the practices of the classroom is long accepted. But the reality is often different. A recent OECD report makes the point that despite massive and sustained investment in IT infrastructure across the developed world, the impact on practice has been largely disappointing in policy terms.<sup>5</sup>

The problem is not one of a lack of resources or vision; it is one of conviction and belief. Teachers do not trust the stability of most IT facilities and so do not invest valuable time and status in mastering something so undependable and pedagogically inappropriate.

If ICT is to impact in terms of the immediate teaching and learning context it must be an asset. And it must connect with the imagination and interests of the students. A number of what can be termed potentially *disruptive technologies*<sup>6</sup> have recently become robust enough to provide teachers with a way to begin doing this. These include blog technology, ipodding, and mobile phone/ mobile device technologies.

What is important about these technologies is not what they are; in a way this is simply relative. There will always be emerging technology and some of it will always have pedagogical potential. What is important about the technologies mentioned above is that they have educative capacity and provide *adaptive challenges* (Heifetz and Linsky, 2003) that is, challenges which require difficult learning and that demand a response beyond current repertoires. And which reward on the same scale.

Teachers and other educators need to develop grasp and capability in relation to innovativeness as this relates to classroom and school ICT activities. In a very practical sense we need to work our way towards becoming shapers and reshapers of school

<sup>5</sup> OECD (2004).

<sup>6</sup> See Christensen (2000) for a full discussion of this concept.

and classroom innovation – in all its adaptive and technological aspects.

**2.2 ACTIONS RELATED TO THIS PRACTICE**

- Reflecting on the idea of *disruptive innovation*. Considering the personal challenges involved in moving school practice forward in this way – the difficulties and possible rewards. Taking the time to read in this area; perhaps taking Fullan (2004) and Christensen (2000) as starting points.
- Developing and deepening personal understanding of truly transformative ICT usages – even those that may not have immediately relevance to the teacher’s setting and practice.
- Developing familiarity with the technical and pedagogical aspects of one or more disruptive technology – such as blog technology, ipodding, and mobile phone/mobile device technologies.

**2.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE**

The areas of teachers’ knowledge and understanding most significantly involved in shaping and re-shaping ICT-led change in terms of the learning and teaching cluster around basic technological and pedagogical aspects of successful innovation. They include:

1. Understanding the role of adaptive challenges<sup>7</sup> in innovation – these are more complex and demanding than the simpler technical issues / problems that may also present. We need to develop the expertise to engage these confidently.
2. Accepting the need for some *difficult learning* if we are to introduce disruptive technologies into our teaching. There is probably a learning gain in developing some basic familiarity with core texts and principles in knowledge management or change management – an area that teachers generally tend to find unfamiliar.
3. The deep nature of innovation in the knowledge society and the place of new and emerging technologies in both this society and in the activities surrounding innovation.

There is also a change in professional mindset that we must address when it comes to risk taking in relation to the introduction of new and in some ways ‘unproven’ technologies into our teaching. We need to consider our obligations to share the experience. Essentially we need to consider the currency and deep significance in an open source approach to pedagogical innovation. Teachers must become *hackers*<sup>8</sup> in the true sense of that term – we must try things and share what we find in doing so with colleagues within our schools and beyond.

**2.4 REFERENCES**

Christensen C.M. (2000), *The Innovator’s Dilemma*, HarperCollins, London.

<sup>7</sup> See Heifetz and Linsky 2002 or Fullan(2004) for a discussion of this.

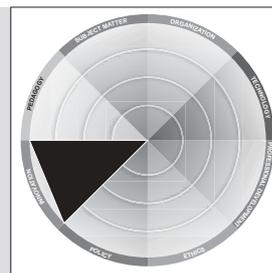
<sup>8</sup> See Hargreaves (2003).

- Fullan M. (2004), *Learning to Lead Change: Building System Capacity*, OISE / Microsoft, Toronto.
- Hargreaves D. (2003), *Education Epidemic: Transforming secondary schools through innovation networks*, DEMOS, London.
- Heifetz R. and Linsky M. (2002), *Leadership on the line: Staying alive through the dangers of leading*, Harvard Business School Press, Boston.
- OECD (2004), *Completing the foundation for lifelong learning. An OECD survey of upper secondary schools*, OECD Publications, Paris.

### 3 Teachers' interaction with **colleagues**

#### Innovation and innovativeness

*Working with colleagues to introduce and develop innovative uses of ICT in schools and teachers' wider practice communities*



#### 3.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

In the past ten years or so a very considerable amount has been learnt about the drivers and barriers that impact ICT-led change in educational settings. These include published findings from major international initiatives such as the OECD *Schooling for Tomorrow* project<sup>9</sup> and large scale ICT pedagogical usage studies such as SITES M2<sup>10</sup>. They also include a considerable range of EU-wide activity funded under MINERVA and IST actions, as well as large numbers of individual projects in almost every EU country. Together, these provide detailed qualitative and case-level understanding of *what works* in education ICT and *why*.

Where we have *not* been successful is in understanding how innovation can be seeded and – crucially – how it can be recognised, captured and then scaled/replicated across a system more broadly and/or to other constituencies and settings. Basically, research has not addressed the problems and issues of *knowledge relay* as these relate to the use of ICT in educational settings. We do not understand how well the conditions and protocols that govern understandings of innovation relay at the theoretical level – such as those developed by DG Enterprise in the early 1990s – apply to the challenge of innovation for better schools' ICT. Or even if they do.

Recently however there have been some interesting developments that might help advance this area. Separate research activity by David Hargreaves and Michael Fullan has led to published outcomes that can offer the teacher some useful insights into the challenge of relaying innovative practice within their schools and beyond.

Much of Fullan's recent work is directed at the notion of *change knowledge*<sup>11</sup>

*understanding and insight about the process of change and the key drivers that make for successful change in practice* (2004:1).

A very significant element of this is represented by the distinction he draws between *innovation* and *innovativeness*. Understanding of innovation is necessary but is not, in Fullan's view, sufficient to achieve change in practice. This requires *innovativeness* – grasp and ability in the process of engaging in producing change in practice. It means

*...going beyond superficial knowledge of the key concepts [of*

<sup>9</sup> See for example OECD (2001) among many others.

<sup>10</sup> Kozma (2003) probably represents the best drawing-together of SITES M2 project currently available.

<sup>11</sup> Developed in part in relation to a Microsoft initiative. See Fullan (2004).

*change knowledge] toward a deeper commitment to developing knowledge, skills and beliefs related to being change agents in collaboration with others (2004:13).*

Hargreaves has concentrated on understanding what he terms *engineering an education epidemic*.<sup>12</sup> This results in an intriguing analysis of the possibilities of educational change set in a context of innovation networks. Using his understanding of network and emergence theory, Hargreaves argues that schools should be linked together so that small-scale innovations spread quickly and easily. Such innovation networks could allow teachers to share good practice in a way similar to peer-to-peer networks which allow music enthusiasts to share sound files on the internet. The idea that such innovation networks might help develop innovativeness and function as a means of spreading better ICT pedagogy is a powerful one.

### 3.2 ACTIONS RELATED TO THIS PRACTICE

- Developing familiarity with the core concepts of *change knowledge*. This could be achieved through private study of Fullan's work or perhaps by organising a peer workshop or seminar on the area of innovation and innovativeness: see [www.michaelfullan.ca](http://www.michaelfullan.ca)
- Develop familiarity with the concept of innovation networking. David Hargreaves work like Fullan's is readily accessible on various internet sites.
- Engage with the challenge of co-producing school-level and class-level usages of ICT. Sites like *teachnet.org*, *eschoolnet.eun.org*, and *etwinning.net* provide relatively simple to use internet platforms, resources and a way of linking up schools and like-minded subject colleagues. These sites are toll-free and are maintained by educationalists.

### 3.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

There are a number of key areas of teachers' knowledge and understanding that need to be developed if teachers are to work with colleagues to introduce and develop innovativeness/innovative uses of ICT in schools. These are also required to take the activities further – for example into teachers' wider practice and professional communities:

1. A grasp of the principles of innovation and the drivers of successful change – the core expertise engaged when teachers undertake innovative activity in the context of their school, peer community or some broader practice community such as a subject association.
2. An understanding of the possibilities of innovation networks – in particular a sense of how such networks can be used to spread ideas, materials and practices. New and unfamiliar concepts such as the 'viral nature' of good ideas (Rushkoff 2003) and the power of *blended* and *face-to-face* learning

12

Developed out of a DEMOS / DfES (UK) initiative. See Hargreaves (2003).

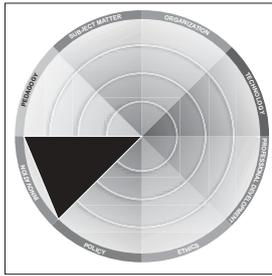
communities to channel and support learning and new pedagogical practices (Rheingold, 2000).

3. The skills and understandings needed successfully to run and/or participate in on-line communities. The increasing importance of such communities in the knowledge society cannot be overlooked. Nor can the highly specialised skillset and mindset required to get value from involvement in such a community (Amy Joe Kim, 2000).
4. Some knowledge of the difficulties of innovation relay on how these might be approached. Without this the teacher will have neither the insight nor the capacity for action necessary to ensure that good ideas travel well and take hold.

In summary, teachers need to foster professional values of collaboration and reciprocity and harness ICT in ways that power learning communities – both within and beyond the school setting. We need also to engage with the values and practices of innovation so that we develop – singularly and in partnership with colleagues – a culture of innovativeness in our schools and in our communities of practice, along with the information society skills to utilise these to good effect.

### 3.4 REFERENCES

- Fullan M. (2005), *Leadership & Sustainability: System Thinkers in Action*, Corwin Press, Toronto.
- Fullan M. (2004), *Learning to Lead Change: Building System Capacity*, OISE / Microsoft, Toronto.
- Hargreaves D. (2003), *Education Epidemic: Transforming secondary schools through innovation networks*, DEMOS, London.
- Kim A. J. (2000), *Community Building on the Web : Secret Strategies for Successful Online Communities*, Berkley, Peachpit Press.
- Kozma R.(ed)(2003), *Technology, Innovation, and Educational Change - A Global Perspective*, Washington, DC, ISTE.
- OECD (2001), *Learning to Change: ICT and Schools*, OECD Publishing, Paris.
- Rheingold H. (2000), *The Virtual Community: Homesteading on the Electronic Frontier*, MIT Press, Boston MA.
- Rushkoff D. (2003), *Open Source Democracy: How online communication is changing offline politics*, DEMOS, London.



## 4 Teachers' interaction with the external environment

### Innovation and the wider context of education change

*Contributing to building a culture of informed education change beyond the school; at regional, national and supra-national level*

#### 4.1 CONTEXT OF ACTIONS RELATED TO THE PRACTICE

Everything that has been said elsewhere in the Innovation section regarding teachers and innovation is equally true for innovation within the wider context of education change. However, a defining feature of this specific context is that the teacher is conventionally seen as having – at best – only a peripheral role while the centre is occupied by the policy maker and the system.<sup>13</sup> Teachers are perceived as recipients of policy devised by others rather than the developmental force behind such policy. Contributing to building a culture of informed education change at regional, national and supra-national level is therefore – from a teacher perspective – difficult, and very much about *failing* to impact policy and policy making. In short, this is not an area of great accomplishment for teachers as a professional group.

As teachers we need to develop awareness of where we are in relation to the knowledge society and of the changing functions and opportunities this presents. We need to become the engineers of change and the innovators of a new ICT-leveraged pedagogy – not unthinking consumers of some outside vision of what we should be doing in our schools. We need to move teachers in from the periphery.

Much of this context of innovation is concerned with EU level action on the ideal of a knowledge society. However, it could be argued that the process of convergence in the education field is not yet at a stage where member states can learn readily from each other – despite initiatives within the Bologna Accord and the education dimensions of the Lisbon Agenda. When it comes to innovating successfully at the broader level, the principal difficulty is one of conviction and belief rather than lack of resources or vision. What is often lost on education policy makers is the capacity for policy generation that lies within the teacher community and the point that innovation in a knowledge society is less concerned with inventing and more with assembling or bringing together leading edge ideas and technologies.

We have not been successful in understanding how innovation can be seeded or – crucially – how it can be recognised, captured and then scaled/replicated across a system more broadly and/or to other constituencies and settings. We have not addressed the problems and issues of *knowledge relay* as these relate to the use of

<sup>13</sup>

See for example Bottery's (1998) argument on the sequestration of key policy processes by new managerialist interests within the education sphere.

ICT in educational settings. We do not understand how well the conditions and protocols that govern understandings of innovation relay at the theoretical level – such as those developed by DG Enterprise in the early 1990s – apply to the challenge of innovation for better schools’ ICT. Or even if they do. The context of any action therefore is very shaky and confused. We are not operating in a *stable* policy field.<sup>14</sup>

#### 4.2 ACTIONS RELATED TO THIS PRACTICE

- Reflect on Fullan’s assertion that individualised change – the sort of school-level change frequently associated with pioneer ICT teaching, for example – is not the way forward ultimately. He argues that individuals, organisations and systems need to be developed *simultaneously* if change is to have a real chance.<sup>15</sup> If this is correct, it demands a much more systemic/strategic approach to teacher activity in relation to pilot and test-bed ICT activities, such as that evident in various reports from (for example) the ERNIST project. These can be accessed at <http://schoolportraits.eun.org/>
- Engage with the process of policy influence and development. This has both technical and political dimensions and needs to be approached along a number of axes: activity within professional organisations and associations to advance a more educational agenda in relation to ICT innovation; activity within the social partner sphere (where applicable) to retrack pedagogical priorities in relation to education ICT; and – most especially perhaps – contributing where possible to the political redirection of the Lisbon Agenda, so that it contains a more educative and appropriate vision of ICT usage in schools. The principal relaunch document is European Commission (2005) *i2010 – A European Information Society for growth and Employment*. It can be accessed at [http://europa.eu.int/information\\_society/europe/i2010/index\\_en.htm](http://europa.eu.int/information_society/europe/i2010/index_en.htm).
- Develop familiarity with the technical and strategic aspects of innovation within the wider education context. A useful way into this might be to consider the central questions raised by thought leaders in this area, particularly contributors to publications such as Sellinger (ed)(2004). This is not a discussion in which teachers frequently participate: it needs to be. Alongside this, it could be useful to become – individually and collectively – more research active in the vein proposed by Ozga (2000). This would assist greatly in deriving materials that can usefully feed into policy debate and action at regional, national and EU level.

#### 4.3 KNOWLEDGE AREAS RELATED TO THE ACTIVITIES INVOLVED IN THIS PRACTICE

There are certain key areas of expert knowledge and understanding that need to be developed if teachers are to

14

See Mulgan(2003) for a detailed discussion of the issues this raises.

15

See Fullan (2004) for detailed discussion of this idea.

contribute to building a culture of informed education change beyond the school – at regional, national and supra-national level. These are somewhat different to the skill-sets emphasised elsewhere in the Innovation section – they are, however, even more essential in some ways:

1. We need to appreciate the *systemic* rather than *linear* nature of innovation and to engage seriously with the notion that innovation is a complex, multidimensional/multiparty activity, which takes time and know-how – and doubly so in an education setting. Useful work has been completed over recent years by DG Enterprise in relation to these less evident aspects of innovation – and in particular on the requirement to develop over time adequate networking and knowledge transfer mechanisms, and the technical and network aspects of this.<sup>16</sup> These reports could provide a useful way into this neglected area of policy action.
2. As teachers and educationalists we also need to engage more directly with the nature and detail of the Lisbon Agenda. Despite considerable mid-term disappointment surrounding its shortcomings both nationally and at EU level, the Agenda remains the key reference point for innovation and change in the EU drive towards the knowledge society.<sup>17</sup> One of the more positive aspects of the relaunched agenda is the positioning of teachers and teacher formation more centrally in the project. This is encouraging. However, it brings with it a degree of responsibility that needs to be understood and integrated into the professional values and frames of reference of teachers throughout Europe. This may signal a fundamental shift in the role teachers are asked to play in this aspect of public policy formation. It must not be let slip away.
3. There are already a considerable number of expert networks operating in Europe in relation to ICT and education. Additionally, various European projects under a number of actions and across a number of directorates have generated a very considerable bank of knowledge and expertise in relation to life and learning in the information society. There is a very great need for this knowledge base to be made more accessible and more widely available to teachers – individually and collectively, and for the significant expansion of facilitating networks of expertise and professional education. In short we need to consider how learning communities and communities of professional practice might be constructed and/or reconfigured to support the radical and exciting re-professionalisation that teachers are facing if the true possibilities of the knowledge society are to be achieved.

In summary, the skills and understandings that teachers need in order to contribute effectively to the building of a culture of informed education change beyond the school relate to the deep nature of innovation and the place this occupies in a knowledge society, coming to a sound understanding of how knowledge and

**16**

See EC DG Enterprise (2002 and 2004).

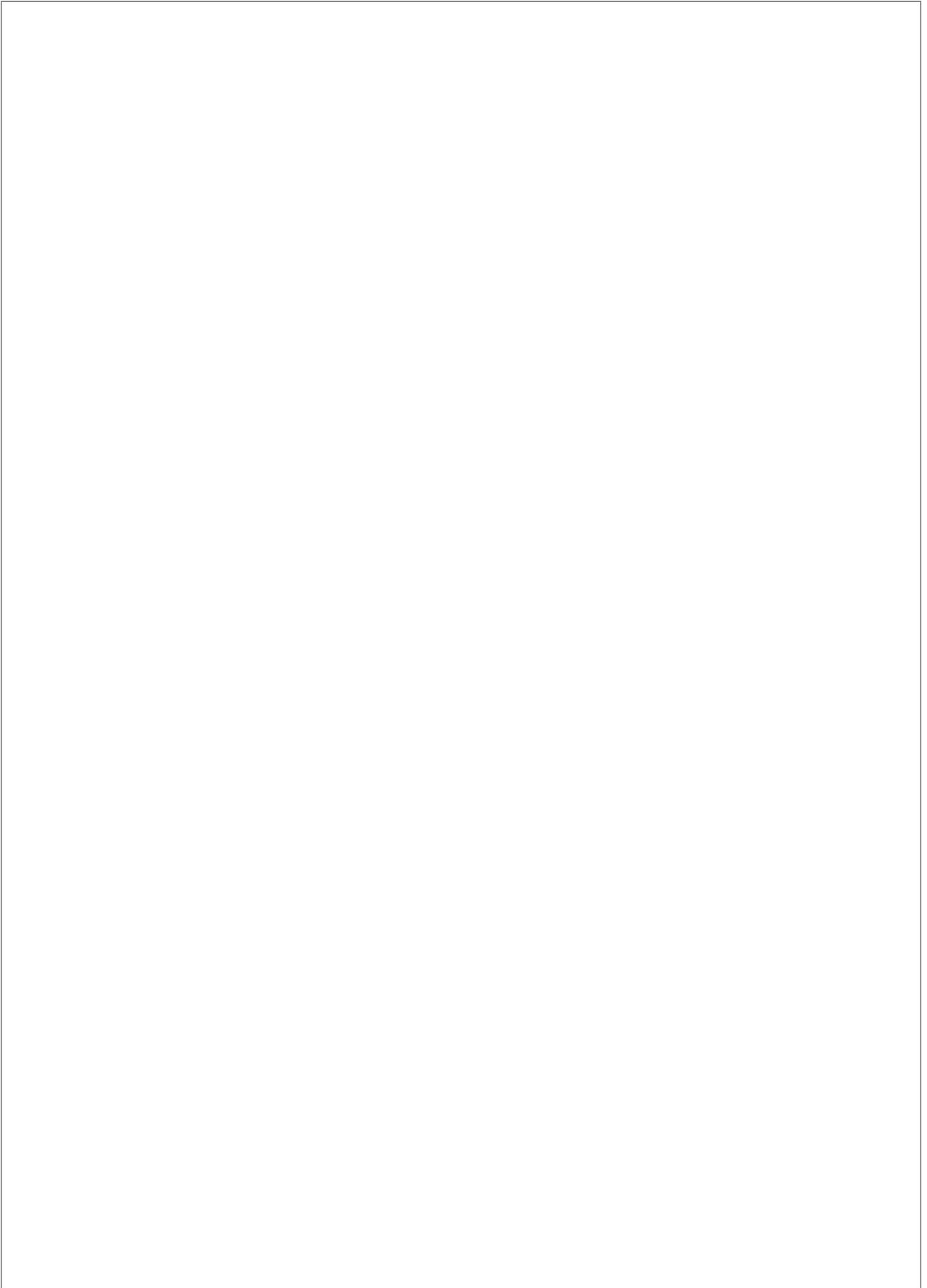
**17**

See Barosso (2005) and European Commission (2005).

expertise can be relayed systemically, and how – as professional groupings – teachers’ field knowledge can be leveraged for better public policy formation in these areas.

#### 4.4 REFERENCES

- Barosso J. M. (2005), *Creating a Europe of opportunities, The 2005 Robert Schuman Lecture for the Lisbon Council*, Speech /05/172, accessed at:  
<http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/05/172> 16 June 2005.
- European Commission (2005), *i2010 – A European Information Society for growth and Employment*, Com (2005) 229 final, The European Commission, Brussels.
- European Commission DG Enterprise (2002), *Innovation Policy Studies: Status report of latest results, and forthcoming tasks*, DG Enterprise, [mimeo.], Brussels.
- European Commission DG Enterprise (2004), *Innovation Management and the Knowledge - Driven Economy*, Brussels-Luxembourg, ECSC-EC-EAEC.
- European Commission (2005), *Mobilising the brainpower of Europe: enabling universities to make their full contribution to the Lisbon Strategy*, European Commission staff working paper, SEC(2005) 518, Brussels.
- Fullan M. (2004), *Learning to Lead Change: Building System Capacity*, OISE / Microsoft, Toronto.
- Mulgan G. (2003), *Global comparisons in policy-making: the view from the centre*, accessed at:  
<http://www.opendemocracy.net/debates/article-3-52-1280.jsp#>
- Ozga J. (2000), *Policy Research in Educational Settings*, Open University Press, Buckingham.
- Selinger M.(ed)(2004), *Connected Schools: essays from innovators*, Premium, London.



# Glossary of terms and abbreviations<sup>1</sup>

## **Asynchronous Communication**

A time-delayed communication through some type of recording device. It is replayed at the convenience of the user. An example is e-mail. Communication in which interaction between sender and receiver does not take place simultaneously (e.g. e-mail or fax).

## **Blended learning**

A method of educating that uses e-learning techniques, such as online delivery through the web, discussion boards and e-mail, combined with traditional face to face lectures, seminars, and tutorials.

## **Bologna Declaration, Bologna Process**

In 1999 Education ministers from around 30 countries undertook in a joint declaration (the Bologna Declaration) to establish a European area of higher education by 2010. This includes, for example, enabling students to study in other European countries, and ensuring that their qualifications and skills are transferable. The ongoing work to achieve this is the Bologna process.

## **CMC**

Computer-Mediated Communication. A typed communication method that offers private but narrow channel of communication.

## **Collaborative Learning or Cooperative Learning**

Students of varying abilities and interests work together in small groups to solve a problem, complete a project, or achieve a common goal.

## **Communities of Practice**

CoPs are communities of people who share the same profession, situation, or vocation. These communities facilitate professional exchange, allow members to establish a bond of common experience or challenges.

## **Computer Conferencing**

Interactive sessions between networked computers whereby data, documents, and/or video and audio are shared. The term encompasses both data conferencing and desktop video conferencing. Web chat, whiteboards, and web-based conferencing may be used in computer conferencing.

1

Original source: UNESCO (2002), *Information and Communication Technologies In Teacher Education. A Planning Guide*, Paris.

**Constructivism**

The learner constructs knowledge; learning is a personal interpretation of experience; learning is active, collaborative, and situated in real-world contexts; and assessment of learning is integrated within the learning context itself.

**Courseware**

Instructional materials in a complete mediated format. May refer to a single instructional component, such as a computer-assisted instruction program, or a multiple instructional entity, such as guidebooks, videodiscs, and computer-assisted instruction.

**CPD**

Continuing Professional Development.

A range of short and long training programmes, some of which have an option of accreditation, which foster the development of employment-related knowledge, skills and understanding.

**CSCL**

Computer-Supported Collaborative Learning. Area of work that focuses on socially oriented theories of learning using computer technologies to support collaborative methods of instruction.

**Curriculum (plural curricula)**

A plan of instruction that details what students are to know, how they are to learn it, what the teacher's role is, and the context in which learning and teaching will take place.

**Distance Learning**

Using some electronic means (e.g. modems, satellite transmissions) to make possible teaching and learning at separate sites.

**Distributed Learning**

A system and process that uses a variety of technologies, learning methodologies, online collaboration, and instructor facilitation to achieve applied learning results not possible from traditional education in a truly flexible, anytime/anywhere fashion.

**Drill and Practice**

An instructional software program that presents items for students to work (usually one at a time) and gives feedback on correctness; designed to help users remember isolated facts or concepts and recall them quickly.

**ECTS**

The European Credit Transfer and Accumulation System is a student-centred system based on the student workload required

to achieve the objectives of a programme, objectives preferably specified in terms of the learning outcomes and competences to be acquired<sup>2</sup>.

### **Educational Technology**

The combination of instructional, learning, developmental, managerial, and other technologies as applied to the solution of educational problems.

### **Experiential Learning**

A learning situation is set up which presents a problem or a complex task for the learners to deal with. The learners are encouraged to draw general conclusions and establish general principles that may explain or predict across a range of similar situations.

### **Formative Evaluation**

Evaluation of materials to determine the weakness in instruction so that revisions can be made to make instruction more effective and efficient.

### **Generative Instruction**

Those approaches in which learners encounter the content in such a way that they are encouraged or allowed to construct their own idiosyncratic meanings from the instruction by generating their own educational goals, organization, elaborations, sequencing and emphasis of content, monitoring of understanding, and transfer to other contexts.

### **Groupware**

A computer software program that allows the same information to be shared among several computers simultaneously. With some applications, users can see each other and from their own computers, add to or edit text and graphics in a single document.

### **Hypermedia**

An approach to information storage and retrieval that provides multiple linkages among elements. It allows the learner to navigate easily from one piece of information to another. The storage and retrieval of text, images, audio, and video in computer (digital) form.

### **Hypertext**

The linking of information together by highlighted key words that have been marked up creating paths through related material from different sources such as footnotes and encyclopedias. It is the ability to present connected documents.

### **ICTs**

Information and communication technologies.

Tools and processes to access, retrieve, store, organize,

**2**

[http://europa.eu.int/comm/education/programmes/socrates/cts\\_en.html](http://europa.eu.int/comm/education/programmes/socrates/cts_en.html)

manipulate, produce, present and exchange information by electronic and other automated means.

### **Instructional Design**

The systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation.

### **Instructional Technology**

The systemic and systematic application of strategies and techniques derived from behaviour and physical sciences concepts and other knowledge to the solution of instructional problems.

### **IT**

Information technology.

### **ITE**

In-service Teacher Education.

Initial education or preparation of individuals prior to their being certified and becoming practising teachers in schools.

### **Metacognition**

The process of thinking about and regulating one's own learning. Metacognitive activities include recalling/reviewing what you already know about a topic, identifying gaps in your knowledge, planning strategies to fill those gaps, assessing the relevance/importance of new information, and revising your beliefs about the topic.

### **Paradigm**

An overall concept accepted by most people in an intellectual community about a complex process or ideas such as "school".

### **Portfolio Assessment**

A portfolio is defined as a purposeful collection of student work that exhibits to the student and others the student's efforts, progress, or achievement in a given area. This collection must include 1) student participation in selection of portfolio content, 2) the criteria for selection, 3) the criteria for judging merit, and 4) evidence of student self-reflection. Portfolios, even more so than other forms of performance assessment, call on the learner to be highly involved in planning the entries, choosing what to include, and providing the rationale behind those decisions. Portfolios thus attempt not only to assess the end products, but to some extent, the process that went into creating them as well.

### **Problem-solving**

Refers to a learned capability involving selection and application of multiple rules.

**Project-based Learning**

Each group is assigned a project, or chooses one. They collaborate to complete the project, detailing their basic goals and objectives, timeline, budget, etc.

**Role Playing**

A type of simulation in which team members, sometimes with the aid of computers, act out roles as parts of the problem being analyzed. For example, one member of the group could act out the role of editor; another could be a reporter, etc.

**Scaffolding**

The cognitive processing support that the instruction provides the learners, allowing them to learn complex ideas that would be beyond their grasp if they depended solely on their own cognitive resources, selectively aiding the learners where needed.

**Self-paced Learning**

Education in which the learner is on their own, studying without interaction with others. Sometimes used to refer to asynchronous modes of delivery. CBT has been the most common form of self-paced learning, but web-based asynchronous systems are catching up quickly.

**Surfing**

Exploring locations and scanning the contents of WWW sites on the Internet.

**Synchronous communication**

Communication in which interaction between sender and receiver takes place simultaneously (e.g. telephone or videoconferencing).

**Utility Software**

Computer programs that help to manage, recover, and back up files.

**Videoconferencing**

The ability for groups at distant locations to participate in the same meeting at the same time using analog or digital video capabilities.

**Web-Based Training (WBT)**

A form of computer-based training in which the training material resides on pages accessible through the World Wide Web. Typical media elements used are text and graphics. Other media such as animation, audio, and video can be used, but require more bandwidth and in some cases additional software.



*Printed in June 2005 by*  
Litografia Botolini s.r.l.  
Rocca San Giovanni/Italy