Vlaamse overheid

Competences for the knowledge society

ICT in education initiative

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Foreword

Children and young people are growing up in a multimedia environment where information and communication technology is everywhere. Young people often even lead the way in embracing all kinds of technology. Nonetheless, the interaction with ICT is often achieved on an intuitive and sometimes irrational basis. Interacting with modern technology in a discerning and efficient yet responsible and safe way requires a new set of basic competences. In the light of their core task, educational establishments obviously provide outstanding opportunities for ensuring all parties (children, young people and adults) may boast these competences.

Starting from 1 September 2007 new cross-curriculum final objectives and developmental objectives are being introduced into primary education and the first level of secondary education. ICT training has also been reviewed in primary education in the light of general basic competences. In the context of basic ICT competences there is a crucial need to ensure a sufficient degree of compatibility between the various educational levels: every citizen, pupil, course participant or student has to have these competences.

As a result of the new situation in compulsory and primary education, the authorities have to spell out what their goals are as far as ICT in education is concerned. This strategy paper aspires to provide an answer to this question.

This policy document “ICT in education” first of all outlines my vision of educational technology and what I am expecting from all the educational stakeholders in this area.

I will use this document to set forth my ICT policy priorities. I also attach particular importance to the two issues of educational innovation and equal opportunities. In the case of educational innovation several initiatives have already been set in motion. Examples are pilot projects where the focus is on technology. I firmly believe that when it is effectively deployed ICT can give a big boost to educational innovation. A second priority is the need to address the digital divide. Equal opportunities represent the unifying theme of my entire educational approach. As far as the digital divide in the context of ICT is concerned, education has a key role to play in narrowing the gap, as a result of providing access to ICT resources and providing basic ICT competences for all sides. A big boost has to be given in this connection as a result of introducing new ICT-related final objectives.

Lastly, this paper provides an answer to the question of what concrete measures have to be taken to extend and underpin ICT integration in education.

The implementation of final objectives in compulsory education and the closer attention to basic ICT competences represents a new and important milestone in ICT policy and is the main underlying principle of this policy document. This will give a huge boost to ICT integration in the classroom. Educational establishments are tasked with systematically seeking to achieve the ICT-related final objectives. The inspectorate is responsible for keeping track of the ICT integration process. The authorities' flanking policy in this area is no longer merely an incentives policy.

Such a far-reaching educational innovation process obviously has to be paired with a suitable flanking policy, whose key priorities and initiatives are outlined in this policy document.

The paper was written by a working group comprising members of the administration and the cabinet of the Ministry of Education and Training. The text has been presented to two sounding-board groups, one comprising teachers, ICT coordinators and representatives of educational umbrella organisations and one comprising education ICT experts from academia, the corporate sector and educational organisations.

A non-exhaustive lexicon with key educational and technical terms is featured at the back of this document. Interesting cases or examples of projects are included to help illustrate the text.

This document is targeted on a wide range of educational stakeholders. ICT coordinators and head teachers or teachers interested in ICT, as well as laypeople and parents keen to find out about the Education Minister's approach, will be able to find answers to their questions in this paper.

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Flemish Minister for Employment, Education and Training

1. Social background

1.1. ICT's growing social impact

Technical progress has given rise to tremendous social changes and very different ways of living over the last decade. This document will be considering the services economy and knowledge society concepts, which point to the importance of ICT in various social sectors. This process has been speeded up by the advent of the Internet. The pace of change has clearly accelerated in the case of network-based services and applications. The huge upsurge in mobile communications, the wide variety of digital media, the extensive digitalization of data and – accordingly – the unprecedented availability and accessibility of information are just a sample of the implications.

Three major trends may be singled out to clarify the ever-growing social impact of ICT.

First of all media content may be delivered in a new array of formats irrespective of time or place and tailored to personal preferences and circumstances. This involves the *digital convergence of communication networks, media, content, services and equipment.*

Second: fast broadband connections provide for new, faster distribution channels and new formats for content and services, such as interactive digital TV and Internet music. Day after day, more and more people are going on online and thanks to fast broadband connections may avail themselves of the downloading opportunities (music, software, video, photographs,…).

A third trend is the steady increase in interactivity within digital networks. The new media and technology allow citizens access to media, enabling them to publish their items, to seek information and knowledge and share this with other people. A key component in this case is the role ICT plays in community building. Blogs, discussion fora, digital radio (podcasts) are examples of this. ICT is changing the social fabric and creating new (virtual) communities. City blogs, for example, help to determine local public debates or set them in motion. This is referred to as the web2.0 concept. Web2.0 is truly path-breaking insofar as it helps bridge the gap between providers and consumers of digital content. The users themselves are increasingly becoming the content providers as well. The sharing of digital content, knowledge, expertise, media and so on forms the basis of the Web2.0 approach.

People have an opportunity on the Youtube site, for example, to upload their own film clips. Youtube has resulted in the creation of a technology enabling rapid access to and downloading of online images, thereby bringing Internet digital television a stage closer. The British government initiative Teachers TV has provided an opportunity to explore the educational possibilities of this.
www.youtube.com www.teachers.TV

Another good example of the web2.0 concept is the Internet encyclopaedia Wikipedia, a community project designed to create a free encyclopaedia on the Internet on a neutral basis. Wikipedia is unique because it is free, available only online and is compiled entirely by volunteers. Wikipedia is based on the wiki principle, where people are regarded not only as users of information but also as individuals making an active contribution. A. wiki encyclopaedia is by definition an open and dynamic system so information may be provided and amended by the users themselves. The aim is obviously to ensure the quality of the information is constantly improved. All changes can also be quickly traced so that any abuse may soon be dealt with.
www.wikipedia.org

A number of notes of caution should be sounded about these social and technological trends.

The combined impact of these trends further speeds up technological innovation so that technology become faster and more compact thus penetrating into more and more spheres of life. Accordingly, the impact of ICT on the daily environment is all the more powerful, thus increasing the dependence on ICT and particularly the Internet.

ICT clearly involves not only further opportunities but also a number of risks. Technology is not a panacea guaranteeing automatic innovation. Too much focus on technology also creates the risk of attention being distracted from what is really involved: the need to function properly in the knowledge society. Other risks have a bearing on the need to ensure the increasing dualisation in society is not exacerbated by the deployment of ICT. This is a reference to the digital divide. The implementation of technology also creates a number of new hazards in terms of privacy, data security, new types of harassment and even physical risks.

Finally, it should also be emphasised that ICT integration has not only a utilitarian dimension (economic, social, educational, for example) but also a creative component. This is referred to as e-culture. Examples of such creative cultural expression are quite easy to discover: digital access to cultural heritage, the library as the interface for online consultations and Internet access, the digital availability of music, literature, audiovisual productions and multimedia, the development of interactive games, the availability of multimedia art, the integration of all kinds of media in traditional forms of art, such as dance and theatre, interactive and networked types of cultural participation …

1.2. The economic importance of ICT in the knowledge society

Information and communication technologies represent a key driving force for growth and employment. A European Commission report (2005) reveals that ICT accounts for one-quarter of the rate of growth in the EU and 40% of the increase in productivity. The share represented by the ICT sector in the Belgian economy rose from 3.35% to 4.27% between 1995 and 2004. During this period the ICT sector accounted for as much of 19.5% of the rate of growth in the GDP in Belgium. The ICT sector is responsible for 20% of the total research and development efforts of the Belgian economy.

New content creation, services and business models are driving growth and jobs. For example, Western European online content markets are expected to triple by 2008 (with the consumer part growing tenfold), according to the European Information Technology Observatory (2005). These developments are expected to multiply across the sector, today already accounting for 8% of EU GDP. However, the impact of digital convergence will be felt globally and will lead to increased worldwide competition.

ICT's relevance for the economy is not confined to the ICT sector itself, however. On the contrary, the careful deployment of ICT in all sectors of economy gives a tremendous boost to the levels of productivity and profitability. Against this background, the Internet plays a vital role as a platform. The opportunities for further productivity gains are by no means exhausted. ICT services, competences and content are becoming ever-more prominent within the main economic and social networks.

1.3. Policy initiatives

1.3.1. European ICT policy initiatives

During the March 2000 European Council in Lisbon, EU government leaders stated that Europe was faced with major challenges in adjusting to globalisation and the changeover to a knowledge-based economy. They stressed the need to 'provide each citizen with the competences necessary to live and work in the new information society,' and 'adopt a European framework to define the new basic competences which lifelong learning must make it possible to acquire: information technologies, foreign languages, culture, entrepreneurship and social competences'.

Meanwhile, the European Commission unveiled a strategic framework of wide-ranging policy guidelines: i2010 or the European information society of 2010. In the light of a review of the information society challenges and large-scale consultations with the stakeholders about earlier initiatives and instruments, the Commission recommended three priorities for the European information society and media policy:

1. the creation of a Single European Information Space which promotes an open and competitive internal market for information society and media;
2. stepping up innovation and investment in ICT research with particular emphasis on more and better employment;
3. achieving an inclusive European Information Society that prioritises better public services and quality of life. The emphasis here is on the generalised learning of basic digital competences.

Against this background, the European Commission tabled a proposal on key competences for lifelong learning. The proposal defined 8 key competences, one referring to ICT competences. This is described as follows:

> *Digital competence involves the confident and critical use of information society technology (IST) and thus basic competences in information and communication technology (ICT). It is underpinned by basic ICT competences : the use of computers to seek, assess, store, produce, present and exchange information and to communicate and share with cooperation networks over the Internet.*

According to the European Commission, the skills cover: the ability to seek, collect and process information and deploy it in a discerning and critical way, to assess its relevance and distinguish between real and virtual reality in line with the linkages. People have to be able to use tools to produce, present and understand intricate forms of information and gain access to Internet services, then to search for and use information. People also have to be able to deploy ICT as an aid to critical thinking, creativity and innovation.

1.3.2. Federal and Flemish policy initiatives

On the federal front, the government announced in 2005 its National Action Plan for Digital Inclusion, as an outcome of the UN-sponsored World Summit on the Information society. The

plan is broadly based on the digital divide issue, designed to develop instruments to close the digital divide. A number of initiatives are proposed in the light of three priorities: awareness-raising, providing access and training. The initiatives are due to be fleshed out in conjunction with the regions and communities.

The Flemish government policy agreement "Giving Confidence, Taking responsibility" focuses in particular on the flow of information and communication within Flemish society. The Government of Flanders is keen to create an ambitious action plan (Digital Action Plan Flanders) "*to underpin the digitisation of communication in society, while helping to bridge the digital divide"*. The twofold purpose of the action plan is for the Government of Flanders to ensure that Flanders continues to be out in front with the European information society leaders and to close the gap, in particular on the basis of a target group approach. The promotion of a Flemish digital society is a cross-cutting issue that has to be championed government-wide, with all policy areas, including education and training, playing a key role.

Launched in 2005 by Minister Vandenbroucke the Strategic Literacy Plan is designed to facilitate a coordinated approach to low literacy skills in Flanders. Precisely because there is now such a premium on ICT skills, the plan includes initiatives to sharpen these aptitudes. Literacy is defined as basic competences that are important in society for processing information, hence ICT skills as well, in addition to language, numerical and social skills. The Government of Flanders announced in July 2005 its approval for the basic principles of the Literacy Plan.

ICT policy within the education system has undergone major changes over the years and the latest transformation is the focus on promoting ICT skills, knowledge and attitudes.

1.4. State of play

Flanders enjoys the advantage as being one of the world's best cabled regions. The Flemish region is an international leader in broadband use but continuing growth is jeopardised by comparatively low PC ownership. According to a survey by the international research office, Forrester Research, Belgian broadband Internet services are amongst the fastest ones in the whole of Europe, even though the consumers' association Testaankoop reports Belgian broadband connections are comparatively expensive (May 2005).

Figures the Federal Public Service - Economy issued on 8 November 2006 show that 64% of Flemish families own a computer, with most of the appliances being connected to the Internet. 60% of Flemish families enjoy access to the Internet. The Belgian average is 57% and 54% respectively. Interestingly, 90% of families with access to Internet have a fast broadband connection. In terms of broadband connections Belgium, is still in the European Top 5 after Sweden, Finland, Denmark and the Netherlands. 75% of Flemish people have already used a computer, while 69% of them are already using the Internet. Conversely, one-quarter of the population has never tried out a computer and nigh-on one-third have never accessed the Internet.

Belgian companies are out there with the European leaders when it comes to using the Internet. Eurostat reported in January 2004 that 96% of Belgian companies were connected to the Internet. Solely Denmark and Finland can claim a higher percentage.

The number of Internet connections offers an insight exclusively into Internet access but fails to show the actual *usage*. Internet and e-mail systems are used by all companies but the implementation of commercial processes and online activities is still at low ebb (such as e-banking, online purchasing, taking orders online, …).[1] Now that the gap between the preparedness of small and large businesses to operate on the Internet is being bridged, a new divide may be forming in the case of e-business in more advanced applications (such as the internal integration of electronic ordering systems or the external integration with suppliers and customers).

[1] OECD, Communications Outlook 2005, 30.11.2004

2. ICT and education

Various stakeholders in our society are urging the educational sector to take account of ICT in the classroom. Society is moving towards a knowledge-based society where interacting with ICT has become a basic competence. Just as ICT becomes more and more integrated into society, so the ability to use ICT is increasingly regarded as a condition for operating on an autonomous basis. Consequently, education has to pay attention to ICT knowledge and skills. Various stakeholders speak of plans to integrate ICT, such as the authorities, parents, the business community and, not least, pupils, course participants and students themselves. In this section we will be considering three issues: the vision of technological developments in education, ICT's role in educational innovation and the challenge posed by the digital divide and equal opportunities

2.1. Vision of technology in education

There are generally two contrasting visions of technology. The first one refers to *technological determinism*. This idea operates on the basis of technological progress being patently obvious: a kind of natural, irresistible process in the march of history. However, others believe technology is developed in response to a social demand and human needs. Technology is applied to cater for the requirements of users. The Dutch philosopher Jos de Mul hits out at both theories, which he basically regards as determinist. He puts forwards the interesting idea of *technological interactionism*, thereby resisting any tendency to attribute primary responsibility to one or more factors that patently play a role in technological developments. Interactionism holds that social developments and technological design processes interact, implying that technology is both the cause and outcome of social processes or evolutions.

This theory offers an interesting opportunity for education in the sense that education is a consumer of technology made elsewhere, but developments and specific applications may also be guided in the light of specific needs and specific ways of working.

The Internet itself is a good example of this. A precursor of the Internet, the Arpanet was developed to accommodate the needs of research groups and universities to exchange data and research findings at a rapid pace.

2.2. ICT and educational innovation

ICT can help a great deal in revitalising education but the teaching methods for pupils and course participants do not automatically improve because ICT is deployed in the classroom. ICT has to be incorporated into the teaching process in a carefully-though-out, balanced way. Research shows that teaching and instruction chiefly benefit from ICT when attention is paid to the entire teaching environment rather than solely to ICT as a medium. In short, teaching efficiency is enhanced only when ICT is deployed effectively within a rich learning environment.

The First … the best project… at Ghent Middle school 2.

Pupils from B-stream15 produce a school newspaper and are assigned various roles: journalist, columnist,

photographer, designer or publicist. They may draw their inspiration from within and outside the school environment. Everything is processed with the help of ICT resources and numerous skills (language skills, seeking and effectively processing information, publication on the Internet …) are taught on a pupils concerned basis. The completed product has a welcome impact on the learning experience of the pupils involved. The fact of working with pupils from the B stream ensures that the project sets an example for how various aspects of the school policy (special needs education, ICT use, community school, equal opportunities) may be integrated in a meaningful and easily accessible way. Moreover, ICT appears to be firmly underpinned in this case for reaching both subject-specific final objectives, such as language and artistic activities, and cross-curriculum final objectives, such as citizenship.

Ghent Middle school 2
Winner of a European E-learning Award in 2004
http://www.ms2gent.be/de1stedebeste/index.html

Achieving educational innovation on the basis of ICT involves having a sound overall view of the many educational opportunities available. There are a variety of opportunities for ICT in education. In the same way that ICT is deployed in our society to assist in the way we work, communicate, shop and travel, ICT is also used in education as a *tool*. Teachers may deploy ICT to keep an electronic agenda, an electronic pupil monitoring system or a grade book up to date or seek information they need to prepare their lessons. Pupils use ICT to produce attractive presentations or to communicate with the teacher.

Apart from its usefulness as a tool ICT offers many other opportunities in the educational sphere, thereby boosting the additional advantages. ICT may *make education more flexible* by disconnecting teaching from time and space. This can be valuable, for example, for adults eager to study outside the daily education system, for work-based learning or children who are ill over a long period of time or people with disabilities. Towards this end, ICT lends support for tailor-made education and more differentiated programmes and paths extending the opportunities for leaving and re-entering the education system and for continuing to build upon earlier qualifications. Owing to its flexibility, this e-learning system can increase the involvement in lifelong learning.

More flexible education may also cater for the differences in the prior knowledge of pupils or course participants or ensure a more effective differentiation. This also offers the opportunity for flexibility in the pace of learning. The electronic learning environment plays a key role in the bid to deploy ICT for making education more flexible – time, space and space desynchronization. This involves software programs combining a number of presentation and communication options: a virtual class to which teachers as well as pupils, course participants and students have a certain level of access. These feature learning items, such as courses, examples of exercises and even tests, while pupils, students or course participants may do exercises on their own or work in a group situation.

The key opportunity available is using ICT as a catalyser for educational innovation. Many of the new applications, such as discussion fora, weblogs, games or online tests with direct feedback, are admirably suitable for the perspective of a participatory and pupil-centred learning process. Within this perspective, the focus is not on teaching but on learning, with the teacher acting as the pupil's coach. As well as offering opportunities for *enhancing learning outcomes*, ICT may also have a welcome impact on the *motivation* of pupils, students and course participants. Particularly in the case of younger children and working with adults with low literacy skills, ICT helps to motivate and is even reported to improve course participants' feelings of self-esteem.

ICT also offers teachers with further opportunities in the case of *variation, differentiation and*

remedial approaches. As we mentioned earlier, ICT can be deployed to *compensate for disabilities* and even neutralise their impact, so as to boost the independence and self-reliance of the disabled, even within the education system.

In short, recent educational research has increasingly shown how big a contribution ICT can make to improving education in terms of outcomes, motivation and attitudes. Further details about this issue are featured in the following sources: Balanskat et al (2006), Cox et al, (2004), Kulik (2003), Waxman et al (2002).

2.3. Eliminating inequity

A major challenge for ICT policy is the digital divide. It is absolutely vital to provide equal opportunities for all young people in the knowledge society now and in the future. In this section we will take a closer look at the education-related dimensions of the digital divide and the equal opportunities dimension of ICT for people with disabilities.

2.3.1. Bridging the digital divide via education

As well as creating extra opportunities, ICT also involves risks. Such as the risk of a social polarisation between the ICT haves and have-nots. This refers to the digital divide.

The digital divide is a polyhedron of digital fault lines: this may involve differences in the level of access to ICT (Dekkers and Kegels, 2003, Roe, 2001, Steyaert, 2003, Federal Public Service - Economy, 2006), differences in the use of ICT (PISA, 2006, Federal Public Service - Economy, 2006) or the differences in ICT-related competences (Dekkers and Kegels, 2003). Here are a few figures: in terms of access to ICT 36% of Flemish homes do not have a PC and 40% of families do not have access to the Internet (Federal Public Service - Economy, 2006). The striking facts about ICT include: the discovery that 40% of unemployed people have never been on the Internet, compared with solely 20% of wage earners and self-employed people. Conversely, nearly all students have already been on the Internet. Two-thirds of people who are not studying, working or looking for work have never used the Internet. The academic level also plays a part. Nearly 60% of low-skilled people have never used the Internet, compared with solely 10% of the highly qualified. Lastly, the digital divide is reported to increase with age: two-thirds of people over 55 have never been on the Internet. A consideration of the comparatively few men and women who have never used a computer shows the difference between both genders increases with age. Half of men aged between 55 and 74 and two-thirds of women in the same age group never use a computer. A computer is a complete mystery for 60% of men and 75% of women aged between 55 and 74.

Half of all families with no Internet connection at home do not wish to have one either. They have no need to have the Internet at home or are against the Internet as a matter of principle. There are striking differences in the reasons for having no Internet at home according to the type of family. For example, one-parent families find the cost of the equipment and the connection charge too expensive, while families with two childless adults have more doubts about the usefulness of an Internet connection. 16% of all families regard a lack of computer skills as the main reason for not buying a PC.

These analyses clearly show the importance of basic competences for interacting with ICT. The knowledge-driven society calls for suitably adapted skills, attitudes and knowledge. Specific groups of people often lack the knowledge and skills, or motivation and resources to make the best possible use of this. They are not familiar with the opportunities the technologies offer, or think there is not enough variety and quality in the content and services available for ICT to be useful or relevant to them. Education and training policies have a key role to play in bridging the digital divide by way of teaching knowledge, skills and attitudes.

The education system is tasked with offering young people as many opportunities as possible to develop in the knowledge society, teaching them how to interact with the new media in a discerning, meaningful and congenial way. Using final objectives to put each pupil in contact with ICT education ensures that all pupils, course participants and students, receive an equally valid basic training. However, it also has to be clear that education is not alone in playing a role in this context. Discovering solutions for the digital divide involves the necessary coordination between education training and instruction plus cooperation between stakeholders from the cultural sector: social-cultural work, community work, libraries, museums,… Equally important is the complementary role community initiatives can play.

Eurydice analyses (2005) of the PISA research findings reveal that the home environment now plays just as important a role in acquiring (technical) ICT competences as the classroom. Solely 9% of Flemish 15-year-old boys believe their school has been the instrumental factor in learning how to use a PC. Over half of them learned how to use ICT themselves via self-tuition, 18% from friends and 17% from their family. The school plays a bigger part in learning ICT competences in the case of girls : 19% of Flemish 15-year-old girls say the school was the most the instrumental factor in learning how to use a computer. This is also reflected in ICT use at home. 93% of Flemish 15-year-olds have access to a computer at home (one of the highest figures in Europe). Moreover, 85% of Flemish 15-year-olds have access to the Internet.

Education still has a key role to play. An examination of access to ICT at home in each educational level (Roe, 2001) shows that young people in vocational secondary schools have much less access to a PC than young people from general secondary and technical secondary schools. One in four young people in the vocational secondary education system (who has already used a computer) do not have a PC at home. The percentage is only about 5% for young people receiving general secondary and technical secondary education.

Education therefore plays a role in two ways: a) ensuring young people with no ICT resources at home still have access to technology via educational establishments and learn how to use them and b) upgrading ICT knowledge and skills so that a discerning and reasoned approach is adopted towards the deployment of ICT. This is precisely where the new ICT-related final objectives are targeted.

The Centres for Basic Education play a key role adult in education The aim of basic education is provide the necessary knowledge and skills to less qualified adults on the basis of self-reliance and self-development. The basic education on offer represents an instrument for combating the (impending) educational dualisation of society. A key task is dealing with low literacy and numerical skills. ICT competences also come into the picture. A start was made in 2003 with an ICT modular training scheme. Many centres have an open learning centre. Allowing adults to experiment themselves in a safe and well supervised environment, the

Centres for Basic Education create ideal opportunities for ICT integration. The Adult Education Centres also provide ICT instruction for adults.

2.3.2. Digital opportunities for people with disabilities

There is a striking paradox in the case of people with disabilities. ICT offers huge opportunities for them to function (better), to facilitate their social participation and their inclusion, but their accessibility to ICT is limited by technically ill-adjusted standards, steep adjustment costs and a more expensive infrastructure than that available to ICT users without disabilities. People without access or insufficient access to ICT cannot acquire the skills needed to be fully involved in the knowledge society and use also continues to be limited or purely functional.

The main emphasis in special education is on the *compensatory and remedial opportunities* of technology. Adjustments to the hardware, such as a bigger mouse ball and a bigger keyboard, a joystick with appropriate software, can help children with motor or multiple disabilities to write texts, play games, send e-mails and do exercises, for example. For children with very limited “motor functions” the computer can be a vital tool for increasing self-independence. This involves the “prosthesis function” of computer. A good example of this is children with speech problems that are helped with supporting speech technology, so that the children in question are able to communicate with their environment.

The highly structured and serial nature of much educational software is an ideal tool for children with intellectual disabilities, and also very much so for autistic children. The logical structure and the step-by-step exploration, the suitably adjusted graphic design and the connection to a visual or auditory reward system encourages children to continue and improves their concentration.

As a result of simplifying activities, the computer offers children the opportunity to take their own initiatives so that their self-esteem and self-respect can be enhanced. Further welcome effects are the possible increase in motivation to work, play or learn and a higher level of concentration.

3. ICT competences for everyone

The social context calls for a specific interpretation of ICT competence. The introduction of ICT competences by way of cross-curriculum final objectives and developmental objectives provides an answer to this social demand, outlining what is expected from educational establishments on the ICT front. This does not lead to the standardisation of ICT activities in schools. It is up to the educational establishments to assign an ICT status consistent with the personal approach to what constitutes effective education, as provided for in the school development plan and the educational project. The ICT integration process is the responsibility not just of the individual teacher but of the entire school team. A strategic and structured approach to ICT policy ensures a gradual and effective integration of ICT throughout basic education.

The education system also has to offer competences that enable learners to undertake specific tasks effectively on the basis of ICT in the future and outside educational establishments. This

is underpinned by a number of intricate (metacognitive) skills and attitudes, such as developing a positive attitude towards ICT, being willing to use ICT for problem-solving, adopting a discerning and conscious position on ICT as a social phenomenon, etc. The gradual development of these high-order skills enables learner to reflect them in situations outside the formal learning context, i.e. they are prepared to be able to cope in a world that is increasingly inundated with ICT applications.

ICT competence may be described as the ability to deploy ICT knowledge, understanding, skills and attitudes creatively, in the light of the specific, daily and changing learning and working environment and on the basis of personal development and social participation. What are the ICT competences every pupil, course participant and student has to have?

The subject and/or cross-curriculum ICT-related final objectives developed for education are as follows:

Normal primary education and special primary education,
types 1, 2, 7, 8:

1 Pupils have a positive attitude towards ICT and are prepared to use ICT to assist their learning process
2 Pupils use ICT safely, responsibly and effectively.
3 Pupils may perform exercises unassisted in an ICT supported learning environment.
4 Pupils may learn unassisted in an ICT supported learning environment.
5 Pupils may use ICT to give creative expression to their own ideas.
6 Pupils may use ICT to help them seek, process and store digital information intended for them.
7 Pupils may use ICT to present information to others.
8 Pupils may use ICT to communicate safely, responsibly and effectively.

Secondary education A and B streams and special secondary education – education type 3:

1 Pupils have a positive attitude towards ICT and are prepared to use ICT to assist their learning process.
2 Pupils use ICT safely, responsibly and effectively.
3 Pupils may perform exercises unassisted in an ICT supported learning environment.
4 Pupils may learn unassisted in an ICT supported learning environment.
5 Pupils may use ICT to give creative expression to their own ideas.
6 Pupils may use ICT to help them seek, process and store digital information intended for them.
7 Pupils may use ICT to present information to others.
8 Pupils may use ICT to communicate safely, responsibly and effectively.
9 Pupils may satisfactorily choose from various ICT applications in the light of the goal to be achieved.
10 Pupils are prepared to adjust their approach after considering how they and others use ICT.

3.1. Comments about each final objective

Pupils have a positive attitude towards ICT and are prepared to use ICT to assist their learning process

In the learning environment, ICT has to compensate for skills and attitudes that are not acquired spontaneously or much less at home. This is why the positive attitude is complemented in this case with a willingness to use ICT as a teaching aid.

Pupils use ICT safely, responsibly and effectively

This involves a wide range of competences and attitudes, such as working in a rigorous and careful way, taking care of equipment and software, vigilance about harmful or discriminatory content and reporting this to a teacher, supervisor, competent department, where necessary, being aware of viruses, spam, pop-ups, … and recognising unusual and unreliable messages, dealing cautiously with personal or confidential information, rejecting any abuse of ICT resources (such as harassing other people, bullying, sending unethical messages…., working ergonomically with a computer, using ICT solely where meaningful (for example, making a realistic assessment of the time the ICT is used and monitoring this), respecting intellectual property when using information and software and taking account of the financial and ecological dimension of the use of ICT.

Pupils may perform exercises unassisted in an ICT supported learning environment

Once new learning content has been acquired, there have to be sufficient opportunities for exercises and a computer may be a useful tool under this heading. Examples are the widespread exercise programs for elementary maths. The added advantage of this type of ICT integration may take various forms such as: variation (in the types of exercises, catering for various learning styles …), differentiation (in terms of the pace and level), customised feedback, saving time during the assessment.

Pupils may learn unassisted in an ICT supported learning environment

Unassisted learning means pupils may acquire and process new learning content with the computer taking over the role of the teacher so to speak. An example of this is the 'Webquest' method where the pupil is gradually led towards sites where information is available and has to process this information on the basis of goal-oriented tasks. Pupils may also carry out a simulation, for example, in the light of an appropriate educational programme and draw conclusions from this. An increasing number of secondary education establishments use open learning centres to teach pupils to work unassisted. Suitable programmes are also available for pupils with low cognitive abilities, plus all kinds of distance learning, supervised or otherwise.

Pupils may use ICT to give creative expression to their own ideas

ICT may facilitate the creative process, so that learners can adopt a creative approach to dealing with images, words and sound. Examples are producing an attractive poster with words and images, illustrating an improvised text, making an electronic 'collage', the use of digital photography, making film clips and the use of drawing software for designing buildings. Learners may avail themselves of the basic capabilities offered by all kinds of text, image and drawing programs. Pupils who are good at coming up with ideas but are less good at drawing can rely on ICT to provide them with further opportunities for realising their ideas.

Attempts to develop the visual faculty in education are seen to be almost non-existent, although sufficient facilities are available. In spite of the huge amount of visual material children and young people have to process every day, the ability to look is often intuitive and superficial. As for the reason for using these audiovisual aids, documentaries, films, news, picture recordings, soaps and video clips are mainly used to illustrate lessons, to motivate pupils to analyse what the lessons contain. In the case of animation films, the relaxation factor is important as well as the need to catch the children's attention, as in the case of pre-school education, for example. When visual material is used, the idea is mainly to underpin the lessons, so the function is purely instrumental. Visual material is rarely considered as a teaching aid in its own right, in the light of media education, for example, as underscored in the IAK/Canon research into audiovisual training in Flemish education (Goegebuer, 2004).

Audiovisual images cannot be confined to after-school recreational activities, but rarely receive any attention in education in practice. On the basis of the final objectives, there nonetheless has to be a focus on being able to interact with image and sound. A new competence has to be created within the context of ICT competences.

Pupils may use ICT to help them seek, process and store digital information intended for them

Searching for information partly involves the ‘electronic libraries ’ available on CD-ROMs, servers or the Internet. Examples are electronic encyclopaedias, DVDs, bilingual dictionaries, databases, educational CD-Roms with text, image, sound, animation and, of course, web pages. Just as pupils will find the part intended for them in the actual library more appealing; so can teachers define a ‘platform’ here with information intended for or specifically targeted upon themselves. Teachers may also allow their pupils to work with search engines especially developed for educational purposes.

Information processing involves various activities such as establishing what is interesting in the context of their goal or tasks, using the information to find solutions for a request or a task, arranging this information so as to be able present it to others, representing the information in other forms, such as an informative text, a dialogue, a diagram, a model, a presentation, a poster …

The digital information concept needs to be broadly interpreted so it also covers the conversion of information into an electronic medium, such as the use of photographs or newspaper articles that have been scanned.

In terms of content, the scope of this final objective is restricted by the context of the learning content for the relevant level, in terms of difficulty by the final objectives/ developmental objectives defining these contexts. For example, in the case of information processing, the restrictions the final objectives / developmental objectives set for interpretation in primary education also apply to the processing level, distance level and the types of texts. In the first level, the final objectives no longer restrict the texts used as ‘intended for them’. This means that this final objective also implies that learners gradually learn to use criteria to assess a digital source in the light of its content-related quality. For (less qualified) adults this may involve information acquisition and processing within the continuum of self-reliance to social participation.

Pupils may use ICT to present information to others

This involves the presentation process itself: pupils who are able, unassisted or in cooperation with others, to share or show information with the support of multimedia, for example, an infant on a Monday morning telling the class about his/her weekend with the support of a few electronic photographs. A third level pupil gives a ‘lecture’, using moving electronic images. A pupil from training type 3 uses digital photographs to offer a mood shot of his/her course.

Pupils may use ICT to communicate safely, responsibly and effectively

Communicate means pupils being able to use the facilities ICT offers (in the form of words, images, sounds) to provide information or seek it from third parties. This refers to the opportunities for contributing to the learning process, such as arranging meetings by e-mail, sending electronic documents along with an e-mail message, making contacts and collecting information for an educational visit, live chats with pupils from another school, using Internet fora, blogging and videoconferencing.

The words ‘safely, responsibly' refer to the basic rules and ways of interacting in the context of ICT communication and to specific guidelines for chatting and using e-mails safely. Responsibly means, for example, that the medium's anonymity is not abused for the purposes of bullying other people. Effectively implies the pupils asking themselves what is the best means of communication, in the light of their goals.

Pupils may satisfactorily choose from various ICT applications in the light of the goal to be achieved

The characteristics of an ICT competent person point to someone who, when faced with a problem or goals, is able to choose from a wide range of programs, applications or instruments, electronic or otherwise. In contrast to a one-by-one approach in education, where one program is used for one goal. This is why it is important for pupils to discover there are several ways of processing texts, photographs, diagrams and the like, making calculations, lending support to a presentation, charting the way to the course venue … These choices have to be appropriate and goal-oriented. Attention should also be paid to the availability of open-source software.

This all applies not only to the use of software but also to use of means of communication. As we said earlier on, pupils, course participants and students may choose the means of communication that fit in most effectively with their goals, in the light of their knowledge and experience with the characteristic of this system (such as speed, cost and user-friendliness).

Pupils are prepared to adjust their approach after considering how they and others use ICT.

Reflection is the result of effectively learning how to choose. Considering the resources used and comparing the outcomes teaches pupils the various characteristics, the advantages and disadvantages of the resources, programs and applications deployed. Hence this is an ICT competence, too, and it is useful to allow learners to experiment with various resources when problem-solving. The products and process may then be compared with each other. This method will offer them the experience they need to benefit from during a subsequent assignment, so becoming competent ICT users.

3.2. Priorities for ICT-related final objectives and developmental objectives

Subject area and/or cross-curriculum final objectives are designed to be deployed in primary education and/or the first level of secondary education. No separate objectives are defined for pre-school education: the schools themselves decide when to start working on various competences within the learning process. Nonetheless, the compatibility between primary education and secondary education is guaranteed.

The aim is definitely not to create a separate subject in basic education as a result of opting for subject area/cross-curriculum final objectives. ICT provides opportunities within all subjects and fields of study. However, the final objectives/ developmental objectives have nothing to say about how ICT should be integrated and in which subject or fields of study. It is up to the school to reach agreements about this. A strategic and structured approach to ICT policy makes for a gradual and effective process for integrating ICT into the education opportunities.

This approach has to provide the requisite ICT competence to be able to cope adequately with various situations, while forming a basis for becoming more qualified in the use of ICT and in a more differentiated way. The ICT-related final objectives and developmental objectives are therefore focused within primary education.

Starting from the second level of secondary education ICT is deployed in a more specific way in the light of the type of education and educational, level. Specific or more specialised components are then added in accordance with the training needs.

The focus in primary education is on social independence. The 10 final objectives from the primary education section of the compulsory education system form the basis for creating the ICTcurriculum for primary education.

The proposed final objectives obviously also call for underlying technical and instrumental knowledge and skills. It was decided against establishing these as final objectives as they are not a goal as such and there is a need to avoid education being focused on or confined to step-by-step learning and assessing a few popular programs. The proposed final objectives will provide pupils with sufficient instrumental skills, provided they are incorporated into the daily learning environment according to a qualitative and quantitative approach.

The final objectives are certified solely via the usual compulsory education channels: apart from the basic primary certificate, the secondary education diploma (general secondary education, secondary education in the arts, technical secondary education) or the study certificate (vocational secondary education) there is no separate certificate to confirm that pupils in the compulsory education section have acquired ICT competences.

4. Conditions for effective ICT integration at all educational levels

The ICT competences defined earlier on provide a framework for educational establishments that will deploy ICT in the future. It is up to the education providers, curriculum designers and the schools themselves to decide how these competences are taught in practice to all pupils, course participants and students and what the principles of digital didactics should be.

The key system for rolling out basic ICT competences is to incorporate them into the final objectives and developmental objectives. New cross-curriculum final objectives and developmental objectives are set be rolled out on 1 September 2007.

ICT integration via final objectives is also on the adult education agenda. Under the Strategic Literacy Plan, in particular, the basic education system is assigned the key task of providing rudimentary ICT skills for less qualified adults. These objectives cannot be achieved with the present modular training profile for ICT in basic education, so ICT-related final objectives are also being developed.

ICT is prominent in a number of modules (as a field of study) in the Flemish Adult Education Centres (AECs) but ICT is being used more and more to consolidate adult education and make it more flexible. There has been a strong upsurge in the use of digital learning environments and blended learning paths in the AECs in recent years, although the AECs continue to differ from each other to a great extent. A new decree on adult education should further boost the support for and roll-out of blended learning.

However, a number of key preconditions have to be met for the implementation of the ICT-related final objectives. These preconditions refer to the policy-making capacity and the support of educational establishments, staff training for teachers, the infrastructure and teaching aids. In order to cater for this, the Government or Flanders is set to apply a five-point flanking policy:

1. Strengthening the policy-making capacities of educational establishments at institutional level
2. Promoting the professionalism of educational staff
3. Providing a high-quality infrastructure
4. Developing a suitable teaching aids policy
5. Research and ICT monitoring

4.1. Strengthening the policy-making capacities of educational establishments

Educational establishments are required to make a lot of strategic choices in the context of teaching ICT: what infrastructure to provide, the location, in computer rooms, in standard classrooms, what purchases should be made in terms of software, what refresher courses have to be taken and by whom, etc. The establishments need to have a clear perspective and sufficient policy-making capacities. The Education Inspectorate's annual report for 2005 (Onderwijsspiegel, 2005) showed it is precisely the educational establishments that have an effective perspective on the issue, and it is there where the integration of ICT is also most advanced.

4.1.1. Priorities

- The authorities are keen to boost the policy-making capacities of educational establishments so they themselves may develop an ICT policy according to their needs, rather than imposing (new) measures. A separate ICT initiative, for example, is not being applied but managements will be provided with instruments – if they so wish – so as to be able to incorporate a high-quality ICT vision into the school development plan.

- Various organisations offer ICT support. Overlapping should be avoided as much as possible. The authorities are anxious to coordinate the available initiatives more effectively and play a regional role, rather than taking new initiatives. The part played by the various stakeholders has to be re-examined within the overall flanking policy and in the light of ICT competences. The existing flanking measures for raising awareness and disseminating examples is due to be reconsidered in the light of the ICT-related final objectives and developmental objectives.

- The school communities within compulsory education represent the ideal level for decisions to be taken about ICT support. The ICT coordination times are assigned to the school communities, while the Inspectorate's assessments show that the scale size of the school communities is perfect for maximising the effectiveness of the resources for ICT coordination.

- ICT coordination is the cornerstone of the process for lending support to ICT activities. The ICT policy now has to be geared towards the new ICT-related final objectives and developmental objectives.

4.1.2. Initiatives

ICT vision in the school development plan

The comprehensive ICT integration process calls for a formal refurbishment of the school development plan. It is important to re-emphasise that it primarily the educational establishments that have an effective perspective on the issue, and it is there where the integration of ICT is also most advanced. In other words, a written ICT vision is a key instrument for achieving the main goal: striving for ICT competences.

An ICT vision involves two issues. First of all the subject area and/or cross-curriculum final objectives. An ICT vision has to establish the subject area and/or subject where the objectives have to be sought and how but ICT integration also calls for more effective education. An approach towards ICT integration means that every educational establishment has to decide what it deems to be effective education and how ICT can act as a catalyser in this respect. Only when a team has taken this hurdle can it make a suitable assessment about the required infrastructure, training and adjustment to the education content.

A written ICT vision is therefore not compulsory. We wish to lend support to educational establishments by collecting good examples in this area and disseminating them, on the basis

of cooperation with partners such as REN Vlaanderen and the teaching supervisory services. The distinctive character, specific needs, general approach and the educational project will be a determining factor for the content-related choices made as part of the vision for ICT. This is why we also wish to offer and develop ICT self-assessment instruments, so as to highlight the ICT refresher training requirements and so on. This ICT vision is part and parcel of the school development plan.

ICT coordination

In cooperation with the teachers' team and the ICT coordinator, the head teacher and deputy heads of the educational establishments are in charge of developing the ICT vision. A key ICT coordination task is ensuring that the vision is subsequently put into practice as well. When the ICT policy is being worked out at establishment level, it is advisable to take account of the agreements made in the ICT coordination partnership. The authorities set these partnerships as a condition for creating a sufficient level of support for the ICT coordination policy and preventing the resources being spread too thinly.

We note that the periods for ICT coordination are now primarily specified on a technical basis. The educational establishments are more or less at liberty to decide how the periods are applied and although the job descriptions will be rolled out at all educational levels on 1 September 2007, it is not up to the authorities to formulate a detailed job description. We nonetheless stress that ICT coordination periods are also best used for items apart from merely technical tasks. The roll-out of new ICT competences will obviously set educational establishments a challenge. A core task of ICT coordination is to lend support to teachers or teachers for the roll-out of ICT in accordance with the final objectives and developmental objectives.

It is advisable to limit the ICT coordinator workload by making a rational review of the job profile. It is best to give a great deal of thought to the deployment of ICT coordination in the establishment and school communities. Some tasks, such as managing and editing a school website, providing extra training or ICT in the light of the administration, are tasks that may also be carried out others. Further tasks, such as major infrastructure work, are best carried out by specialist companies. The most successful educational establishments in terms of ICT succeeded in developing a system at school community level where a number of ICT coordinators were exempt from technical duties, such as network management and so on so as to be able to take care of more teaching-oriented tasks.

First of all, we are anxious to see the continuation of the resources earmarked for ICT coordination. We also want the involvement of ICT coordinators to be established by ensuring they are active participants in the ICT flanking policy. An investigation will be made with all the stakeholders into the potential methods and the role each party can play in this area.

Good examples, pilot projects and experiments

We want to use the pilot projects to try out innovations on a small scale, with a view to applying them on a broader scale later on if possible. The themes include technology in primary education, the transition from primary to secondary education, the policy-making capacities of educational establishments and developing talent. Pilot projects are a key policy instrument we also want to deploy in the context of ICT innovations. The ENIS demonstration project is due to be fully incorporated into the pilot project activities.

Initiatives for e-learning in adult education

Adult education is faced with the intriguing and intricate challenge of making the services more flexible so as to increase the level of participation and provide adults learners with a second chance in education according to a high-quality flexible approach. The Flemish Adult Education Centres are key protagonists in this connection, owing to their low entry threshold and wide distribution. Ushered in back in 1999 blended learning is a powerful instrument for making the services more flexible. The new decree on adult education will extend the flexibility and funding opportunities. Moreover, the AECs will be able to provide comprehensive distance learning opportunities in due course.

The Ghent Provisional Centre for Adult Education has made a start with blended learning as a solution for two very concrete problems. At the highest level of specific language courses, course participants were attending lessons twice a week, which was too much of a burden for most of them. As a result of offering the course on line to some extent in the form of blended learning, course participants now need attend only once a week and otherwise they work on their assignments at home whenever they have the time. There was only a limited intake of participants for other courses but a number of them wanted to complete their programme. Thanks to blended learning the two groups have now been combined and the course participants can now complete the final modules. When one group is working at home, the other group attends the lesson and vice versa.. Both options are successful, resulting in satisfied course participants.

This success story does raise one or two questions, however: is there any point fleshing out this project and can a new target group be addressed via blended learning, particularly people who are unable to spare the time to attend the course every week?

Specific language courses were launched in September 2005 (including Italian and Spanish). The participants attend the course one week and work at home the second week. 85% of the participants claim this flexible system meets their needs. What is more… these course participants wish to undertaken their learning plan only via blended learning.

Blended learning has other advantages apart from these organisational ones. It is a powerful tool for involving course participants more in their learning process, encouraging them to learn actively. Blended learning also provides opportunities to operate in a more differentiated way. In the light of this analysis and the Centre's vision, the blended learning opportunities are set to be extended during the 2006-2007 school year.

What a Adult Education Centre needs to undertake blended learning is an electronic education platform and learning content... but the real key to success is a participatory concept, where the teachers and management flesh out a project together and undertake the hard work.

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A new support structure is due to be developed for Adult education comprising the Flemish Support Centre for Basic Education and the supervisory services. This support framework will also be called upon to play a key e-learning role.

The Training and Alignment Information Service (DIVA vzw) is continuing to develop the "e-learning" working group to ensure the coordination of e-learning in adult education. This working group comprises representatives of the Flemish Employment and Vocational Training Service, Socius (the Support point for Socio-Cultural Adult Work), the educational umbrella organisations (including adult education representatives) and the Flemish Syntra training centres. The working group investigates what specific support initiatives may be started to continue promoting e-learning and blended learning in Flanders, while coordinating

the various training providers. This working group's broader remit is to ensure that resources available for e-learning in adult education are deployed as efficiently as possible. Thanks to this working group, the Authorities of Flanders ensure better ICT-related harmonisation between the labour market and the normal education sector.
Against the background of this policy it was decided in late 2005 to set up an e-learning task force for adult education so as to consolidate the Authorities of Flanders' operational efforts for e-learning in adult education. The task force comprises representatives of the Ministry of Education and Training, the Flemish Employment and Vocational Training Service and the Syntra training centres. The task force will enable these stakeholders to consult about the operational dimensions of ICT in adult education, with the scope primarily extending to cooperation between the Flemish Employment and Vocational Training Service and the Ministry's Supervised Individual Study Online project (BIS Online). Under this policy it was decided in late 2006 that the authorities would no longer operate as the organising body for distance learning, so the BIS is set to be run down shortly as a provider of online and written courses. A draft proposal is being formulated to prepare for the transfer of BIS Online's specialist knowledge and teaching materials. The basic aim is to optimise the investments made and to deploy the teaching materials and expertise developed to cover a wider range of stakeholders in Flemish adult education (such as Flemish AECs, Syntra training centres and the Flemish Employment and Vocational Training Service...).

We also want to see the distance learning organised by the Ministry of Education and Training incorporated more into the Adult education services now available. First of all, the Adult Education Centres and Centres for Basic Education may use the teaching modules already available for blended learning. The centres can also organise distance learning courses when they meet a sufficient level of quality criteria.

Support projects for special education
A number of special education-specific projects are enjoying support via funding and on the basis of secondments. These rather small-scale initiatives make a major impact on the relevant children and young people. First of all there is the *Wai-Not* Internet project where a learning environment and e-mail client has been developed for children with a mental disability. Next is the *Bednet* project to enable sick children to take lessons at a distance via the appropriate technology and remain in contact with their school, teachers and classmates. Lastly, the *Letop* project seeks to raise the awareness of educationalists and lend them support for the issue of teaching challenges.

Other support projects
A number of cross-network secondments are granted every year to projects with a key supportive significance, high visibility and scale size. In future, we will ensure these types of support are sufficiently in line with the vision and purposes of the ICT-related final objectives.

Moreover the European financial support channels for ICT and innovation in education must be deployed in the best way possible. Towards this end, we are actively participating in the European Schoolnet services organisation. This entity is tasked by the ministries of education with taking part in EU-sponsored projects, thereby generating European project subsidies for the benefit of the ministries.

4.2. Promoting the professionalism of teaching staff

A second precondition for introducing the ICT-related final objectives is that the teachers and teachers' team themselves have sufficient competences to use ICT in a teaching context. Hence as well as ICT competences teaching staff must have the teaching skills to transfer the competences and deploy ICT in the daily learning environment.

4.2.1. Priorities

- The introduction of new final objectives and developmental objectives involves major changes to both integrated and specific teacher training. First of all the teacher training system is expected to provide the labour market with teachers who have the necessary initial qualifications – in the case of ICT as well. Consequently, all teacher training services have to pay attention to the ICT competence of its students so they can manage the final objectives themselves to a large degree. This is possible only if ICT is incorporated into the training curriculum itself to a large extent.

- However, teachers-to-be not only have to enjoy basic competences they also have to deploy ICT in an educationally responsible way in the teaching process. On top of basic competences all teacher training has to continue fleshing out the teaching methodology for the use of ICT and feature it in the training to a sufficient extent.

- Teacher training also has to pay sufficient attention to the training of teacher trainers, who themselves have to be ICT competent and deploy ICT according to sound teaching principles.

- The new situation for the introduction of cross-curriculum final objectives and developmental objectives also means special attention has to be paid to the need for further training. Further training organisations are expected to include a high standard of opportunities in teaching the implementation of the new cross-curriculum final objectives and developmental objectives.

- Further training initiatives have to be coordinated more effectively and, in terms of content, cater for the specific needs and requirements of the educational establishments at all levels.

- A key word in the context of teaching staff training is “self-reliance”. The idea cannot be to call upon the services of an ICT coordinator whenever a problem crops up, as the official cannot be on tap at all times. Self-reliance means the teachers themselves are capable of solving problems to do with the use of a computer.

4.2.2. Initiatives

ICT integration and the focus on ICT competences in teacher training
The 2001 teacher training review revealed in particular the limited knowledge about ICT and its presence in teacher training and work experiences as a constraint. The minister proceeded

in 2002 to conclude an agreement with each college of higher education (offering teacher training for pre-school, primary and special education 1) to encourage them to pay special heed to the opportunities ICT provides and to help with the attainment of education innovation, particularly in training supervision. In the wake of this a number of initiatives were taken, using, in particular, electronic portfolios and educational websites. A total of nearly Euro 2.5 million was committed for this purpose. The separate projects already underway received further financial support. This mainly applied to the STAP project of the Artevelde college of higher education and a training project of the Ghent college of higher education concerning the development of distance learning opportunities within the teacher training services of the Catholic college of higher education in South-West Flanders.

The implementation of the bachelor/master structure in higher education and the flexibility Decree provided an opportunity to establish educational innovation on a more establishment-wide basis. Starting in 2002, additional resources were earmarked for the establishments to provide support to items such as educational innovation and promoting quality as a result of redesigning the curricula in terms of content, education and learning systems, educational-learning approach and vision, the development of new study and learning material, the development of new types of tests and examinations and the development of new systems of student supervision, including the creation of electronic learning environments and learning material geared toward full and part-time distance learning. All establishments were required to establish an educational developmental plan. Agreements or memorandums of understanding were concluded with the universities.

The authorities agreed to provide further resources in 2007, in the countdown to a final settlement of the educational innovation issue within the new higher education funding model.

E-learning means teachers having a suitable set of skills compared with more conventional teaching methods. Staff training and support for teachers in e-learning is therefore also one of the factors that make a difference between pointless heavy investments in digital learning environments and an actual added value in the educational or learning process.

The "ELISE" intensive online course allows teachers from the higher and adult education sectors to be immersed in a "technological learning batch" for eight weeks. The courses originated with a European Minerva project (E-learning for in-service teacher training in Europe – with the Flemish partner being the Vliebergh- Sencie Centre at the University of Leuven) that developed in Flanders into a cross-establishment and association initiative. The course has already been provided to over 200 Flemish teachers from the higher and adult education sectors.

Apart from a get-acquainted and assessment meeting, the participants have face-to-face contacts. The course is highly intensive (a minimum of three hours learning time a week, with an average of 4 to 5 hours) and is based on discussion fora, chat sessions and videoconferencing sessions. Towards this end the participants become acquainted with the advantages and disadvantages of synchronous and asynchronous forms of communication and experience themselves what works or otherwise with online or distance learning.

"The online e-learning course is a successful basis for teachers anxious to make a start with e-learning, or upgrade their present use of e-learning", according to Ludo Mateusen, the course coordinator. "The online eight-week professionalisation learning path is an intensive but successful formula that is much appreciated by the participants. Moreover, the course results in a dynamic group of participants whose individual members are mutually supportive. The most interested participants become e-coaches or content developers within the Elise network in Flanders. The course assets are not the learning content opportunities on offer but the tremendous interaction within the group of participants and the tools used. Consequently, the course's present concept is more of a community or practice, rather than primarily a course.

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Staff training via the REN Vlaanderen expertise centre

The regional expertise networks were set up in 2000: 5 networks spread throughout Flanders for the purpose of offering large-scale further training in ICT at educational, technical and organisational level. Starting in the 2003-2004 school year, the various networks were incorporated into a single expertise network with a central overseeing system: "REN Vlaanderen". A three-year management agreement has been concluded with REN Vlaanderen. A key operational change was the shift from supply to demand-based training. Teachers, head teachers, ICT coordinators from all educational levels and networks and teacher trainers represent REN Vlaanderen's target group. The management agreement with REN Vlaanderen came into effect on 31/8/2006.

A new management agreement was concluded with REN Vlaanderen in September 2006. The Government of Flanders committed itself to a three-year cooperation arrangement. However, the method of operation was once again completely adjusted on the basis of the current situation. In terms of content the focus has to be on the introduction of the ICT-related final objectives and developmental objectives. A far-reaching system of formal cooperation with the educational supervisory services is required towards this end. The cooperation is rooted in the organisation of REN Vlaanderen. In addition to offering core opportunities for further training REN Vlaanderen also has a theme-specific effect. Every year a minimum of one and a maximum of three themes concerning specific flanking measures are formulated, such as further training, material development and value build-up activities. The ICT coordinators and educational supervisory services have to be involved in choosing the themes.

4.3. Providing a high-quality ICT infrastructure

A first rate computer population to teach pupils, students and course participants ICT competence. Using the ICT infrastructure programme PC/KD further resources were set aside from 1998 to 2002 for educational establishments to purchase hardware, software and training. The ICT infrastructure programme was worth nearly Euro 93 million. These resources for infrastructure and further training did make an impact.. Nearly all the European standards have been obtained[2].

On the international scene, Flanders and Belgium regularly appear in the top 6 for the penetration of broadband Internet services. The European Commission's 11th

[2] A basic infrastructure is available in education to allow ICT assisted multimedia and image education to be provided. In ordinary primary education there is an average of one PC for every 10 pupils and in special education one PC for every 5 pupils. In secondary education there is also an average of one PC for every 5 pupils, In special secondary education 1 PC for every 4.7 pupils. In ordinary primary education there is 1 PCI (= PC connected to the Internet) for 19 pupils. In secondary education the ratio is 1 every 6.6 pupils. See also: http://www.ond.vlaanderen.be/ict/archief/pckd/eindrapport_pckd_basiseducatie_2002-2003.pdf for a report on primary education and http://www.ond.vlaanderen.be/ict/archief/pckd/eindrapport_pckd_leerplicht_2002-2003.pdf for a report on compulsory education.

telecommunications report shows Belgium is in fifth place (after Sweden, Finland, Denmark and the Netherlands respectively) with a level of penetration equal to 18 broadband connections per 100 inhabitants[3]. This high level of penetration is ascribed to the fierce competition between two technologies : copper (ADSL) and cable (Seghers, 2004). A reference has already been made to the huge advantages this situation offers for network services and applications.

4.3.1. Priorities

- educational establishments need an adequate infrastructure to promote ICT in all subjects and for all pupils, course participants and students. In the light of their operational resources, the educational establishments themselves have to provide for an ICT infrastructure in the light of their specific situations.

- The effectiveness of the ICT infrastructure has to be maximised, so it can be used by all pupils, course participants and students, rather than being earmarked for specific fields of study or subjects. The ICT infrastructure may also be made available to pupils, course participants and students outside contact hours, but within the educational establishment's usual opening hours. Many educational establishments are already applying this policy and will be encouraged to forge further ahead in this respect.

- However, it also possible to make the ICT infrastructure accessible to the broader public. Under this heading we are referring to the “broad-based school”. Making the ICT infrastructure accessible to the community reflects the authorities' eagerness to ensure more citizens have the opportunities to come into contact with ICT on a cheap and ongoing basis, and to make this familiarisation process easily accessible, thereby making the best possible use of the expensive equipment. This obviously calls for close cooperation between the training and education providers, residents committees, community initiatives, local authorities and so on.

- The broadband potential Flanders enjoys has to be harnessed by the educational establishments. Every educational establishment has to have a broadband connection to the Internet. The focus in the past was on connecting establishments to the Internet, but the future goal is to provide every classroom or schoolroom with a fast Internet connection.

- A prime concern is ensuring the safety of the ICT infrastructure and networks, hence the educational establishments are expected to guarantee a minimum level of basic safety.

- As well as applying to the provision of computer equipment, the ICT infrastructure issue also involves management and maintenance. The flanking policy will take account of these various factors.

[3] By way of comparison: the average for the EU25 is 11.5 connections per 100 inhabitant. For the EU 15 this 13 per 100 inhabitants. This information dates back to October 2005. There are 52,000 new broadband connections every day in the EU on average.

4.3.2. Initiatives

Investing in hardware

Running from 1998 to 2002 the PC/KD-project (project for the Coming Decades) sought to ensure all educational establishments have a basic infrastructure. The programme provided a major incentive for deploying ICT in the daily environment. The educational establishments were then expected to use their operating budgets to make the required replacement investments but the progress made in this area was limited, so there is the risk of returning to a situation where the new final objectives and developmental objectives have to be introduced when some of the infrastructure becomes obsolete. In order to remedy this, the introduction of the ICT-related final objectives and developmental objectives is set to coincide with a one-off catching-up exercise for ICT infrastructure. We should emphasise the one-offness of these resources. It would be wrong to assume that the ICT infrastructure may and should always be funded with additional resources. We are looking to the educational establishments themselves to proceed in the wake of the catching-up exercise to arrange the necessary investments for ICT infrastructure. In the light of the specific needs in special primary and -secondary education a weighting factor has been introduced for these types of education.

School computers are becoming noticeably obsolete The Sint Pieters college in the Brussels municipality of Jette has discovered a way of ensuring they continue to be used efficiently. The school's open learning centre has 50 computers of all types, most of them Pentium 2s. It was not feasible for them all to operate under Windows XP: not enough memory, processor too slow, much too expensive as well. Consequently it was decided to opt for open source software: the Linux operating system, Open Office, Gimp instead of Photoshop...

The school has therefore created an open learning centre with roughly 50 thin clients running on the Linux operating system by connecting with a LTSP server, a Ubuntu web server with a Moodle on-line learning environment and a Joomla website. A "thin client" or terminal requires only limited capacities (generally not even a hard disk), as it is nothing more than a keyboard and a screen for ensuring the interaction with a program running on a server. The server is a powerful computer, as it has to cater for dozens and often hundreds of terminals.

Terminal servers are becoming popular again for two reasons: networks have become ultra rapid and it is much simpler to maintain a number of terminals ("thin clients") and one server then dozens of desktop computers that have to be installed separately everywhere. The ICT coordinator believes pupils can learn how to use a word processing program, spreadsheet and carry out a search on the Internet... at a low cost.

"Three years ago, our school was lagging behind in terms of computer use but the teachers became more and more insistent about being able to work with them in the classroom. This is the system we devised to solve the financial constraints problem."

Theo Jaspers, ICT coordinator and computer teacher at Sint-Pieters college, Jette
www.linuxschool.be - www.sint-pieterscollege.be

Harnessing the broadband potential

The welcome broadband situation is fortunately also reflected in the educational establishments' infrastructures. An analysis of the Internet facilities (Clarebout e.a. 2004) reveals that most establishments boast advanced broadband technology (via ADSL or cable). The use of ISDN-technology has shot up. In the basic education sector, 83.19% of educational establishments have broadband technology, in special education 83.81%, an improvement on the previous school year. Nearly all Centres for Basic Education have broadband technology.

The federal I-line programme has providing an inexpensive opportunity for educational establishments to have a broadband connection. All educational levels are tapping into this service. The federal Telecommunications Law provides for the continuation of this

programme. In the countdown to the arrival of the implementing decision for this Law, the old regulatory system continues to apply. The authorities are still striving to use the I-line action programme to hook all educational establishments up to the Internet via broadband access. We are also seeking to bring about a transformation in the relevant broadband policy (in compulsory education): from Internet access for educational establishments to Internet access for classrooms. However, this raises the question whether the current technical capacity of the I-line is still enough to accommodate the educational establishments' increasing demand for bandwidth. This is why an investigation will be made to see how the effectiveness of broadband services can be maximised.

During the 2001-2002 school year, all colleges of higher education received financial grants from the Science and Innovation Administration for the purpose of connecting to the Internet. The universities had Internet services earlier via Belnet. Since 2006 colleges of higher education have had a Gigabit Ethernet connection via Belnet as a result of resources from the Economy, Science and Innovation policy area and Belnet. The aim is primarily to maximise the use of ICT as a lever for accelerating the innovation chain. The educational component fits in with a more wide-ranging Government of Flanders project on e-entrepreneurship, e-government and providing incentives for research and development in Flanders. Under this heading, the Government of Flanders is wholeheartedly committed to allowing higher education establishments to opt for e-research, while promoting the development of digital infrastructure and creating a flanking policy for the maintenance and optimum use of the infrastructure.

Security of the ICT infrastructure

Most Flemish educational establishments have finally realised that using high-quality security software is a very risky business. Educational establishments have learned from their own experiences with computer viruses, which can destroy a month's work in a trice. Technical security nonetheless means more than simply installing an anti-virus system and a firewall. Creating a safe ICT policy is no mean feat. Many managements and ICT coordinators are, for example, not sufficiently aware of what they can do to prevent spam and computer hacking. Another problem is that privacy on the Internet can easily be violated for commercial purposes. The various types of malware include cookies, spyware, webbugs, Trojan horses and system hijackers.

In spite of various campaigns there is still a need for basic information in this area, so in the 2007-2008 school year we will be providing educational establishments with a new, up-to-date set of guidelines about the safe use of ICT.

No super safety harness

"Our school's education project is aimed at promoting the freedom and responsibility of pupils. We do not aspire to be an out-of-touch school creating a super safety harness around its pupils. Rather than opting for excessive security we prefer conscious behaviour on the basis of a genuine knowledge reflecting experience. These attitudes are also assessed in a separate attitude report."

Checks are obviously in place thanks, in particular, to the PC-Duo package, where the pupils screens can be called up via a logbook for each computer and in the case of infringements we check the history, the temporary Internet files, the date and time.

"We also try to prevent infringements by not setting Internet search assignments so arbitrarily. In most lessons the assignments are sent by providing the URL of one or more sites leading to the correct information for completing the assignment."

We have an effective anti-virus program to protect us from viruses. The virus database is updated at least once a week. We provide teachers and pupils with instructions about reacting to a virus alert. You are not allowed to use diskettes from home in the school computers. If someone nonetheless has to bring information from home for a thesis, for example, the medium first of all has to be checked for viruses.

Attention is also paid to the physical dimensions of the safe use of ICT in our school. The tables in our computer rooms are suitably adjusted. "We have modified the width and height in line with the ergonomic requirements and provided appropriate chairs. We also teach pupils the right position for the back, arms, hands and wrist. And the pupils are monitored during lessons to see they use these positions. This is of key importance, because some classes spend up to 20 hours a week in a computer room."

We tackle the problem of people spending too much time on computers by minimising the use of computers for recreational purposes. The pupils need to have a task and reserve the equipment beforehand."

Greet Vanderbiesen –Sint-Vincentius en Vrij Handelsinstituut, Deinze.

4.4. Applying a suitable software and digital teaching aids policy

On top of hardware, suitable software and digital teaching aids are required to be able to focus on ICT competence in a rich learning environment. The software and digital teaching aids requirements are many and varied. In this section we single out three groups of software applications. First of all, system software such as the operating system, security software, an electronic learning environment or other network-based applications. Second, software for general use, such as a browser, office applications and multimedia packages for audio, video or photo processing. Third, educational software and interactive digital educational content such as information programs, exercise packages, communication tools, digital courses and tests, online educational applications and image and sound for educational use.

The priorities and projects are defined in the light of four factors: the need for, development of, finding and using software and digital teaching aids.

4.4.1. Priorities for software and digital teaching aids policy

- Need for software and digital teaching aids
  - Educational establishments will always need system software and programs. Framework agreements may be used to negotiate favourable rates.
  - Now the basic competences have been defined, the curriculum designers can play a key role here in deciding the educational-teaching implications.

- Development of software and digital teaching aids
  - It is first of all up to the educational publishers to develop the learning objects required to flesh out the curricula.
  - We are keen to encourage teachers to develop teaching aids themselves. Towards this end, the authorities are anxious to provide teachers with the opportunity of an educational portal so as to urge them to share and deliver comments on their learning objects.
  - Arts centres, heritage organisations, museums, radio and TV archives, etc. have huge collections of information which are all potential learning objects. Their digital accessibility for educational purposes may offer a tremendous

added value for educational establishments. This potential has to be harnessed as much as possible.
  - Both commercial software and open source software have a role to play in education. Educational establishments have to be at liberty to choose on the basis of the needs and requirements.
  - The authorities are keen to encourage the maximum use of open standards.

- Discovering software and digital teaching aids
  - An educational platform has to be developed that operates as a one-stop-shop for software and digital teaching aids.
  - One requirement for discovering learning objects is for the learning objects to be standardised and metadated. The authorities are not themselves responsible for developing standards but we are prepared to lend support to existing standardisation initiatives and recognise standards.

- Using software and digital teaching aids
  - We are looking to the educational establishments to use software legally and respect copyright. Safe ICT involves various items such as a respect for copyright when publishing on web sites or using material in electronic learning environments. Educational establishments will continue to be informed about and sensitized to digital rights, software licences etc.
  - In the case of electronic learning environments those in the Flemish educational sector have to join forces, so that all the stakeholders can seek to achieve harmonisation in terms of standardisation and exchanging learning objects, making open content available, etc.
  - The Bis Online learning materials already developed have to be exploited to the hilt.

4.4.2. Initiatives

Accessing learning objects via an educational portal site

One of the key projects applies to the creation of an educational portal site. This is a multipurpose electronic knowledge centre. This type of portal site first of all acts as a central access point for educational information and support. This involves developing and offering information, examples of good practice and thematic files to various target groups. These may be general or specific themes (such as dimensions involved in the integration of ICT, learning participation, lifelong learning, special needs education, broad-based school, …).

The portal site also has to offer the opportunities for effective digital teaching aids (e-learning opportunities) in an accessible and structured way. Consequently, a framework also has to be developed allowing individual teachers - but publishers, for example, as well - to publicise their programs, examples and curricula online so as to reach out to a wider target group.

Standardising learning objects

Learning technology standards are models for describing (digital) learning objects in the light of exchanges within items such as an electronic learning environment, database and a website, etc. Apart from exchanges, standardisations also facilities the accessibility and reuse of learning objects.

Various international standards have been developed with LOM (Learning Objects Metadata) being the most well-known. LOM is an international standard comprising 60 or so fields, such as title, language, description, version, teaching method, learning source, level of interaction, age group for which the learning object is intended, user licence, copyright, … LOM has been specially developed to describe learning objects. A key factor of standardisation is the degree to which the learning objects are actually consistent with the ICT competences.

The Flemish Ministry of Education is represented in the Users Commission for the IWT-Tetraproject "PUBELO"[4]. The project is investigating the scope for agreeing on an educational standard and deploying it within a large group of relevant stakeholders (such as publishers or managers of portal sites or electronic learning environments). The authorities' input is providing incentives for the creation and recognition of open standards.

[4] PUBELO stands for "Publishing in an Electronic Learning Environment" – further details are available at http://www.pubelo.be

Adding the greatest possible value to BIS teaching aids

As we mentioned earlier, the Flemish Ministry of Education and Training is eager to make the BIS Online learning materials available to a wide group of users in the Flemish educational sector, both adult education and compulsory education. The BIS Online learning materials comprise over 3500 reusable electronic teaching packages to do with learning languages (French, English, German, Italian, Spanish, Dutch as a second language) each lasting roughly 30 minutes. Each learning object is described according to a standardised set of metadata (such as level of language proficiency, competence taught…) and made available via an online platform so teachers may use the lessons or even entire courses in their own educational environment. The learning materials are admirably suited for self-study (supervised or otherwise) or may deployed for remedial or complementary purposes in or outside the customary context. A framework will be created for this purpose during the course of 2007.

Publicising open source software in education

The campaign to introduce open source software into the Flemish education system has helped raise the profile of this type of software to a significant degree. This continuing focus reflects the multiple opportunities offered in this area for education. Now an initial awareness-raising stage has been completed, we are keen to start a second phase where the focus is on actual support for the open source software community in education on top of basic information.

ICT training is assigned a key role. We wish to initiate a dialogue to see how far open source software can be accepted in the curriculum and the extent to which students may be involved in (educational) development projects, in the context of their theses, for example.

Against the background of a project on artistic experiences, Lieven Van Parys has pupils work on 8 themes with three techniques: pencil, paint brush and a computer program. The eight themes are light, darkness, movement, rest, points, lines, shapes and text. Pupils from Japan and Flanders are able to compare their creations and publicise them on the Internet. The 'Zoo-project' shows an example of an artistic creativity with the assistance of ICT. The Zoo project is an international project where children make animals with 'chenille' (coloured pipe cleaners). The digital photographs taken of the animals are processed with an open source software program "The Gimp". The object is then imported into the drawing program 'Tux Paint' (also open source software). In 'Tux Paint' plates can be added (photographs) to be used as stamps in a drawing. The idea is to create a virtual zoo.

Lieven Van Parys, ICT coordinator St.-Amandusbasis school, Meulebeke
http://www.sip.be/stamand/earthlinkinfo.htm
http://www.sip.be/stamand/zooproject/zoo.htm

E-culture and education

Projects such as "Ingebeeld"[5] are a first step towards a more efficient system of (multi)media use in education. An investigation is also due to be made to see how far government funded or subsisided cultural establishments – including the Flemish Television and Radio archives - may allow access to their material and what should be the best metadata and technical tools to use for this accessibility so as to streamline accessibility in the educational environment.

[5] www.ingebeeld.be

4.5. Research and ICT monitoring

The introduction of ICT-related final objectives and developmental objectives has to go hand in hand with an extensive data-gathering and knowledge-building process about various dimensions of ICT integration. This involves not only the trend in ICT skills amongst pupils, course participants, students and teachers, but also the ICT infrastructure, how it is used, perceptions about the use of ICT and ICT integration.

4.5.1. Priorities

- The authorities have to be responsible for building and disseminating knowledge about various dimensions of ICT policy and above all the ICT skills of pupils, course participants, students and teachers.

- An investigation may be made in cooperation with the relevant partners into specific dimensions of ICT in education. A link may also be sought with existing initiatives. Full use should be made of funding channels available, including the Flemish (such as the Interdisciplinary Institute for Broadband Technology - IBBT) and European ones (such as the framework programmes for Research and Development).

- The authorities have to ensure suitable access to data and the dissemination of knowledge and information.

4.5.2. Initiatives

ICT monitor
In the countdown to the future policy assessments, scientists from the Universities of Ghent and Leuven are developing a monitoring instrument proving information about 4 types of indicators:

- ICT competences of pupils, course participants and teachers
- ICT infrastructure (computer/pupil ratios, PCInternet /pupil ratios, type and age of PCs, Internet facilities, …),
- the use and integration of ICT in the learning environment (level and type of use of ICT, use of electronic learning environments, methods, …),
- relevant stakeholders' perceptions about the educational use of ICT.

The research also covers the development of a (web-based) tool to be deployed for a biennial sample, so the authorities can constantly keep track of ICT integration trends.

Research on educational broadband applications
The Government or Flanders set up a new interdisciplinary institute for broadband technology in 2005: the IBBT[6]. This new research is focused on all factors allowing for the development and exploitation of broadband services. The research centre's chief aim is to train highly-skilled human resources and conduct broadband technology research on behalf of the Flemish business community and the Authorities of Flanders. The Government or Flanders hopes this

[6] www.ibbt.be

initiative will contribute to the process of making Flanders a pioneer and internationally recognised player in the future information society, primarily as a result of investing in medium-term research. The IBBT oversees 15 leading university research groups. Educational technology and e-learning was recently added to the IBBT's fields of activity. Various ongoing projects are investigating broadband services for education. In the coming years we will be investigating the extent to which the IBBT can be a partner in achieving our aim of making everyone ICT competent.

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6. Lexicon

ADSL
ADSL stands for *asymmetric digital subscriber line* and is a data communications technology that increases the bandwidth of conventional telephone connections. The term *asymmetric* refers to the fact that the flow of data from user to server (upstream) is smaller that the data flow from server to user (downstream). With ADSL the entire telephone channel (bandwidth) is used for the communication between the user and computer (and so is not shared with other users) thereby enabling a higher transmission speed and the use of telephony and the Internet at the same time.

File format)
A file format is a code for storing, retaining and sending digital texts, illustrations (graphic files, scanned images, video etc.) or sound. There are 10 or so different file formats for illustrations (such as TIFF, PICT, EPS, BMP etc.), video (MPEG, AVI, QuickTime...) and sounds (WAVE, mp3, AIFF...). During coding, compression is also generally applied, so the files require less storage space.

Broadband
The collective name for ICT infrastructures with a huge throughput capacity: permanent networks over which huge amounts of data may be carried at a high speed downstream and upstream. The speed is usually expressed as kilobytes/second and the capacity is referred to as the 'bandwidth'.

Source code
The source code of a computer program (or software) is the code the programmer writes in a formal programming language, in contrast to the executable code or programming language for the processor as this is generated from the source code.

Digital
Opposite to analogue. A digital signal has only two discrete values: on/off or 1/0. Intermediary values are defined between these two extremes. A byte is a unit of digital information. Digital data has a number of advantages over the analogue variety. Digital information may be processed and sent without any loss of quality (retouching, compressing, trucking and so on).

Digital divide
Where specific groups of people run the risk of failing to connect with the contemporary technological society, so, for example, they have limited or no access to new technologies (Internet, IT, mobile telephony...), or they lack the knowledge and skills to make the best possible use of them.

Digital learning environment
The part of the total learning environment supported by ICT and making electronic materials and resources available to help students to learn.

E-learning
Learning and teaching with the help of Internet technology. What is striking about this way of learning is that electronic tools are used both for the organisation of learning and the learning

process itself. E-learning is never a goal in itself, but lends support to flexible training and new types of learning.

E-learning platforms
Learning environments and learning communities that process content and collect programs as building bricks to integrate into a hybrid environment.

Freeware
Software authors make freely available, minus the source code or a licence, to enable the free use of software such as open source software.

Hardware
The hardware in computer technology indicates all the physical components playing a role in a computer. The term is used as a counterpart to software or computer programs.

Interactive
Interactive literally means 'moving in both directions'. A communication process is interactive when the sender is also a recipient during the communication and vice versa. However, the term is very broad and may –multimedia programs, for example – have various meanings, ranging from programmed interaction, such as the scope for making choices from a menu, to more advanced forms of interactivity where the sender and receiver engage in an open dialogue with each other.

Internet
Internet is short for ***Inter****connected* ***Net****works*, a huge public network of computer networks whose conventions are described in the *Requests For Comments* managed by the Internet Engineering Task Force. The Internet originated in the ARPANET, a nexus of military and subsequently university networks established in 1969 in the United States. In the meantime, the Internet has become a global phenomenon, and the most popular means of communication ever. Computers are able to communicate with each other over the Internet on the basis of protocols. An almost universally used protocol is the Internet protocol (IP). In common parlance, the Internet is often synonymous with the World Wide Web, but that is only one of the many services. Other well-known services are e-mail, *file transfer protocol* (FTP) to exchange files between computers and 'usenet' for exchanging newsgroup files. The Internet should not be confused with an intranet, a computer network that is available solely within an organisation or premises.

Interoperability
Interoperability generally means systems (or equipment) being able to exchange and/or communicate items between each other. In other words, the systems can 'talk to each other' and are 'compatible' to a certain degree. Standards, protocols and procedures are vital for achieving interoperability. See also: Standards

Learning object
A learning object comprises a subject matter element with a specific learning goal. Examples:
- data or raw media elements: text, software, audio, video, animation, illustration,...
- information objects: procedures, principles, concepts, facts, overviews, summary,...
- aggregate objects: lessons, units, chapters, exercise...
- larger structures: method, course,...

Learning environment

The overall resources, strategies, people and facilities enabling learners to learn. Learners lean through an interaction with the learning environment. A traditional learning environment may comprise a teacher, fellow learners (pupils, course participants or students), learning materials such as a book, exercise materials, sources of information, the physical environment the learners find themselves in (a classroom or a practical room) and tools such as paper and writing instruments.

Metadata
Metadata is data describing the characteristics of specific data, so it is data about data. The metadata for a specific document may be, for example: the author, the date of writing, the number of pages and the language in which the data is written. The explicit storage of metadata with data in digital format it is related to has the advantage of making it easier to find this data.

Multimedia
Multimedia refers to digital media where text, sound and image (moving or otherwise) may be stored and where interactivity is possible between the user and program.

Open content
(Digital) information not protected by exclusive intellectual property rights or for commercial exploitation, and which may be freely used to some extent, without infringing copyright.

Portal site
A portal site is a blanket term for a website allowing access (portal) to other websites and sources on the Internet. Portal sites may be created for a specific theme or a specific target group.

Standards
A standard is a procedure or measure a group of people have agreed among themselves to use. The agreements are featured in a document where the specifications are described. Standards may be established by various (semi-official) accredited bodies, also by industry, for example. There are a) open standards and b) closed standards. Standards in technology are specifications for completing a specific task, such as hard and software standards. Many standards are closed (most industrial ones, for example) and a licence is required from the organisation that has the copyright for this standard. Closed standards make it difficult to mix computer programs and hardware components from various suppliers. In the case of open standards (not to be confused with *open source*) a licence also has to be obtained and possibly paid for, but thanks to their open character, various types of hardware and software components are exchangeable so people can choose themselves which software program and/or which computer equipment to buy or use, being less dependent on a specific hardware- and/or software supplier or service providers. Open standards call for the proper technical knowledge and the necessary equipment to which the solutions of other manufacturers (seamless) may be connected.

Virtual
The adjective ‘virtual’ implies an independence from place and/or time. The properties of an item may be known without it being physically present. In the world of computers, something is virtual when it does not exist but seems as though it does exist as a result of software: hence the well-known concept of virtual reality. A room may be virtual even though the user has the feeling of forming part of it. Organisational science refers to virtual teams, while sociology

refers to virtual communities: people who have (possibly) not yet met each other and cooperate at a distance from each other, via telephony, e-mail and shared documents on the Internet.

Virtual community
Users communities who find each other on the basis of shared interests or joint commitments, without a real organisation ensuing and without the members of such a community meeting (having to meet) in real life.

Open source software)
Open source software is the collective term for computer programs distributed under a licence and providing users with the following rights: a/ the computer programs may be used by anyone, for any purpose, b/ the computer program may be operated and adjusted by anyone, c/ towards this end, each user should have access to the computer program source code. Amended versions may also be distributed so the community can benefit from the improvements.

Web 2.0
This refers to what some people regard as the second stage of the development of the World Wide Web. This involves changing from a collection of websites to a complete platform for interactive web applications for end users on the World Wide Web. Some people claim this will make separate desktop applications unnecessary in due course.