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DigEuLit: Concepts and Tools for Digital Literacy Development

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Abstract

In the e-permeated society, a society also increasingly unpredictable and uncertain, “digital literacy” becomes not only a key factor in enabling participation in education, as well as employment and other aspects of social life, but also a means of gaining some understanding of the world. The DigEuLit project, funded by the EC eLearning Initiative, has a task of defining digital literacy and developing a framework and tools for digital literacy development in European educational settings. We have observed converging literacies which have gained new relevance in digital environments, and proposed a definition of digital literacy which focuses on the processes of using digital tools to support the achievement of goals in the individual’s life-situation. A suite of online tools is being developed to enable digital literacy progress to be tracked by teachers and learners, and evolution of these tools will continue beyond the life of the project.

The digital society

Today it is true to say that, in most of Europe and many other parts of the world, we live in a digital society, a society permeated by the digital, in which our actions are frequently mediated by digital tools, and the objects we encounter are often shaped by digital intervention. The mobile phone and the MP3 player are the most visible personal artifacts of this society, whilst the PC is the ubiquitous gateway to cyber-activity, at work and at home. Yet it would be wrong to think that we live in The Digital Society, for this suggests that society is made by the digital, that its essential characteristics have been created because of the development of digital technology. The reality is opposite. Seeking to achieve their own goals, individuals, governments and firms have created and developed digital technologies. We have made the “Information Society” and the “Digital Age” for ourselves.

But while technology does not create social order, it is complicit in social change. Social theorists such as Zygmunt Bauman (2000, 2001) and Ulrich Beck (1992, 2001) point to the decline of the classical industrial order into a society characterised by uncertainty and risk, in which nothing can be predicted and the long-term becomes meaningless. Heavy industry, the nation state, and institutionalised religion, the three pillars of the “modern” order, are dissolving, robbing individuals of the certainties which once they provided: of work, order and belief. In the era of what Bauman calls “liquid modernity” individuals fall back upon short-term satisfaction, temporary goals, and the acquisition of objects or consumption of services. The causes of this direction of social change are many, and as with all social changes, technology is its tool, its medium and its reflection. Digital technologies have enabled the globalisation of business processes and of commercial cultural output, and also the capture of massive amounts of data

about individuals which itself becomes a commodity. The digital is implicated in the genesis and maintenance of this “post-modern” society, but it is the major actors in that society who have driven it so, directing research and investment in “new technology” in order to reap financial or political gain. For the ordinary individual (one who is not a member of the international economic, political and media élite), the choices may seem very limited. To be part of the consumer society has for many become a source of meaning and identity.

In this context notions of literacy are relevant, since they focus on the individual’s engagement with and articulation of the symbols and meanings of daily life. Bélisle (2006) characterises the evolution of literacy concepts in terms of three models. The *functional model* views literacy as the mastery of simple cognitive and practical skills, and ranges from the simple view of literacy as the mechanical skills of reading and writing to a more developed approach (evinced by e.g. UNESCO, 2006) regarding literacy as the skills required to function effectively within the community. The *socio-cultural practice* model takes as its basis that the literacy is only meaningful in its social context, and that to be literate is to have access to cultural, economic and political structures of society; in this sense, as Brian Street (1984) has asserted, literacy is ideological. The *intellectual empowerment* model argues that literacy can bring about the transformation of thinking capacities, particularly when new cognitive tools, such as writing, or new processing tools, such as those relying on digital technology, are developed. In viewing literacy within the context of a digital society as, at one level functional, at another engaged with the social context, and at a third as transformative, we can see it as a powerful tool for the individual and the group to understand their own relationship to the digital.

Literacies of the digital

We can identify several “literacies of the digital”, mostly originating in the pre-digital period, but presented as routes to understanding phenomena which have become more significant or even transformed in digital contexts.

Computer, IT or ICT literacy has been identified as a need from the late 1960s. We can see concepts of computer literacy as passing through three phases, the *Mastery* phase (up to the mid-1980s), the *Application* phase (mid-1980s to late-1990s) and the *Reflective* phase (late-1990s on) (Martin, 2003). In the *Mastery* phase the computer is perceived as arcane and powerful, and emphasis is placed on gaining specialist knowledge and skill to master it. “Computer Basics”, whatever they may be called, consist of how the computer works (simple computer science), and how to program it (using whatever languages were current at the time), sometimes with additional input on the “social and economic effects” of computers. The *Application* phase began towards the end of the 1980s with the appearance of simple graphical user interfaces and easy-to-use mass market applications, which opened up computers to mass usage. In this phase the computer is seen as a tool which can be applied in education, work, leisure and the home. Use of applications software becomes the focus of literacy activity, and definitions of computer or IT literacy focus on practical competences rather than specialist knowledge. This is accompanied by the appearance of mass certification schemes focusing on basic levels of IT competence. Movement to

the *Reflective* phase was stimulated by realisations that IT could be a vehicle through which student-centred pedagogies, championed by innovators since the 1960s, could at last be realised. There is an awareness of the need for more critical, evaluative and reflective approaches to using IT. At the reflective level specific skills are superseded by generic skills or meta-skills, as evident in the definition formulated by the OECD-ILO PISA project:

ICT literacy is the interest, attitude and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in society. (van Joolingen, 2004)

It is possible that this three-phase development of ICT literacy, from skills through usage to reflection, is paralleled in the evolution of the other literacies considered here. We should note that the earlier phases remain as subordinate layers, so that literacy concepts become more complex and multi-layered as they develop.

Technological literacy emerged in the 1970s as a response to two very different concerns: the growing awareness of the enormous potential danger of technological developments for the environment and for humanity; and the growing fear that ignorance of developing technologies would render the workforce, in countries such as the US and Britain, vulnerable to competition from countries with more technological awareness (Waks, 2006). The result was an uneasy marriage of the two concerns, since one favoured a skills-based vocational approach (with a preference for a behaviourist pedagogy) and the other a critical, action-oriented “academic” approach (with a liking for a more constructivist pedagogy) (Dakers, 2006a). A criticism of these developments is that, despite the rhetoric, the critical element of technological literacy is insufficiently developed or implemented, and it must engage the industrial application of technology with deeper understanding of the social and political involvement of technology (Michael, 2006).

Information literacy developed in the US since the late 1980s as a re-focusing of “bibliographic instruction” in academic libraries, in the light of the trend towards student-centred learning, and thus arose in a largely pre-digital context. With the increasing perception of the Worldwide Web as a seemingly infinite source of information, the information literacy movement gained more urgency. In the UK, SCONUL has been a prime mover in encouraging consideration of information literacy in the UK; their “Seven Pillars” model, for students in higher education, identifies seven “headline skills” forming information literacy:

- a. Recognising an information need;
- b. Identifying what information will fulfil the need;
- c. Constructing strategies for locating information;
- d. Locating and accessing the information sought;
- e. Comparing and evaluating information obtained from different sources;
- f. Organising, applying and communicating information;
- g. Synthesising and building upon information. (adapted from Town, 2000: 17-18)

The “seven pillars” tag refers to the fact that each element supports information literacy, but also that progression is possible up each pillar (as it were) following a continuum of increasing competence from “novice” through “advanced beginner”, “competent”, and “proficient” finally reaching “expert”. Information literacy has influenced librarians on a worldwide basis (see

Rader, 2003), and is seen as important by national and international bodies. An “Information Literacy Meeting of Experts”, held in Prague in 2003, led to the “Prague Declaration” (UNESCO, 2003) stressing the global importance of information literacy in the context of the “Information Society”. It includes the statement that:

Information Literacy encompasses knowledge of one’s information concerns and needs, and the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address issues or problems at hand; it is a prerequisite for participating effectively in the Information Society, and is part of the basic human right of life long learning. (ibid.: 1)

Media literacy has developed from the critical evaluation of mass media, and is a major educational and research activity in both the US and Europe. The Alliance for a Media Literate America offers the following definition on its website:

Within North America, media literacy is seen to consist of a series of communication competencies, including the ability to ACCESS, ANALYZE, EVALUATE and COMMUNICATE information in a variety of forms including print and non-print messages. Interdisciplinary by nature, media literacy represents a necessary, inevitable and realistic response to the complex, ever-changing electronic environment and communication cornucopia that surrounds us.

(<http://www.aamlainfo.org/home/media-literacy>)

There is much similarity between definitions of media literacy and information literacy, suggesting that the generic competences are very similar. Media literacy is focused more on the nature of various genres of medium and the way in which messages are constructed and interpreted – in this perspective the characteristics of the author/sender and the receiver are crucial in understanding the meaning of the message and its content. Information literacy has tended to focus on the ways in which information is accessed and the evaluation of the content.

Visual literacy has developed out of art criticism and art education, and was initially concerned with perception, and the way in which artists and designers have used perspective, ratio, light, colour and other techniques of visual communication. Wilde and Wilde (1991: 12) link visual problem solving to “the quest for visual literacy” and offer this as “the best hope for creating future generations of visually literate designers.” Dondis however emphasises that this approach can enable everybody (not merely the artistic elite) to engage with the visual aspects of culture, and thus sees visual literacy as very much paralleling classical literacy:

Literacy means that a group shares the assigned meaning of a common body of information. Visual literacy must operate somewhat within the same boundaries. ... Its purposes are the same as those that motivated the development of written language: to construct a basic system for learning, recognizing, making, and understanding visual messages that are negotiable by all people, not just those specially trained, like the designer, the artist, the craftsman, and the aesthete. (Dondis, 1973: x)

Visual images have always been a powerful medium for the interpretation of information and the communication of meaning, in science as well as art, and in dealing with the exigencies of everyday life. The wealth and complexity of visual imagery which is possible using digital tools emphasises the power of the visual. For instance, the website www.visualcomplexity.com offers many examples of how visual structures are used in the processes of interpreting data and creating new knowledge.

Communication literacy underlines the importance of communication as a human activity, indeed, as a basis of social interaction, and is seen as a basic personal attribute, whether mediated orally or digitally. But the advent of the digital, offering instant communication to one or many disassembled from a face-to-face situation, requires the user to be more aware of the nature and implications of the medium. The website of the Winnipeg School Division defines communication literacy as:

Learners must be able to communicate effectively as individuals and work collaboratively in groups, using publishing technologies (word processor, database, spreadsheet, drawing tools...), the Internet, as well as other electronic and telecommunication tools. (online at <http://www.wsd1.org/techcont/introduction.htm>)

Literacy theorists have also recognised the significance of the digital in shaping the contexts within which literacy is to be understood. Lankshear and Knobel (2003: 16-17) describe “new literacies”:

The category of ‘new literacies’ largely covers what are often referred to as ‘post-typographic’ forms of textual practice. These include using and constructing hyperlinks between documents and/or images, sounds, movies, semiotic languages (such as ... emoticons (‘smileys’) used in email, online chat space or in instant messaging), manipulating a mouse to move around *within* a text, reading file extension and identifying what software will ‘read’ each file, producing ‘non-linear’ texts, navigating three-dimensional worlds online and so on.

Focusing on the idea of a range of distinct but interrelated literacies, some commentators use plural terms: thus Kellner (2002: 163) prefers the term “multiple literacies” which “points to the many different kinds of literacies needed to access, interpret, criticise, and participate in the emergent new forms of culture and society”, but also refers to “technoliteracies” (Kahn & Kellner, 2006). Snyder calls her 2002 book *Silicon Literacies* but tends in the text itself to refer to “literacy practices”. Tyner (1998: 63-68) recognises the need to refer to multiliteracies, but prefers to identify groups of linked literacies while retaining “literacy” as an overarching concept. Kress (2003) also supports developing a new theoretical framework for *literacy* which can use a single set of concepts to address its various aspects.

It is clear that there is considerable overlap between the literacies outlined above. In some cases, the definitions of the different literacies are almost identical, and only nuanced in different directions, as a result of their pathways from pre-digital foci, and their sense of the concerns of the particular community whom they have developed to serve. Part of the convergence also involves the evolution of literacies from a skills focus through an applications focus towards a concern with critique, reflection and judgement, and the identification of generic cognitive abilities or processes, or meta-skills. In this way the digital literacies define themselves as being concerned with the application of similar critical/reflective abilities in slightly different fields of activity. Alongside this has been an identification of student-centred pedagogy as the appropriate vehicle for literacy activities.

Digital Literacy and the DigEuLit project

The convergence of digital literacies formed the starting point for the DigEuLit project¹, proposed as a response to a call for actions on "digital literacy" in the context of the eLearning Programme of the European Commission:

The ability to use ICT and the Internet becomes a new form of literacy – "digital literacy". Digital literacy is fast becoming a prerequisite for creativity, innovation and entrepreneurship and without it citizens can neither participate fully in society nor acquire the skills and knowledge necessary to live in the 21st century. (European Commission, 2003: 3)

The goal of DigEuLit is to develop a European framework for digital literacy: a definition, generic structure, and set of tools which will enable educators, trainers and learners to share an understanding of what constitutes digital literacy and how it can be mapped into European educational practice, in terms of both curriculum and personal development.

The first task was to come to an agreed understanding of the term *digital literacy*. It was popularised by Paul Gilster, who, in his book of the same name defined it as:

the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. The concept of literacy goes beyond simply being able to read; it has always meant the ability to read with meaning, and to understand. It is the fundamental act of cognition. Digital literacy likewise extends the boundaries of definition. It is cognition of what you see on the computer screen when you use the networked medium. It places demands upon you that were always present, though less visible, in the analog media of newspaper and TV. At the same time, it conjures up a new set of challenges that require you to approach networked computers without preconceptions. Not only must you acquire the skill of finding things, you must also acquire the ability to use these things in your life. (Gilster, 1997: 1-2)

Gilster identifies critical thinking rather than technical competence as the core skill of digital literacy, and emphasises the critical evaluation of what is found on the Web, rather than the technical skills required to access it. He also emphasises, in the last sentence, the relevant usage of skills "in your life", that digital literacy is more than skills or competences.

The notion of digital literacy being embedded in life situations is also brought out in the report *Digital Horizons* of the New Zealand Ministry of Education:

Digital literacy is the ability to appreciate the potential of ICT to support innovation in industrial, business and creative processes. Learners need to gain the confidence, skills, and discrimination to adopt ICT in appropriate ways. Digital literacy is seen as a 'life skill' in the same way as literacy and numeracy. (Ministry of Education, 2003: 5)

It is also reflected in the definition of "eLiteracy" coined by Martin (2003: 18):

The awarenesses, skills, understandings, and reflective-evaluative approaches that are necessary for an individual to operate comfortably in information-rich and ICT-supported environments. ... For the individual, eLiteracy consists of:

- a. awareness of the ICT and information environment;
- b. confidence in using generic ICT and information tools;
- c. evaluation of information-handling operations and products;
- d. reflection on one's own eLiteracy development;
- e. adaptability and willingness to meet eLiteracy challenges. (Martin, 2003: 18)

That considered and informed use of digital tools and facilities is part of a whole life, is emphasised by Sørby, who, in a report for the Norwegian Ministry of Research and Education, proposes the concept of "Digital Bildung":

Digital *bildung* expresses a more holistic understanding of how children and youths learn and develop their identity. In addition, the concept encompasses and combines the way in which skills, qualifications, and knowledge are used. As such, digital *bildung* suggests an integrated, holistic approach that enables reflection on the effects that ICT has on different aspects of human development: communicative competence, critical thinking skills, and enculturation processes, among others. (Søby, 2003: 8)

Søby uses the German term *Bildung* to suggest the integrated development of the individual as a whole person. The process of *Bildung* goes on throughout life, affects all aspects of the individual's thought and activity, and affects understandings, interpretations, beliefs, attitudes and emotions as well as actions. It represents the making of the individual both as a unique individual and as a member of a culture.

Considering these points, the DigEuLit project has developed the following definition of digital literacy:

Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.

Levels of Digital Literacy

Three "levels" or stages are proposed for digital literacy development (see Figure 1).

Level I. Digital Competence

At the foundation of the system is **digital competence**. This covers a wide range of topics, encompasses skill levels from basic visual recognition and manual skills to more critical, evaluative and conceptual approaches, and also includes attitudes and awarenesses. Individuals or groups draw upon digital competence as is appropriate to their life situation, and return to gain more as new challenges are presented by the life situation.

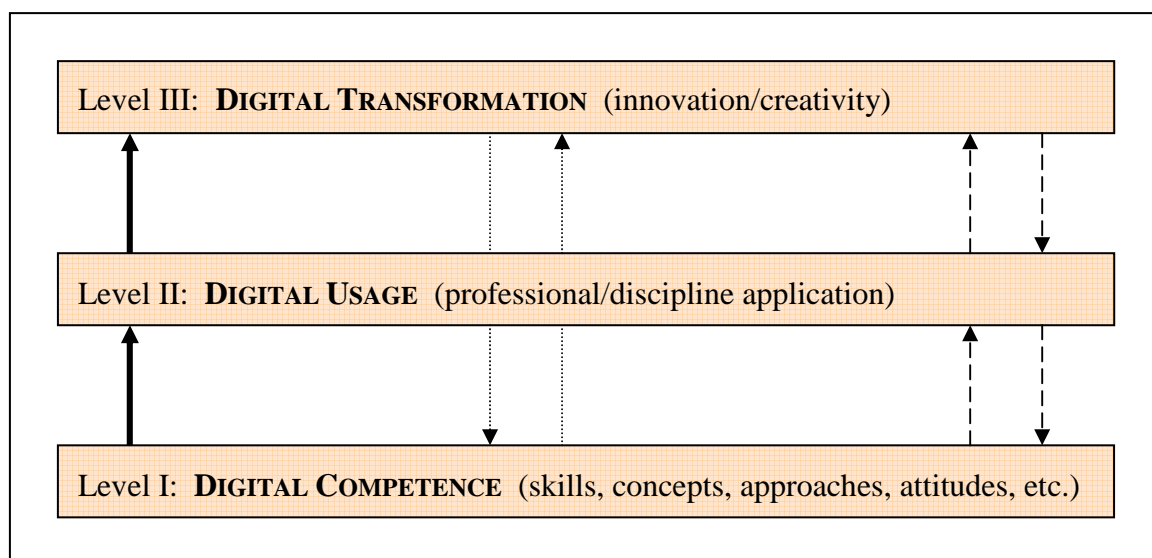


Figure 1. Levels of Digital Literacy

The working group on “key competences” of the European Commission “Education and Training 2010” Programme identifies *digital competence* as one of the eight domains of key competences, defining it as “the confident and critical use of Information Society Technologies for work, leisure and communication.” (European Commission, 2004: 14). Information society technologies (IST) are defined as “offering services based on the use of Information and Communication technologies (ICT), the Internet, digital content, electronic media, etc., via for example a personal computer, a mobile telephone, an electronic banking machine, an eBook, digital television, etc.” (loc. cit.) Digital competence is regarded as consisting of knowledge, skills and attitudes.

A problem here is the varying meaning of the terms *skill* and *competence*. *Skill* is sometimes seen as representing only lower order attributes (e.g. *keyboard skills*) but sometimes as including also higher order attributes (e.g. *thinking skills* or *analytical skills*). *Competence* (or competency) is sometimes construed as the application of skills in specific contexts, but is also seen as synonymous with *skill* or sometimes with higher level skills. The Key Competences working group addresses this issue:

The terms ‘competence’ and ‘key competence’ are preferred to ‘basic skills’ which was considered too restrictive as it was generally taken to refer to basic literacy and numeracy and to what are known variously as ‘survival’ or ‘life’ skills. ‘Competence’ is considered to refer to a combination of skills, knowledge, aptitudes and attitudes, and to include the disposition to learn in addition to know-how. (ibid.: 3)

Focusing on generic aspects of transferable “key competences”, the working group makes clear that the key competences will enable successful life action:

Key competences should be **transferable**, and therefore applicable in many situations and contexts, and **multifunctional**, in that they can be used to achieve several objectives, to solve different kinds of problems and to accomplish different kinds of tasks. Key competences are a **prerequisite** for adequate personal performance in life, work and subsequent learning. (ibid.: 6)(emphasis original)

We can regard digital competence, as conceptualised in the work of the Key Competences working group, as an underpinning element in digital literacy. In moving from competence to literacy, however, we take on board the cruciality of *situational embedding*. Digital literacy involves the successful usage of digital competence within life situations.

We have ordered digital competence around thirteen processes (see Figure 2). These are more-or-less sequential functions carried out with digital tools upon digital resources of any type, within the context of a specific task or problem. The problem or task may be in any area of activity: e.g. writing an academic paper, making a multimedia presentation, or investigating one’s family tree. “Digital resources” are to be considered in the most inclusive way: a digital resource is any item which can be stored as a digital file. This includes text, images, graphics, video, music, and multimedia objects; digital resources could take the specific form of reports, academic papers, fiction, pieces of music, art works, films, games, learning materials, data collections, etc. The first and last processes, *statement* and *reflection*, have a more generic status as mediating processes between digital actions and their cultural context.

process	descriptor
statement	To state clearly the problem to be solved or task to be achieved and the actions likely to be required
identification	To identify the digital resources required to solve a problem or achieve successful completion of a task
accession	To locate and obtain the required digital resources
evaluation	To assess the objectivity, accuracy and reliability of digital resources and their relevance to the problem or task
interpretation	To understand the meaning conveyed by a digital resource
organisation	To organise and set out digital resources in a way that will enable the solution of the problem or successful achievement of the task
integration	To bring digital resources together in combinations relevant to the problem or task
analysis	To examine digital resources using concepts and models which will enable solution of the problem or successful achievement of the task
synthesis	To recombine digital resources in new ways which will enable solution of the problem or successful achievement of the task
creation	To create new knowledge objects, units of information, media products or other digital outputs which will contribute to task achievement or problem solution
communication	To interact with relevant others whilst dealing with the problem or task
dissemination	To present the solutions or outputs to relevant others
reflection	To consider the success of the problem-solving or task-achievement process, and to reflect upon one's own development as a digitally literate person

Figure 2. Processes of Digital Literacy

Components of digital competence may be mastered at levels of expertise which will vary from basic skills to more demanding evaluative or analytical competence. Attempts to define multiple levels of differentiation have not been successful, becoming bogged down in the niceties of defining the exact differences between one level and the next, and it is probably only necessary to have a small number of clear levels. Thus, in considering teachers' professional development, Martin (2003b) offers three levels, *aspirant*, *practitioner* and *consultant*, and is able to distinguish clearly between these three levels.

Level II. Digital Usage

The central and crucial level is that of **digital usage**: the application of digital competence within specific professional or domain contexts. Users draw upon relevant digital competences and elements specific to the profession, domain or other life-context. Each user brings to this exercise his/her own history and personal/professional development. Digital usages are thus shaped by the requirements of the situation. The drawing upon digital competence is determined by the individual's existing digital literacy and the requirements of the problem or task. Digital usages are therefore fully embedded within the activity of the professional, discipline or domain community. They become part of the culture of what Wenger has called "communities of practice":

Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis. (Wenger et al., 2002: 4)

In communities of practice, learning becomes a communal activity intimately linked with everyday practice. Digital usages become embedded within the

understandings and actions which evolve within the community and cause the community itself to evolve; the community of practice is thus also a community of learning.

The process in which digital literacy is put into action is shown in Figure 3. The task or problem arises out of the individual's life context; it may concern work, study, leisure, or any other aspect of the life context. In order to complete the task or to solve the problem, the individual identifies a competence requirement. He/she may then acquire the needed digital competence through whatever learning process is available and preferred. He/she can then make an appropriate use of the acquired digital competence. The informed uses of digital competence within life-situations are termed here *digital usages*. These involve using digital tools to seek, find and process information, and then to develop a product or solution addressing the task or problem. This outcome will itself be the trigger for further action in the life context.

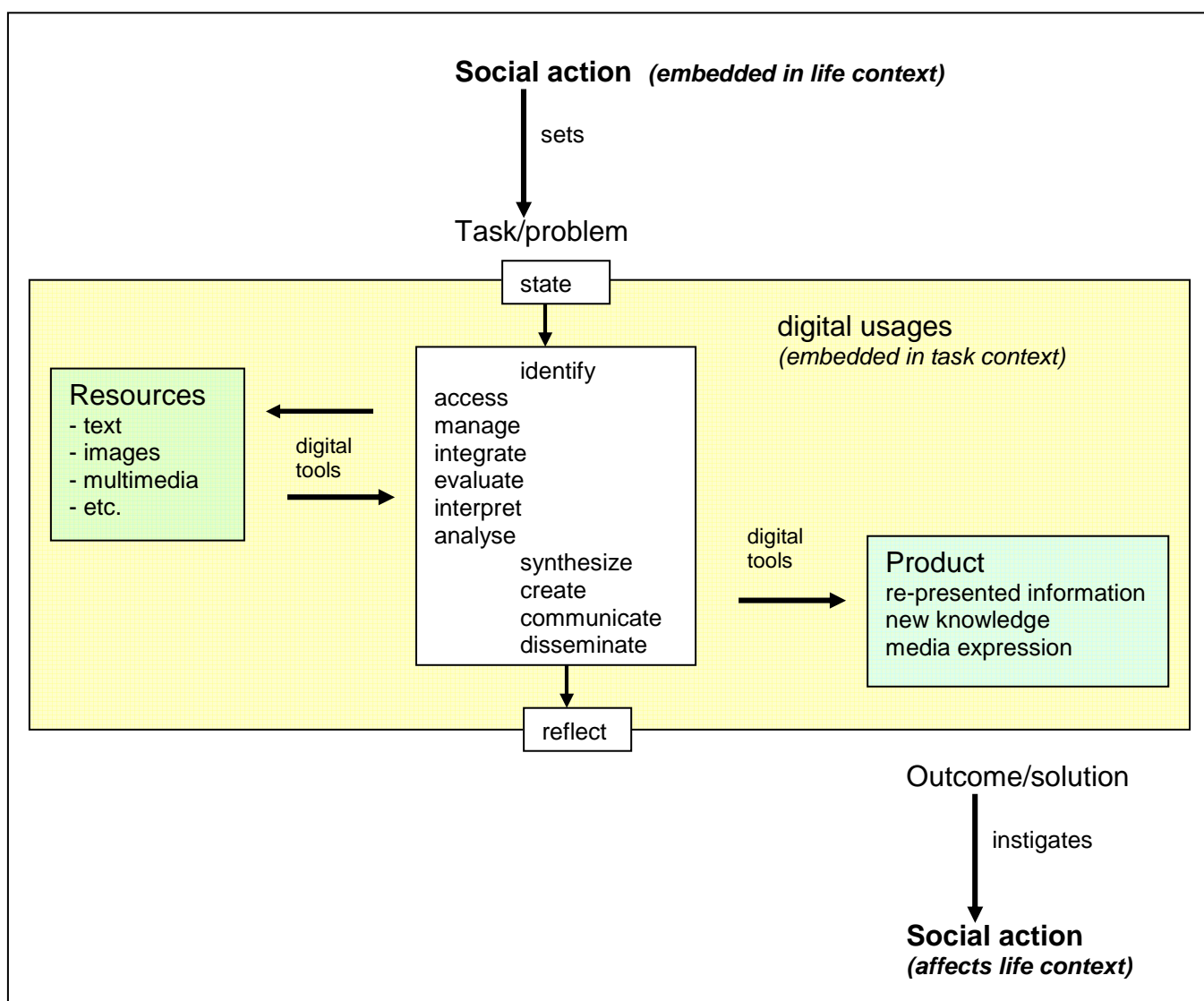


Figure 3. Digital literacy in action

Level III. Digital Transformation

The ultimate stage is that of **digital transformation**, and is achieved when the digital usages which have been developed enable innovation and creativity, and stimulate significant change within the professional or knowledge domain. This change could happen at the individual level, or at that of the group or organisation. Whilst many digitally literate persons may achieve a transformative level, transformation is not a necessary condition of digital literacy. Activity at the level of appropriate and informed usage would be sufficient to describe as digitally literate.

Users do not necessarily follow a sequential path at each stage. They will draw upon whatever is relevant for the life-project they are currently addressing; the pattern is more one of random rather than serial access, although there will be many cases where certain low level knowledge and skill is necessary in order to develop or understand material from a higher level.

A Framework for Digital Literacy Development

The European Digital Literacy Framework is based on the recognition that a common understanding of digital literacy would aid European student mobility across Europe, would aid the passage of students in Europe into employment, and would play a part in the preparation of students as competent practitioners in society. Specific benefits to be gained from a digital literacy framework would be:

- i. Educators will be able to identify clearly the digital elements involved in any programme of learning, and the digital literacy gained therefrom, and will be able to take steps to ensure that the appropriate digital competences are delivered.
- ii. Learners will also be able to identify clearly the digital elements involved in any programme of learning, and the digital literacy gained therefrom, and will be able to take steps to ensure that they acquire appropriate digital competences.
- iii. Learning support staff will be able to identify clearly the digital elements involved in any programme of learning, and the digital literacy gained therefrom, and will be able to take steps to support activities developing digital literacy.
- iv. Learners will be able to keep a record of their personal development as digitally literate persons, relate this development to their career and other life objectives, and reflect upon their own progress.
- v. Mapping of acquisition of digital competences and participation in activities which develop digital literacy onto a single European framework will enable comparability of achievements across Europe. This will aid student mobility and employment mobility within Europe.
- vi. The framework will produce added clarity for all in the understanding of digital literacy and its acquisition and usefulness, and will thereby contribute to the development of individuals as digitally literate citizens.
- viii. A final benefit is socio-psychological: in a fast-changing area such as the digital, a clear identification of what is involved in digital literacy and how educational provision and individual progress can both be mapped can provide a feeling of security and of confidence in tackling an digitally infused world.

Digital literacy is conceived as an attribute of the person in a socio-cultural context; it is an element of that person's identity. In considering the pedagogy of e-learning, Mayes and Fowler (2006: 27) argue that, "Just as in the field of educational technology has matured from a 'delivery of content' model to one that emphasizes the crucial role of dialogue, so the field of digital literacy, we suggest, should shift its emphasis from skill to *identity*." (Italics original) We can point to the progression noted above with regard to computer literacy from mastery through application to reflection – from the objective to the subjective, the impersonal to the personal. The development of digital literacy is one aspect of lifelong personal development – *Bildung* – and hence needs to be approached in a way which enables its meaning for the individual and its embeddedness in life to be expressed. Thus, rather than representing the framework as a grid full of content, we have represented it as a set of online tools for enabling individuals to map personal digital literacy development, and to enable teachers to map the provision of opportunities for digital literacy development.

The framework tools are organised into three interfaces, the tutor interface, student interface and support interface, as shown in Figure 4 below.

The Tutor Interface

The tutor interface offers two linked tools, the Digital Literacy Course Provision Profile and the Student Readiness Monitor.

The ***Digital Literacy Course Provision Profile*** is completed by a course leader, and enables mapping of the digitally involved elements in the course. Completion of the Provision Profile will make clear the digital aspects of any course, to facilitate timely provision of digital competence to students, and thus to enable the tutor and class to focus on discipline goals achieved with digital means without being distracted by questions of mastery of the digital means. Ideally the Provision Profile should be completed (or updated) some months before the course commences; there is thus time to ensure there are means by which students can acquire the digital competences required; and for students to engage with the Needs Analysis tool and then acquire required competences. Completion of the Provision Profile involves specification of:

- i. the *digital competence requirements* of the course, i.e. those particular digital competences which must be mastered in order to successfully complete the course. These are linked to the learning activities which they enable. A database of digital competences is maintained as the *Digital Competence Content Reservoir*, so that clicking on the appropriate item in the Reservoir display is often all that is required.
- ii. those *course activities which confer digital literacy*. Digital Literacy is gained when individuals use digital competences in authentic contexts within the discipline, domain or profession. For instance, researching, writing and preparing an essay or class paper may represent an integration of digital skills to achieve a discipline goal – in this case the skills include locating and accessing relevant study material, and preparing the essay using a word-processor, with material possibly integrated from a spreadsheet or other application.

Having completed the provision profile, the tutor may, as the time for delivery of the course approaches, consult the **Student Readiness Monitor** tool in order to be aware of the extent to which the students on the course possess or have acquired the digital competences required. As the beginning of the course nears, action can then be taken with respect to students who have not yet acquired the required competences.

The Student Interface

The student interface offers access to two tools, the Digital Competence Needs Analysis and the Digital Literacy Development Profile.

The **Digital Competence Needs Analysis** is completed by the student before starting a course. Students are assessed on the competences identified by the tutor in the provision profile which are either pre-course requirements or provided in-course. The resultant information will alert the tutor to the readiness of students for the course, through use of the student readiness monitor. It will also alert students to competences still needed and offer immediate registration onto online or face-to-face modules enabling them to gain the required competences.

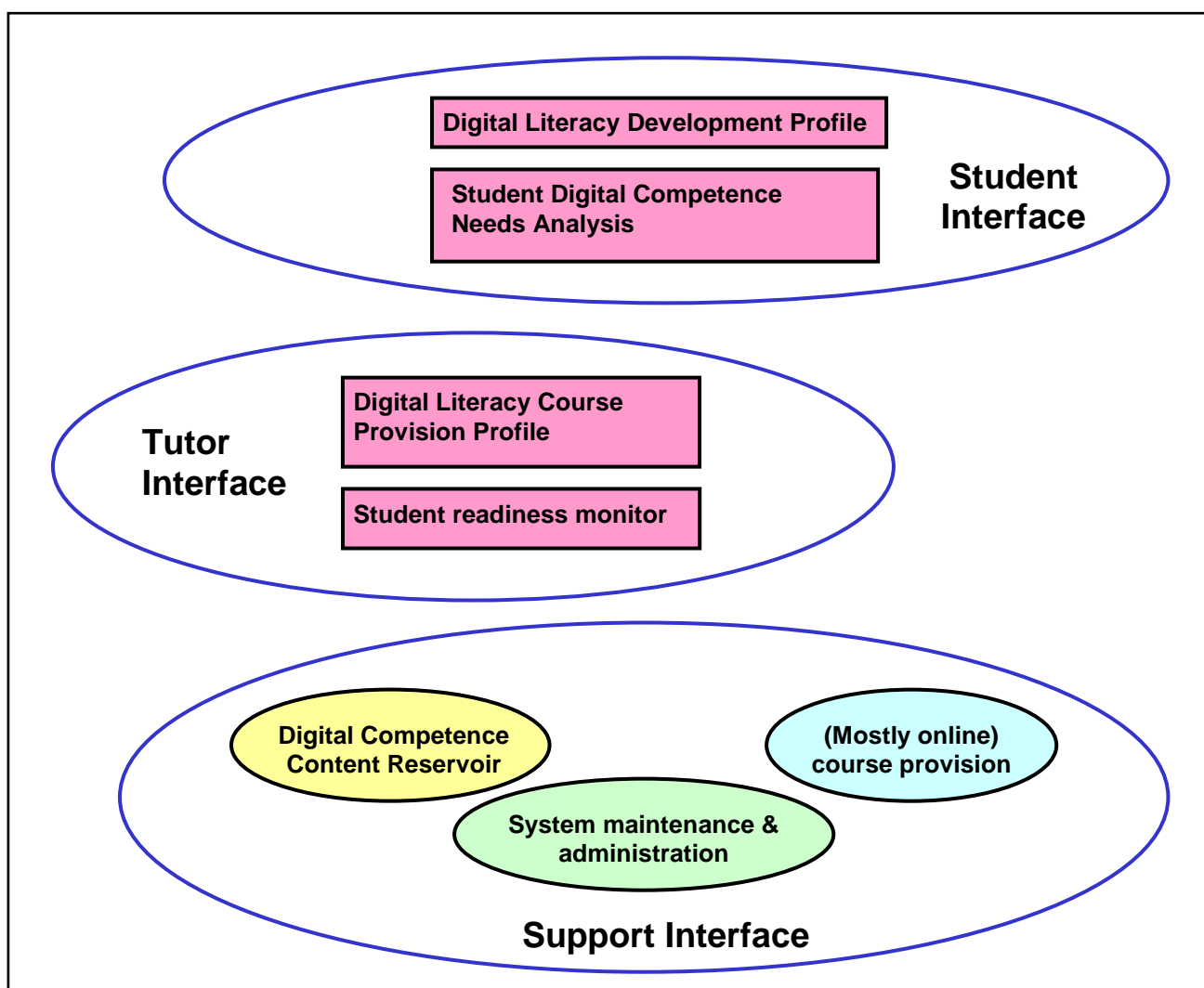


Figure 4. Interfaces and tools of the Digital Literacy Framework

The other element of the student interface is the **Digital Literacy Development Profile**, which enables the student to track his/her progress as a digitally-literate individual, and relate that progress to study, career and life goals. The digital literacy element is embedded in a personal development profile which includes both generic and specific elements:

- i. a *personal development plan*, where study, career or life intentions, goals and possible trajectories can be maintained, and related to ongoing activities and achievements. It is recognised that personal plans and intentions may be very variable, ranging from very specific to vague or nonexistent, from fantasy to reality, from idealism through pragmatism to cynicism. This is also a sensitive area, as the drivers of personal intention are many, and the ability to engage with this action is as much a factor of maturity as of education, information, etc. This will be a generic element, but it can be seen that a single study plan, for example, can have implications in more than one specific area, digital literacy being one such area.
- ii. an *ePortfolio*, where evidence related to personal development can be stored. Evidence can take the form of text, images, audio or video, multimedia files, or any other form of digitally storable object. As evidence, however, each file must be linked to a particular intention of the user, expressed in the personal development plan.
- iii. a *learning log*, where both formal and informal learning achievements can be recorded, either by the student or from outwith the system (e.g. results of an online course may be automatically fed to the learning log from the course management system, or tutors could send information to the learning log as students complete courses successfully). Qualifications previously earned could be entered by the student, and also informal and peer-taught learning. The learning log will also include particular events which are significant for digital literacy development. Students will also be able to add reflections to any item in the learning log; thus, an activity which is felt to have significantly enhanced digital literacy, can be discussed in more detail and reasons given for its impact on their digital literacy development.
- iv. a *curriculum vitae*, which can be continuously updated, drawing where possible from other parts of the system.

The original intention of the PDP system was that it should, like the other tools, be focused on digital literacy. However the immediate response of potential users was that this system offered the opportunity to include other personal development areas. The provision of a PDP element also raises the question of how it might interface with other PDP provision within an institution, or encountered through a lifelong learning context. The overlap of the PDP tool with generic concerns of individual development also highlights the embeddedness of digital literacy in the whole life-project of the individual: digital literacy is not an end in itself, only an enabler (although a significant and maybe necessary one). The PDP system is likely therefore to evolve as a generic system.

A further issue raised by the PDP tool is that of data ownership. We have conceived the PDP as being owned by the student. Data only enters the system by permission of the student: thus, an item for the learning log sent automatically if the student completed an online course would be presented to the student as

PDP owner for acceptance on its arrival (and could therefore be rejected). Similarly, outsiders would only be able to view data within the PDP system with permission from the owner. Even if the PDP is used, as some are, for assessment purposes, the fact and reality of student ownership should not be breached (for further discussion of this issue, see McAlpine, 2005).

The Support Interface

The support interface consists of three elements. ***Maintenance and administration*** ensures the functioning and continuity of the system, and its availability to legitimate users. There is a link to ***course provision*** of digital competences: this will vary according to the way in which such course provision is administered in each institution, and may involve linking to a virtual learning environment or student portal; the linkages implemented at the moment involve simple transmission of text.

The ***Digital Competence Content Reservoir*** indicates the range of digital competence elements which are currently relevant. It is regularly updated centrally as technologies and applications change, and is drawn upon by the tools. It consists of all the digital competences which are likely to be needed by any students in further or higher education at the present time. An item is a bundle, usually fairly small, of digital competences which are clearly related to each other and can form a learning unit which could be delivered face-to-face or online. Items are organised according to the thirteen processes of investigation shown in Figure 2. Existence of the Content Reservoir enables swift completion of the provision profile by tutors, since most items can be drawn from the Reservoir. The needs analysis tool also draws upon the reservoir, using the questions which are attached to each set of competences to carry out the assessment of students' competence. Students may also use the reservoir to plan further digital literacy development, by selecting competences which are relevant to their intentions, and then seeking appropriate course provision.

Relationship of the various elements of the framework are shown in Figure 5.

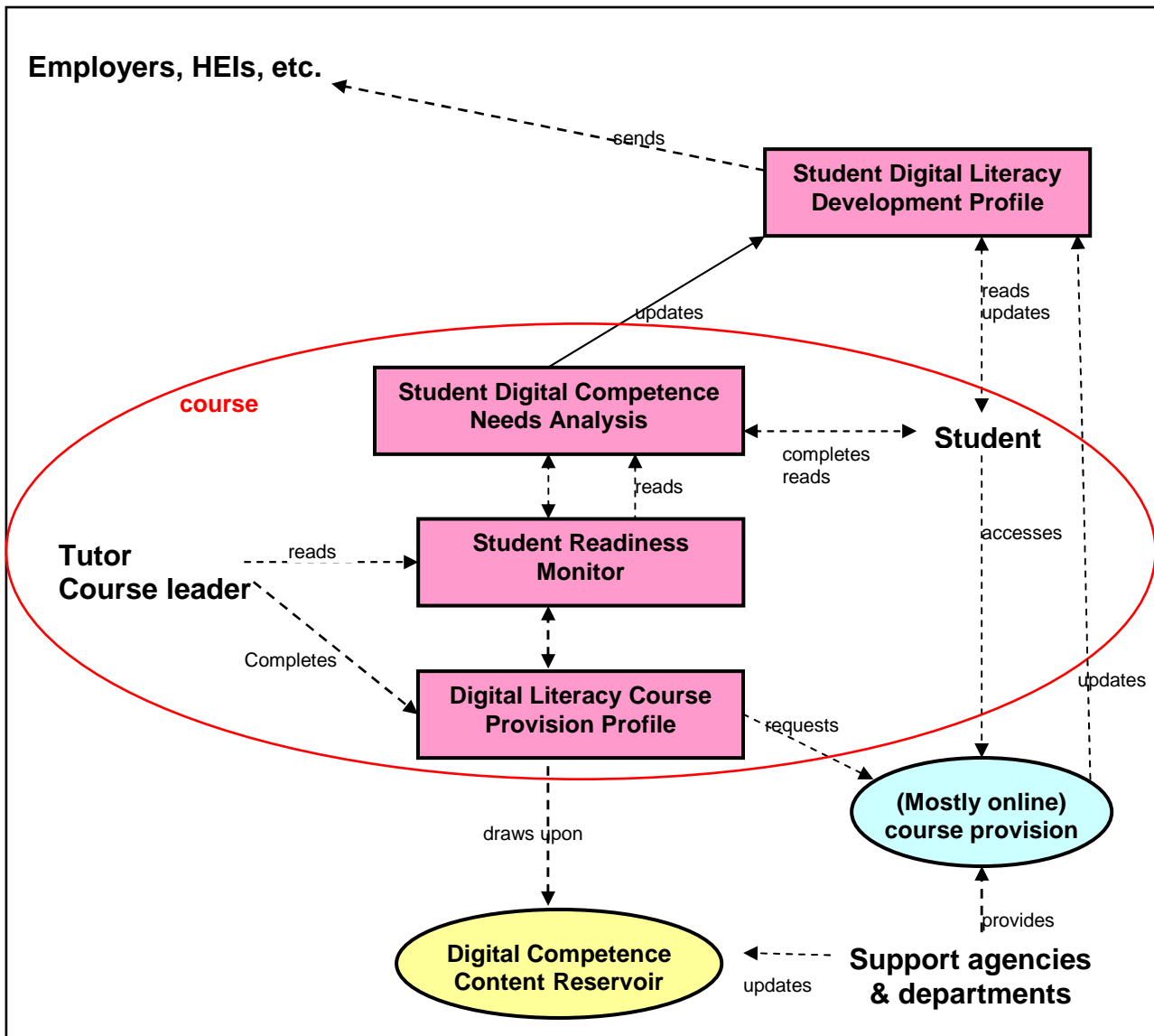


Figure 5. Implementation of the Digital Literacy Framework

Piloting the Framework Tools

The original goal of the project was to specify the tools rather than implementing them, however we have been able to exceed this initial intention, and as this is being written draft versions of the tools are being piloted in Glasgow University and other project partners. Within Glasgow University, for instance, the tools are being piloted with teachers and students in a wide range of departments: biology, chemistry, english language, english literature, medicine, psychology. The first feedback, on the general concept and shape of the framework, has confirmed the perceived value of a framework for digital literacy development. Perceived benefits within the institution included:

- i. achieving digital readiness of students for courses, thereby enabling a focus on the discipline goals of teaching without the distraction of problems with lack of digital competence;
- ii. enabling a focus on appropriate application of digital competence rather than mastery of skills, i.e. "using a spreadsheet can help solving this problem" rather than "how do I delete rows and columns?";

- iii. enabling forward planning of provision of digital competence for students through having a clearer picture of what they need;
- iv. seeing the bigger picture in terms of students' digital competence needs, not only through all the years of a single programme, but across related programmes;
- v. being aware of students' digital literacy development prior to a particular course also sometimes raises the threshold of expectation, and enables more challenging goals to be set because of students' greater familiarity with digital tools.

In terms of relations beyond the institution, student mobility was a clear benefit, but stress was also laid on the value of an awareness of and a record of digital literacy development for gaining either suitable employment or access to further educational courses (e.g. Masters' or doctoral programmes).

From the first discussions with academics also came the pointer to the generic value of the PDP system for students, and this direction is now being actively explored with the Arts Faculty of the University. Whilst this has provided an added complication, it also offers an integrating element which could allow digital literacy not only to be tracked in itself, but to be related closely with other developmental areas, and with the whole learning maturation of the individual.

The project terminates in 2006, however the partners intend to take the development of the framework forward through the formation of a network, which they hope to enlarge through inclusion of others who are interested in developing and using the framework.

Conclusion

We have hoped to move discussion of digital literacy – and of the literacies that make it up or that relate to it – from the area of listing of skills to be mastered towards that of the role of the digital in the growth of the individual, as student, as worker, as person. Whilst the awareness of competences gained is necessary, it is only a beginning or a lower stage in the process of achieving study, career and life goals through the appropriate use of digital means. Digital literacy is in this view an element in the ongoing construction of individual identity.

Notes

1. Partners in the DigEuLit project are University of Glasgow, Scotland (Lead Partner); Reid Kerr College, Paisley, Scotland; West Lothian College, Livingston, Scotland; Amtscentret for Undervisning – Sønderjylland, Aabenraa, Denmark; Centre for Videregående Uddannelser – Sønderjylland, Sønderborg, Denmark; Centre for Fleksibel Voksenuddannelse, Haderslev, Denmark; Business College Syd, Sønderborg, Denmark; Kainuun Ammattiopisto, Kajaani, Finland; Technical University of Łodz, Poland; Littérature, Idéologies, Représentations (LIRE), CNRS Lyon, France; and the University of Oslo, Norway. The project leader is Allan Martin, University of Glasgow. The project website is at www.digeulit.ec The project is supported by the eLearning Programme of the European Commission.

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