



Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe

Final Report

Authors: Christine Redecker, Kirsti Ala-Mutka,
Margherita Bacigalupo, Anusca Ferrari and Yves Punie



EUR 24103 EN - 2009

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2009

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JRC55629

EUR 24103 EN

ISBN 978-92-79-14372-4

ISSN 1018-5593

DOI 10.2791/33043

Luxembourg: Office for Official Publications of the European
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Printed in Spain

■ Acknowledgements

We would like to thank Simon Heid, Thomas Fischer and Walter F. Kugemann of the Institute for Learning and Innovation (ILI) and Joe Cullen, Clare Cullen, Damian Hayward and Veronique Maes of Arcola Research who contributed to this study by conducting in-depth case studies. We are grateful for their valuable input.

Furthermore, we would like to express our gratitude to all those who participated in the Learning 2.0 Validation Workshop which took place in Seville on 29-30 October, 2008 for their critical and constructive remarks and comments which have improved this report. They were: Claudio Dondi (Sciento), Guzman Mancho Bares (Universidad de Alcala), Roberto Carneiro (Universidad Catolica), Torhild Slåtto (Norwegian Association for Distance and flexible Education), Palitha Edirisingha (University of Leicester), Graham Attwell (Pontydysgu), Lesley Mackenzie-Robb (ventaggio), Vuorikari, Riina (EUN), Gráinne Conole (The Open University), Claude Beaudoin (DAREIC de Paris), Jyri Lössenko (e-jump 2.0 project), Josie Fraser (Consultant for Childnet International), Elisabetta Cigognini, Martin Owen (former educational director of NESTA FutureLab), Ulf-Daniel Ehlers (University of Duisburg-Essen), Jim Ayre (Multimedia Ventures), Serge Ravet (European Institute for E-Learning), Pirkko Hyvönen (University of Oulu), and Francesco Pucci (Giunti Interactive Labs).

Finally, we would like to thank Clara Centeno (IPTS) for her support and review of this report.

■ Preface

This report synthesises the outcomes of the research project “Learning 2.0 – the Impact of Web 2.0 Innovations on Education and Training in Europe”,¹ launched by the Institute for Prospective Technological Studies² (IPTS) in collaboration with the European Commission Directorate General Education and Culture (DG EAC) at the beginning of 2008. The project aims to gather evidence on the take up of social computing by European Education and Training (E&T) institutions, to understand its impact on innovations in educational practice and its potential for a more inclusive European knowledge society, and to identify challenges and bottlenecks so as to devise policy options for European decision makers.

Based on the evidence collected, this report describes how the emergence of new technologies can foster the development of innovative practices in the E&T domain. It discusses how the incorporation of new tools into learning and teaching activities opens up new opportunities for redefining educational strategies and formats. It further elaborates the implications of this ongoing transformation at the level of organisations and organisational culture.

The methodological framework for the assessment included:

- desk-based research using available studies, reports and statistics,³
- a stakeholder consultation⁴ which served to set up a database of 250 Learning 2.0 projects,⁵
- the in-depth study of 16 promising cases: a set of 8 cases promoting innovation,⁶ and a set of 8 cases targeting groups at risk of exclusion⁷ were selected,
- a validation workshop⁸ in which 20 external experts reviewed the research results.

This final report integrates the outcomes of the different components of the project. It should be underlined that the focus of this study is on the use of social computing in formal education, emphasising its role in promoting pedagogical and organisational innovation in E&T institutions in Europe. A parallel IPTS study is devoted to assessing the potential of ICT in general and social computing in particular for facilitating informal and non-formal learning in ICT-facilitated learning communities.⁹ Both studies continue previous work conducted in the IS Unit at IPTS,¹⁰ in particular the recently concluded “Exploratory Research on Social Computing” (ERoSC)¹¹ and the IPTS vision on future “Learning Spaces”,¹² models for future learning in the Knowledge Society where technologies mediate new opportunities for learning.

1 For more information see: <http://is.jrc.ec.europa.eu/pages/Learning-2.0.html>.

2 The Institute for Prospective Technological Studies (IPTS) is one of the seven research institutes that make up the European Commission’s Joint Research Centre.

3 Cf. Redecker (2009). “Review of Learning 2.0 Practices: Study on the Impact of Web 2.0 Innovations on Education and Training in Europe”, JRC publications EUR 23664 EN, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2059>.

4 Cf. <http://ec.europa.eu/yourvoice/ipm/forms/dispatch?form=Learning2>.

5 Cf. Redecker (ed.) (2009). “Learning 2.0: Case Database”, JRC publications EUR 23664 EN, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2461>.

6 Cf. Heid *et al.* (2009). “Good Practices for Learning 2.0: Promoting Innovation. An In-depth Study of Eight Learning 2.0 Cases”. JRC Technical Note 53212, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2599>.

7 Cf. Cullen *et al.* (2009). *Good Practices for Learning 2.0: Promoting Inclusion. An In-depth Study of Eight Learning 2.0 Cases*. JRC Technical Note 53578, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2600>.

8 Cf. Ala-Mutka *et al.* (2009). “Learning 2.0: The Impact of Web2.0 Innovation on Education and Training in Europe”. JRC publications EUR 23786 EN, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2139>.

9 Cf. <http://is.jrc.ec.europa.eu/pages/EAP/LearnCo.html>.

10 Cf. <http://is.jrc.ec.europa.eu/pages/EAP/eLearning.html> and <http://is.jrc.ec.europa.eu/pages/EAP/eS.html>.

11 Cf. Punie 2008; Pascu 2008; Ala-Mutka, 2008; Cachia, 2008; Pascu *et al.* 2006.

12 Cf. Punie *et al.* 2006, Punie & Ala-Mutka, 2007, Miller *et al.* 2008.

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■ Executive Summary

Learning 2.0 is an emergent phenomenon, fostered by bottom-up take up of social computing (or 'Web 2.0') in educational contexts. Although social computing originated outside educational institutions, it has huge potential in formal Education and Training (E&T) for enhancing learning processes and outcomes and supporting the modernisation of European Education and Training (E&T) institutions.

The current use of Learning 2.0. Social computing applications are currently not deployed on a large scale in formal Education and Training in Europe. However, there is a vast number and variety of locally-embedded Learning 2.0 initiatives all over Europe, which illustrates the variety and scope of Learning 2.0 approaches in formal E&T. Looking at the 250 cases that have been gathered as part of this project, the following general approaches towards using social computing in formal educational settings can be discerned:

1. **Opening up to Society:** Many educational institutions appropriate social computing as a means of facilitating access to information by current and prospective students, making institutional processes more transparent and facilitating the distribution of educational material. In some cases, social computing tools are used to encourage the involvement of third parties like parents, prospective future employers or external experts.
2. **Embracing Diversity:** In a number of cases, social computing applications are used as a means of integrating learning into a wider community, reaching out to virtually meet people from other age-groups and socio-cultural backgrounds, linking to experts, researchers or practitioners in a certain field of study and thus opening up alternative

channels for gaining knowledge and enhancing skills. From this point of view, Learning 2.0 enables students to broaden their horizons, and collaborate across borders, language barriers, and institutional walls, thus anchoring their learning experiences in a rich world of diverse cultures, traditions, languages and opinions.

3. **Networking:** In many cases, social computing applications are primarily conceived of as communication tools among students or teachers and between students and teachers. The examples studied demonstrate that social networking tools (1) support the exchange of knowledge and material; (2) facilitate community building, providing teachers and learners with social environments that offer assistance and (emotional) support; and (3) provide platforms for collaboration, allowing teachers and learners to jointly develop (educational) content.
4. **Achieving:** Learning 2.0 approaches can be used as a means to increase academic achievement. Social computing supplies learners and teachers with a wide variety of didactical and methodological tools that can be fitted to their respective learning objectives and individual needs with a positive effect on their performance and achievement. Research evidence suggests that Learning 2.0 strategies can be used successfully to enhance individual motivation, improve learner participation and foster social and learning skills. They can further contribute to the development of higher order cognitive skills like reflection and meta-cognition, increase self-directed learning skills and enable individuals to better develop and realise their personal potential.

5. **Learning:** In many cases, social computing tools are used to implement pedagogical strategies intended to support, facilitate, enhance and improve learning processes. As the cases gathered illustrate, Learning 2.0 tools are very versatile in accommodating diverse learning needs and preferences by addressing different sensory channels; by supplying more engaging (multimedia) learning environments; by supporting personalised ways of retrieving, managing and transforming information; by equipping learners and teachers with a variety of adaptable tools; and by integrating students into collaborative networks that facilitate the joint production of content and offer peer support and assistance. They thus allow for the implementation of learning strategies that are tailored to each learner's individual preferences, interests and needs and provide learning environments which are better suited to accommodating individual differences, and supporting differentiation in heterogeneous learner groups.

The impact of Learning 2.0. Learning 2.0 approaches promote the **technological, pedagogical** and **organisational innovation** in formal E&T.

Social computing gives rise to **technological innovation** in E&T by (1) increasing the accessibility and availability of learning content; (2) providing to new formats for knowledge dissemination, acquisition and management; (3) allowing for the production of dynamic learning resources and environments of high quality and interoperability; (4) embedding learning in more engaging and activating multimedia environments; (5) supporting individualised learning processes by allowing learner preferences to be accounted for; and (6) equipping learners and teachers with versatile tools for knowledge exchange and collaboration, which overcome the limitations of face-to-face instruction.

Social computing promotes **pedagogical innovation** by encouraging teaching and learning processes that are based on personalisation and collaboration. As a consequence, interaction patterns between and among students and teachers are changed, re-defining the roles of teachers and learners. Teachers become designers, coordinators, moderators, mediators and mentors, rather than instructors or lecturers, whereas students not only have to take responsibility for their own learning progress, but also have to support each other in their learning endeavours, and jointly create the learning content and context. Learners need to assume a pro-active role in the learning process, and develop their own – individual and collective – rules and strategies for learning.

Social computing both requires and promotes **organisational innovation**. Social computing allows E&T institutions to create learning environments that are transparent and open to society, are accessible at all times and places and accommodate all individuals involved in and affected by formal E&T. Social computing also enables educational institutions to intensify their collaboration with other organisations, across borders, language barriers, and sectors. Learning 2.0 can thus contribute to making educational organisations more dynamic, flexible and open. However, to benefit from these opportunities, E&T institutions have to become reflective organisations that critically evaluate and revise their corporate strategies in order to support innovative pedagogies. They have to ensure an infrastructure in which social computing tools are accessible to all learners and teachers, create an atmosphere of support for Learning 2.0 and encourage teachers and learners to grasp the opportunities offered by social computing. They have to be open to new assessment and grading strategies, foster and integrate new teaching and learning models and embrace the opportunities offered for transversal and peer learning among their staff.

Opportunities for modernising E&T. The evidence collected shows that social computing entails specific opportunities for the four strategic challenges of European Education and Training policies in the years leading up to 2020 (European Commission, 2008g):

- **Enhancing innovation and creativity:** Social computing supports more engaging and playful approaches, provides new formats for creative expression, and encourages learners to experiment with different, innovative, ways of articulating their thoughts and ideas. The Learning 2.0 landscape itself is also shaped by experimentation, collaboration and empowerment, allowing learners and teachers to discover new ways of actively and creatively developing their individual competences.
- **Improving the quality and efficiency of provision and outcomes:** Social computing offers a broad variety of versatile tools which address different channels and involve learners more actively in constructing their own learning process, allowing more effective learning strategies to be implemented. Research evidence indicates that Learning 2.0 strategies can furthermore improve individual performance, actively foster the development of transversal competences, and nurture abilities to flexibly develop skills in a lifelong learning continuum.
- **Making lifelong learning and learner mobility a reality:** Social computing can actively support lifelong learning by offering accessible, flexible and dynamic learning environments that can complement and supplement initial training. Furthermore, the networking potential of social computing, together with its power in overcoming time and space barriers, supports interaction and collaboration among and between learners and teachers who are geographically dispersed and enables students to broaden their horizons, and collaborate across

borders, language barriers, and institutional walls.

- **Promoting equity and active citizenship:** Social computing approaches can mitigate existing inequalities and can successfully be employed to re-engage individuals who are at risk of exclusion from the knowledge society. By offering tailored learning opportunities inside and outside of E&T institutions, they can alleviate disadvantages and lever the intellectual potential of learners who, for different reasons, have been failed by formal E&T.

Opportunities for inclusion and equity.

Social computing strategies can improve access to learning and employment opportunities, promote the active educational and social engagement of individuals who are at risk of exclusion from the knowledge-based society, and increase learners' levels of competences. Accessibility and availability of learning opportunities for the hard to reach can effectively be increased, and motivation and engagement in learning can be significantly improved by using social computing approaches.

Challenges, barriers and bottlenecks. While there are currently vast numbers of experimental Learning 2.0 projects under way all over Europe, on the whole, Learning 2.0 has not disrupted formal education yet. The following technical, pedagogical and organisational bottlenecks have been identified, which may hinder the full deployment of Learning 2.0 in E&T institutions in Europe:

1. **Access to ICT and basic digital skills:** Access to ICT at home and in schools and basic digital skills constitute a major obstacle for the deployment of social computing in E&T, and a key problem for inclusion and equity. In particular, teachers often do not feel confident enough with their ICT skills to implement Learning 2.0 approaches.

2. **Advanced digital competence:** Learning 2.0 strategies require the confident and critical use of ICT and an informed and critical attitude towards interactive media and digital information – particularly concerning its safety, security and reliability. Especially adolescents often lack these skills. Teachers need assistance in supplying their students with the necessary advanced digital skills to safely use social computing environments.
 3. **Special needs:** Though it supports different learning paces and cognitive styles, thus generally empowering learners, Learning 2.0 can also create and increase difficulties for students with physical or cognitive disabilities, or special learning needs. For example, text-based collaboration and knowledge building activities with wikis and blogs can disadvantage dyslectic students. However, in these cases, due to the richness of social computing, alternative tools can be chosen that accommodate for these differences and mediate the inclusion of learners with special needs.
 4. **Pedagogical skills:** Embedding social computing tools in education demands a change in the role of teachers, who have to act as guides and mentors, enabling and facilitating self-regulated learning processes. The mainstream deployment of Learning 2.0 approaches and strategies might be hindered by a lack of didactic methodologies, toolsets and training programmes for teachers which would facilitate this transition and enable teachers to assume this new role.
 5. **Uncertainty:** Social computing is a very recent phenomenon that underlies continuous change and transformation. As a consequence, many key issues relevant for sustained deployment of Learning 2.0 in E&T have not yet been addressed or solved adequately. In particular, uncertainties have arisen concerning the future development and availability of current applications and services; the reliability of user-produced content; suitable assessment and certification strategies; and valid pedagogical concepts and methods for learning with social computing
 6. **Safety and privacy concerns:** Social computing raises important issues in relation to identity, trust, reputation and privacy. The risks arising from using open online environments are a bottleneck for the deployment of the full range of social computing approaches in educational institutions. There are particular risks associated with the uncritical use of social networking services by adolescents and young adults in connection with self-destructive behaviour, cyberbullying and online grooming. Educators need to make sure that the identities of their learners are protected; that rules of conduct are implemented and adhered to; and that intellectual property rights are respected.
 7. **Requirements on institutional change:** The appropriation of social computing in formal education requires schools to re-evaluate their role in society as knowledge providers. New ways to support teachers, learners and administrators are needed, which challenge existing power structures. Resistance to change may cause E&T institutions not to take an active role in deploying promising Learning 2.0 strategies.
- Policy implications.** On the basis of the strengths and weaknesses that characterise the development of Learning 2.0 in formal E&T, a number of policy options are proposed. In summary:
- **Support take up:** Measures to support take up should be implemented. A joint vision for Learning 2.0 could promote take up and guide stakeholders, advising them on how to reap the benefits of social computing for learning; how to use and implement social computing tools; and how to address safety, security and privacy concerns, encouraging

them also to use Learning 2.0 approaches to promote equity and inclusion.

- **Encourage teachers:** Strategies that acknowledge the key role of teachers in fostering new learning and teaching approaches should be devised. These should empower teachers to innovate and be creative with social computing for educational activities; provide supportive measures and networks for learning new skills and approaches; and propose incentives that encourage teachers to play an active role in transforming E&T.
- **Catalyse efforts of institutions:** Participatory development strategies should be developed which support organisational change and provide practical guidelines to ease the transformation at the level of E& T institutions.
- **Revise assessment strategies:** A debate should be instigated on the role and function of assessment, certification and accreditation so as to reap the benefits of social computing practices which necessitate or allow for different forms of assessment.

New approaches promoted by the European Qualifications Framework and also social assessment and recognition opportunities, could be taken as a starting point.

- **Create synergies:** The dialogue between researchers, practitioners and decision makers should be fostered in order to monitor and investigate ongoing developments, gather evidence of good practices and suggest the next steps for the European educational landscape.

Evidence shows that social computing is already affecting the ways in which people find, create, share and learn knowledge, through rich media opportunities and in collaboration with each other. These practices are at the core of Education and Training, as they promote the competences needed for future jobs and enable new tools for educational institutions to transform themselves into places that support the competences needed for participation in the 21st century. European E&T systems need to embrace these new practices to keep up with change and prepare their learners for the future in a knowledge-based society.

■ 1. Introduction

This report is part of the IPTS¹³ research project “Learning 2.0: Impact of Web 2.0 Innovations on Education and Training” under the Administrative Arrangement between DG JRC-IPTS IS Unit and DG EAC, Directorate A, Unit 2. The study aims to evaluate the projected impact of social computing on learning and to analyse its potential in supporting innovation and inclusion within Education and Training. The primary aim of this final report is to summarise and assess the evidence collected in the course of the project on the ways in which social computing applications change learning patterns and give rise to new learning opportunities.

1.1. Study Context

Since 2003, there has been impressive take-up of social computing, i.e. applications for blogging, podcasting, collaborative content (e.g. Wikipedia), social networking (e.g. MySpace, Facebook), multimedia sharing (e.g. Flickr, YouTube), social tagging (e.g. Deli.cio.us) and social gaming (e.g. Second Life). Research evidence suggests that digital technologies have not only deeply penetrated people’s private and professional lives, but are also starting to transform learning patterns. Social computing applications in particular are increasingly being used as new tools for work, leisure and learning in a digital society, by empowering users to produce, publish, share, edit and co-create content (cf. Ala-Mutka, 2008). These recent developments in the appropriation of social computing tools also have a substantial impact on formal Education and Training (E&T) as they disrupt established practices on the one hand, and on the other,

provide new ways of fostering lifelong learning, supporting the vision of personalised future learning spaces in the knowledge society (cf. Punie *et al.*, 2006).

So far, however, E&T systems have generally not reacted to these changes and neither schools nor universities have seized this new opportunity for enhancing learning and addressing their learners’ needs.¹⁴ Results of the last OECD Programme for International Student Assessment (PISA) survey (2006) indicate a general lack of ICT usage in European schools. While 86% of pupils aged 15 frequently use a computer at home, 50% of students in countries belonging to the European Union declare that they have not used a computer in the classroom in the past 12 months (OECD, 2008). Although ICT take up in schools has been progressing well, and almost all European schools are connected to the internet (Empirica, 2006), ICT has not changed teaching and learning processes (Punie *et al.*, 2006).

At the same time, it is generally acknowledged that we need a fundamental transformation of E&T throughout Europe, to modernise educational systems and to increase quality, equity and personalisation in the provision of lifelong learning for all (European Commission, 2006, 2007a), if we want the EU to become “the most competitive economy in the world” in accordance with the Lisbon strategy. Europe must renew the basis of its competitiveness, increase its growth potential and its productivity and strengthen social cohesion, placing the main emphasis on knowledge, innovation and optimisation of human capital.

13 IPTS (Institute for Prospective Technological Studies) is one of the 7 research institutes of the Joint Research Centre of the European Commission.

14 These findings have been largely confirmed during the Learning 2.0 project validation workshop held in Sevilla on the 29 and 30 October 2008, cf. <ftp://ftp.jrc.es/pub/EURdoc/JRC50704.pdf>.

European policy has continually addressed the need to modernise E&T systems to contribute to the Lisbon strategy and to meet the needs of life in the 21st century. Policy actions such as the Education and Training 2010 Work Programme¹⁵ and the Lifelong Learning Programme¹⁶ have set objectives for education and support the development of learning in the knowledge society.

In a recent communication, the Commission (2008g) called upon the Council to endorse an updated framework for future European cooperation in Education and Training, with four strategic objectives for the years leading up to 2020:

- Make lifelong learning and learner mobility a reality;
- Improve the quality and efficiency of provision and outcomes;
- Promote equity and active citizenship;
- Enhance innovation and creativity, including entrepreneurship, at all levels of Education and Training.

Furthermore, the Commission Communication (2008f) on New Skills for New Jobs¹⁷ calls for the education, training and employment policies of the Member States to focus on increasing and adapting skills and providing better learning opportunities at all levels, in order to develop a workforce that is highly skilled and responsive to the needs of the economy. E&T systems must generate new skills, respond to the nature of the new jobs which are expected to be created, as well as improve the adaptability and employability of adults already in the labour force. Providing high quality early childhood and basic education for all, improving education attainment and preventing early school leaving are crucial to equip people with key competences, including the basic skills for learning that are pre-requisites for further updating skills.

To make E&T institutions fit for the challenges of the 21st century, action needs to encompass all aspects of lifelong learning, ranging from early childhood to higher education and adult training. For example, in its proposal for a modernisation agenda for Europe's universities, the European Commission (2006b) acknowledges that universities are key players for the successful transition to a knowledge-based economy and society, while emphasising that they need in-depth restructuring and modernisation if Europe is not to lose out in the global competition in education, research and innovation. One of the proposals is that universities should offer innovative curricula, teaching methods and training/retraining programmes which include broader employment-related skills, along with the more discipline-specific skills, to enhance the employability of graduates and to offer broad support to the workforce more generally.

The foundations for lifelong learning are laid during initial Education and Training, which has to provide all citizens with the key competences that prepare them for a life in a modern world and set them on the path to lifetime learning. A Commission Communication which addresses the provision of key competences by schools (EC, 2008e) emphasises the need to prepare pupils for the 21st century. Member States are encouraged to cooperate on improving the attainment of key competences, equity and teacher education. The Commission Communication on Teacher Education (EC, 2007e) emphasises the important role that teachers play in helping learners to develop their talents and fulfil their potential for personal growth and well-being, and points to the increasing complexity of the teacher's role. Teachers should be enabled to obtain good qualifications, continue professional development throughout their careers, and work in partnership with schools, local work environments, work-based training providers and other stakeholders. The Communication points out that initial education cannot provide teachers with the knowledge and skills necessary for a lifetime of teaching. The education and professional development of every teacher needs to be seen as

15 http://ec.europa.eu/education/policies/2010/et_2010_en.html.

16 http://ec.europa.eu/education/programmes/llp/index_en.html.

17 See also New Skills for New Jobs website: <http://ec.europa.eu/social/main.jsp?catId=568&langId=en>.

a lifelong task, and be structured and resourced accordingly.

It is recognised by the European Commission (2005a) that Information and Communication Technologies (ICT) play a key role in achieving the goals of the revised Lisbon strategy and supporting the modernisation of E&T. Information society strategies emphasise that all citizens need to be equipped with the skills to benefit from and participate in the Information Society (European Commission 2005b). The ICT Peer Learning Cluster set up under the E&T 2010 Work Programme regularly disseminates good practices and recommendations for further policy work.¹⁸ One of the focus areas of the Lifelong Learning Programme is on how to develop innovative ICT-based content, services, pedagogies and practice in order to promote better Education and Training throughout a citizen's life.¹⁹

The European Parliament and Council (2006a) highlight the importance of promoting digital skills by listing digital competence as one of the key competences for lifelong learning. Digital competence encompasses "the confident and critical use of Information Society Technology (IST) for work, leisure and communication" and involves, as a basic skill, the use of computers to "communicate and participate in collaborative networks via the Internet" (European Council, 2006a). In its Communication on Media Literacy in the Digital Environment, the European Commission (2007c) takes note of the fact that due to the increased availability of digital media products and user generated content, there is a need to empower the citizens to "actively us[e] media, through, inter alia, interactive television, use of Internet search engines or participation in virtual communities, and better exploiting the potential of media for entertainment, access to culture, intercultural dialogue, learning and daily-

life applications (for instance, through libraries, podcasts)".

Specific action must be taken to make ICT accessible to groups at risk of exclusion from the knowledge-based society, as underlined in the Commission's eInclusion policy (2007b) and the Council's Riga Declaration of June 2006 (European Council, 2006c). In its Green Paper on "Migration and mobility: challenges and opportunities for EU education systems" (2008), the European Commission points out that many children from migrant backgrounds face educational disadvantages, which lead to lower student performance. In their 2008 biennial joint report on lifelong learning, the Council (2008b) and the Commission assert that "[c]ontinued high levels of early school leaving, low participation in lifelong learning by older workers and the low-skilled, and poor skill achievement among migrants cause concern in most countries".

The recently published European Commission (2008b) staff working paper on using ICT to support innovation and lifelong learning concludes that the impact of ICT on Education and Training has not yet been as significant as expected, despite broad political and social endorsement. The document emphasises the need for policies to focus on i) embedding ICT-based tools in education systems for teaching and learning, and for management and administration; ii) enabling lifelong learning by exploiting the advantages of ICT in providing easy access to learning resources, which support personalised learning paths, and supply innovative learning tools and resources; and iii) leveraging innovation and change into the core functions of education. Innovative content and services are urgently needed. If educational systems are to provide the necessary knowledge, skills and competences for an innovation-friendly society, they must themselves be innovative.

The year 2009 has been named the European Year of Creativity and Innovation (European Commission, 2008b), to draw attention to the

18 http://ec.europa.eu/education/lifelong-learning-policy/doc32_en.htm.

19 http://ec.europa.eu/education/lifelong-learning-programme/doc96_en.htm.

importance of creativity, through lifelong learning, as a driver for innovation and as a key factor for the development of personal, occupational, entrepreneurial and social competences and the well-being of all individuals in society. To investigate the potential of Learning 2.0 for the support of innovation in education and training, the European Commission (DG EAC) asked IPTS to conduct two different studies; the present study concentrates on the use of social computing within, or directly connected to, formal and non-formal education, and a second study focuses on informal learning opportunities that arise in ICT-facilitated learning communities (Ala-Mutka, forthcoming). Hence, this study aims to support policy work by supplying research-based evidence on how social computing fosters new, creative and innovative ways of learning, which contribute to technological, pedagogical and organisational innovation in Education and Training in Europe.

1.2. Study Approach

In order to investigate how social computing applications can be used in organised learning settings to enhance learning activities and promote innovation in Education and Training, the present study focused on the following research activities that are synthesised in this report.

1. Desktop research on the current practice of using social computing in E&T in Europe and the rest of the world, assessing in particular the potential impact of Learning 2.0 on formal E&T;
2. A stakeholder consultation leading to the collection of some 250 examples of Learning 2.0 initiatives, which provide an empirical basis for further research on the impact of social computing on learning;
3. An in-depth case study investigating some paradigmatic examples of innovative Learning 2.0 practices, outlining factors for failure and success in order to identify good practice and assess the impact of Learning 2.0 on innovation;
4. An in-depth study of some paradigmatic examples of social computing initiatives which offer lifelong learning opportunities to groups at risk of exclusion, identifying factors for failure and success, with a view to assessing good practice and the potential of Learning 2.0 strategies to support equity and inclusion.

The research results were presented to a panel of experts during a two day workshop at IPTS on the 29 and 30 October 2008. The workshop aimed to validate the research insights and envision future trends in the E&T context, to identify policy options to support Europe in reaping the benefits of social computing, and facilitate Europe's transformation to a competitive knowledge-based society.

This report is built on the findings of the study and on the enriching discussion that took place during the above mentioned workshop.

The report is structured in nine chapters. Chapter 2 presents the framework of the study by introducing the phenomenon of social computing, the most common tools and their potential for E&T. Furthermore, it addresses observed and expected changes in learning patterns and paradigms enabled by digital media and the subsequent demands on learners' skills and competences. Chapter 3 presents an overview of the findings resulting from the analysis of the data collected, introducing the conceptual framework on which the subsequent assessment is based. Chapters 4 to 6 discuss the potential of Learning 2.0 for technological (Chapter 4), organisational (Chapter 5) and pedagogical (Chapter 6) innovation in E&T. Chapter 7 is devoted to assessing the scope and potential of social computing for re-engaging groups at risk of exclusion in learning. Chapter 8 discusses in depth the findings presented, outlining challenges and chances for promoting innovation and inclusion with Learning 2.0. In Chapter 9, implications for policy and research will be discussed, and Chapter 10 offers the main conclusions drawn from the study.

■ 2. Learning in the Knowledge Society

2.1. Social Computing

Since 2003, the Internet has seen impressive growth in end user-driven applications such as blogs, podcasts, wikis, social networking websites, search engines, auction websites, games, Voice over IP and peer-to-peer services. Together, they are referred to as *social computing* (or “Web 2.0”), as they exploit the Internet’s connectivity to support the networking of people and content. The user is an integral part and co-producer of all the elements of the service delivered, whether it be content (blog, wikis, Flickr), taste/emotion (Amazon, de.li.cious), goods (eBay), contacts (MySpace), relevance (Google pagerank), reputation/feedback (eBay, TripAdvisor), storage/server capacity (P2P), connectivity (wifi sharing, mesh networks) or intelligence (business social computing).²⁰

“Web 2.0” or “social computing” (a term we prefer to use in this report) refers to the range of digital applications that enable interaction, collaboration and sharing between users. These digital applications are used for blogging, podcasting, collaborative content (e.g. wikis), social networking (e.g. MySpace, Facebook), multimedia sharing (e.g. Flickr, YouTube), social tagging (e.g. Deli.cio.us) and social gaming (e.g. Second Life) (cf. Pascu, 2008).

Asian countries lead in the usage of social computing with more than 50% of Internet users across all applications, followed by the US (with about 30% of Internet users) and Europe (with about 20-25%). Creation, use and adoption of social computing applications have been growing strongly since 2003. However, growth has slowed down lately,

indicating that the diffusion of social computing is entering the maturity phase. (Pascu, 2008)

Social computing applications allow users to communicate and collaborate in diverse ways and in a variety of media, which also helps learners to act together and build knowledge bases that fit their specific needs (cf. Owen *et al.*, 2006). The following applications are the most relevant for learning:

Social Networking Services. Social networking services can be broadly defined as internet- or mobile device-based social spaces, designed to facilitate communication, collaboration and content sharing across networks of contacts (Childnet International, 2008; Cachia, 2008). They enable users to connect to friends and colleagues, send mails and instant messages, blog, meet new people and post personal information profiles, which may comprise blogs, photos, videos, images, and audio content (OECD, 2007; Cachia, 2008). Prominent examples of social networking services include Facebook²¹ and MySpace²² (for social networking/socialising), LinkedIn²³ (for professional networking), and Elgg²⁴ (for knowledge accretion and learning). Social networking systems allow users to describe themselves and their interests, connect and communicate with others, and set up groups on dedicated topics.

In October 2007, there were over 250 million profiles on social networking sites. On a monthly basis, using social networking sites is the third most popular online activity in Europe (Pascu, 2008). Recent surveys in the US found that 55% of US online teens have created personal profiles online, and 55% have used social networking

20 Pascu, C., *et al.*: “The potential disruptive impact of internet 2-based technologies” (2006), http://firstmonday.org/issues/issue12_3/pascu/index.html.

21 <http://www.facebook.com/>.

22 <http://www.myspace.com/>.

23 <http://www.linkedin.com/>.

24 <http://elgg.net/>.

sites like MySpace or Facebook; 9-17 year-olds reported spending almost as much time on social networking sites and other websites as they do watching television (9 compared to 10 hours per week) (Attwell, 2007; Childnet International, 2008). Interestingly, the findings indicate that education-related topics are the most commonly discussed, with 60% of the young people surveyed talking about education-related topics and 50% discussing their schoolwork (Childnet International, 2008).

Blogs. “Weblogs” or “blogs”, a term coined by Jorn Barger in 1997, are online public writing environments, which enable a single author or a group of authors to write and publicly display articles (called posts), which are listed in reversed chronological order (Ellison & Wu, 2008; Anderson, 2007). Depending on the author’s wishes, blogs can include visual, audio and video content, as well as features such as links to other blogs, information about the author, and comments from readers (Ellison & Wu, 2008; OECD, 2007). The large number of people engaged in blogging has given rise to its own term – blogosphere – to express the sense of a whole ‘world’ of bloggers operating in their own environment (Anderson, 2007). For searching within the blogosphere, an array of blog and RSS search services have appeared, with different foci depending on user needs and information architecture (Alexander, 2006).

The size of the blogosphere has doubled every 5-7 months in recent years and more than 100,000 blogs are created daily (Pascu, 2008). In 2007, according to OECD (2007) data, it was estimated that there were up to 200 million blogs. Nearly 75% of all blogs are written in English, Japanese or Korean. Blogging is also very popular in China, India, and Iran (OECD, 2007). A recent survey in the UK found that about half the responding educational institutions reported using blogs (Open Source Software Watch, 2006). Children and young people are increasingly becoming authors of blogs (Owen *et al.*, 2006). There are blog sites, like Edublogs,²⁵ that

offer free blogs specifically for pupils and teachers (Rudd *et al.*, 2006a).

Wikis. A wiki is a website that allows users to collaboratively add, remove and otherwise edit and change content, usually text (Owen *et al.*, 2006; OECD, 2007). The most prominent example of a wiki is Wikipedia,²⁶ a collaboratively-created online encyclopaedia. Since its creation in 2001, Wikipedia has grown rapidly into one of the largest reference websites, attracting at least 684 million visitors yearly by 2008. There are more than 75,000 active contributors working on more than 10,000,000 articles in more than 250 languages. The English version of Wikipedia is the biggest, with 2,573,854 articles in October 2008.²⁷

Tagging, Social Bookmarking and Folksonomies. A social bookmarking service allows users to record (bookmark) web pages, and label these records with keywords (tags) that describe the pages being recorded (Franklin & van Harmelen, 2007). Examples include delicious,²⁸ furl²⁹ and Bibsonomy.³⁰ This process of organising information through user-generated tags has become known as ‘folksonomy’ (Owen *et al.*, 2006; Vuorikari, 2007). The types of content that can be tagged vary from: blogs (Technorati), books (Amazon), pictures (Flickr), podcasts (Odeo), videos (YouTube), to even tagging of tags (Pascu, 2008; Anderson, 2007). Different social bookmarking sites encourage different uses: some sites encourage more playful and personal tagging, for example Flickr, the phototagging site; while others afford a more deliberate style of tagging with a very clear idea of a specific audience, such as the academic sites Connotea³¹ or CiteULike³² (Owen *et al.*, 2006; Vuorikari, 2007).

25 edublogs.org.

26 <http://wikipedia.org/>.

27 <http://en.wikipedia.org/wiki/Wikipedia:About>.

28 <http://delicious.com/>.

29 <http://www.furl.net/>.

30 <http://www.bibsonomy.org/>.

31 <http://www.connotea.org/>.

32 <http://www.citeulike.org/>.

According to Pew Internet & American Life, nearly a third of US Internet users tagged or categorised content online such as photos, news stories or blog posts in 2006. Some 7% of US Internet users tag content online on a typical day, 10% of US online users tag web pages or other content at least monthly and about 8% use a tagging service at least monthly (Pascu, 2008). In February 2007, Technorati was tracking over 230 million blog posts using tags or categories. In 2006, Flickr users added, on average, over one million tags per week to the dataset; 2 million photos were geo-tagged in Flickr in 2006, 1.2 million of which were geo-tagged the day after the feature was available. The number of bloggers who are using tags is also increasing month on month. About 2.5 million blogs posted at least one tagged post in February 2007 (Pascu, 2008).

Media Sharing Services. Media sharing devices store user-contributed media, and allow users to search for and display content. Examples include Flickr³³ (photos), YouTube³⁴ (movies), iTunes³⁵ (podcasts and vodcasts), Slideshare³⁶ (presentations), DeviantArt³⁷ (art work) and Scribd³⁸ (documents).

Posting *photographs* online is one of the most popular online content creation activities, driven by increasing popularity of digital cameras and mobiles with cameras. More than 1 billion photos (1 million updated daily) are uploaded in photo sites. Social tagging is rising and millions of photos have been tagged in Flickr (1 million tags are added per week in Flickr) (Pascu, 2008).

There were an estimated³⁹ 42.5 million *videos* on YouTube, 3 million on Yahoo Video, and around 2 million on Google Video and MySpace in 2007. In June 2006, 2.5 billion videos were watched

on YouTube, and more than 65,000 videos were uploaded daily. Online video “consumption” (either streaming⁴⁰ and downloading⁴¹) is one of the most popular online activities worldwide, besides photo-sharing. In Europe, 1 in 3 French people visited a video-sharing website in 2006. Some 70% of the online population downloads video streams, the majority of which, however, comprise professionally produced videos. Below 1% of the visits to popular video sharing sites result in content creation; only some 0.16 % of visits to YouTube are from “those creative people uploading their videos”.⁴² In December 2008, there were 1,360 university channels on YouTube and many learning-related topic groups.

Podcasts and Vodcasts. Podcasting allows listeners to conveniently keep up-to-date with recent audio or video content; vodcasts are video versions of podcasts (Franklin & van Harmelen, 2007). The estimated number of podcasts in 2007 was over 100,000, when only three years earlier, there had been fewer than 10,000 (Pascu, 2008). Apple iTunes hosted over 82,000 podcasts in 2006, representing a 10 fold increase from 2005 (Pascu, 2008; OECD, 2007). Mobile-casting, i.e. receiving video and audio podcasts on mobile phones, is expected to develop rapidly (OECD, 2007). Compared to other social computing services, however, podcasting is less popular: only around 2% of Internet users in Europe used it in 2007 (Pascu, 2008).

Virtual Worlds and Immersive Environments. Virtual environments, like Second Life,⁴³ or similar online 3D virtual worlds, such as Active Worlds,⁴⁴ Entropia Universe,⁴⁵ and Dotsoul Cyberpark⁴⁶ provide users with an online game-like 3D digital

33 <http://www.flickr.com/>.

34 <http://www.youtube.com/>.

35 <http://www.apple.com/itunes/>.

36 <http://www.slideshare.net/>.

37 <http://www.deviantart.com/>.

38 <http://www.scribd.com/>.

39 <http://googlesystem.blogspot.com/2007/06/google-videos-new-frame.html>.

40 Streaming is a technology for playing audio and/or video files (either live or pre-recorded) directly from a server without having to download the file.

41 IPSOS Insight survey “More Evolution than Revolution: Most Consumers Ambivalent About Digital Video Choices”, 2006.

42 Hitwise April 2007.

43 <http://secondlife.com/>.

44 <http://www.activeworlds.com/>.

45 <http://www.entropiauniverse.com/>.

46 <http://www.dotsoul.net/>.

environment to which users subscribe (OECD, 2007). The user is represented by an avatar, i.e. an interactive representation of a human figure in a three-dimensional interactive graphical environment (de Freitas, 2007). Users can build, display, and store virtual creations, as well as host events and businesses or real university courses (OECD, 2007).

Today, Second Life appears to have a rapidly growing base of 1.3 million “active residents”, representing an increase of 46% in the number of active residents from January 2007, 61% of which are European (Pascu, 2008). In March 2007, more than 250 universities, 2,500 educators and the New Media Consortium, with over 225 member universities, museums and research centres, had a presence in Second Life (Calongne, 2007).

A survey of 209 educators who use Second Life, conducted by the New Media Consortium (NMC) in early 2007, indicates the many uses of 3D environments for educational purposes (NMC, 2007): 43% of educators took classes in Second Life and 17% are planning to do so (60% in total); 29% taught a class in Second Life and 28% are planning to do so (58% in total). Learning/teaching-related activities include: supervising class projects and/or activities; conducting research in Second Life; class meetings; virtual office hours; mentoring student research projects; student services and support activities. Asked about the potential of Second Life for education, the majority of respondents see a significant or high potential for role-playing (94%), simulation and scenario activities (87%), artistic expression (86%), group work, collaboration and meetings (78%), distance learning programmes (74%), team building (73%), conducting training (71%), professional development (68%), and teaching full courses (60%).

Online social gaming. Social gaming has become most pronounced in the Massively Multiplayer Online (Role Playing) Games market (MMORPG or MMOs). Multiplayer online games are one of the most powerful forms of modern

gaming, allowing as they do the possibility of reliving situations and conflicts in different settings and conditions in groups. (de Freitas, 2007). According to IDATE, more than 100 MMORPGs exist today worldwide.⁴⁷ Playing games online is attracting a quarter of the total worldwide Internet population; in Europe one in five web users plays online games (Pascu, 2008). The use of online games for collaborative game play in leisure time contexts (e.g. Everquest and World of Warcraft) has increased dramatically over the last five to ten years with the growth of usage of the internet. Currently, there are over 4 million users of Everquest worldwide, 6 million users of World of Warcraft and over 7 million registered users for America’s Army (de Freitas, 2007). The average online gamer visits a gaming site 9 times a month.⁴⁸ More than 10 million people are reported to have played MMOs worldwide in 2006 and the number doubles every year.⁴⁹ As of July 2006, there were over thirteen million active subscriptions to MMOG worldwide.⁵⁰ More than a third of US adult Internet users play online games on a weekly basis, compared with 29% who watch short online videos and 19% who visit social networking sites with the same frequency (Pascu, 2008).

Wider use of games technologies in the home is increasing interest in the use of games in educational contexts. This is leading to a growing use of games particularly in schools and colleges, and also in universities. According to de Freitas (2007) there is great potential for learning with games through the modification of existing games applications for educational purposes. The serious games movement is a trend towards designing and analysing the use of games (and simulations) for supporting formal educational objectives and outcomes.

47 IDATE DigiWorld 2007.

48 comScore July 2007 <http://www.comscore.com/press/release.asp?press=1521>.

49 IDATE Digiworld 2007.

50 www.mmogchart.com.

2.2. New Learning Paradigms

2.2.1. New Millennium Learners (NML)

Various studies⁵¹ indicate that the younger generation which grew up surrounded by digital media – roughly referring to individuals born in the early 1980s or later – displays significantly different learning styles from previous cohorts. Several terms have been used to describe this generation of learners, for example “digital natives” (McLester, 2007), “Net Generation” (Olbinger & Olbinger, 2005), “Millenials” (Pedró, 2006), “New Millennium Learners” (OECD, 2008) or even “Neomillennial Learners” (Baird & Fisher, 2006; Dede, 2005). They have also been dubbed the IM Generation, which stands for Instant-Message Generation (Lenhart *et al.*, 2001), the Gamer Generation (Carstens & Beck, 2005) for the obvious reference to video games, or even the homo zappiens (Veen, 2003) for their ability to control different sources of digital information simultaneously. Each of the terms focuses on different aspects of the same phenomenon. In this report, these different concepts will be considered as interchangeable, describing the same phenomenon from different angles, while preference will be given to the term “New Millennium Learners”, or the shortened version “NML”, which seems to be the most widely accepted term.

Not all people born after the early 1980s display the “typical” properties of NML (while some individuals born before do) and there are profound discrepancies between different OECD or EU countries and within different countries, reflecting prevailing digital divides (cf. OECD, 2008). However, synthesising the observations made on NML in various studies, the following tentative characterisation, illuminating changing learning patterns, can be given:

New Millennium Learners display complex learning styles that are shaped by the ubiquity, accessibility and ease of use of digital

resources. Compared to previous generations of learners, they are digitally literate, they think more visually and in a non-linear manner, they practise multitasking and give preference to multimedia environments (Pedró, 2006). They are continuously connected with their peers and “always on” (Pedró, 2006; Olbinger & Olbinger, 2005). In learning environments they are easily bored, need a variety of stimuli not to get distracted, are impatient and expect instant feedback and rewards (McLester, 2007; Baird *et al.*, 2007). They are social, team-spirited and engaged, goal-oriented and pragmatic, and expect appropriate (learning) resources to suit their individual needs (Olbinger & Olbinger, 2005). To come to terms with the information overload of the digital era, they (need to) employ learning strategies that involve searching, sieving, managing, re-combining, validating and contextualising information (Siemens, 2006).

Empirical studies on the use of digital communication technologies among university students confirm that the generation of NML can be characterised as (1) connected and mobile, (2) skilled at multitasking, (3) social and interactive, and (4) results oriented (Lam & Ritzen, 2008). They select and appropriate technologies for their own personal learning needs, mixing and matching different tools and capitalising on social computing applications to build networked, extended communities of interconnected learners who exchange ideas, query issues, provide support and check progress (Conole *et al.*, 2008).

2.2.2. New Skills for Learning in a Knowledge Society

Current learners live in a world that is characterised by information overload (Siemens, 2006). By its nature, the web rewards comparison of multiple sources of information, individually incomplete and collectively inconsistent. This induces learning based on seeking, sieving, and synthesising, rather than on assimilating a single “validated” source of knowledge as from books, television, or a professor’s lectures (Siemens,

51 cf. Pedró, 2006; OECD, 2008; McLester, 2007; Olbinger & Olbinger, 2005; Lam & Ritzen, 2008; Conole *et al.*, 2008.

Table 2-1: Synthesis of the Characteristics of New Millennium Learners

Characteristics of New Millennium Learners	
Society	Ubiquity of ICT Ease of access and use Information overload
NML's ICT Usage	Technologically savvy, preference for electronic environments Technology is a need Multiple media usage, multimedia orientation, Connected, always on Shallow understanding of technology, lack of critical skills Multimedia oriented
Personal Attitudes	Active involvement, constant engagement Very creative, expressive
Cognitive Patterns	Non-linear, less textual, less structured Multimodal, visual, dynamic representations Discontinuous, distracted Cognitive overload Distracted
Working Attitudes	Less fear of failure, risk takers Instant gratification, impatient Not looking for the "right answer" All information is equal, surface oriented Multitasking
Social Attitudes	Extremely social Need sense of security Egocentric, striving to be independent Feel a sense of entitlement

2006; Dede, 2005). Apart from the skills needed to manage the abundance of information available, learners need additional skills to react to the challenges of a digital society and to counterbalance the deficiencies of their natural learning styles. Siemens (2006) lists twelve different skills that can be grouped as follows:

- (1) **Managing information:** *Anchoring:* staying focused on important tasks while being deluged with distractions; *Filtering:* managing knowledge flow and extracting important elements; *Evaluating and Authenticating:* determining the value of knowledge and ensuring authenticity; *Navigating the Knowledge Landscape:* navigating between repositories, people, technology, and ideas while achieving intended purposes.
- (2) **Networking:** *Connecting with each other:* building networks in order to stay current and informed; *Being Human Together:* interacting at a human, not only utilitarian, level to form social spaces; *Adopting Altered*

Processes of Validation: validating people and ideas within appropriate contexts.

- (3) **Critical and creative skills:** *Creating and Deriving Meaning:* understanding implications, comprehending meaning and impact; *Thinking critically and creatively:* question and dreaming; *Recognising Patterns:* recognising patterns and trends; *Accepting Uncertainty:* balancing what is known with the unknown to see how existing knowledge relates to what we do not know; *Contextualising:* understanding the prominence of context, seeing continuums, ensuring that key contextual issues are not overlooked in context-games.

According to Bruns & Humphreys (2007) current practices are characterised by the (co-) production of content by the user – dubbed “produsage” – which is supported by many social computing applications. They argue that education has to respond to these new working styles by emphasising certain skills and attitudes:

- (1) **Creativity:** Participants need the skills to be collaborative co-creators occupying flexible roles, in contrast to the self-sufficient creative ‘producer’.
- (2) **Collaboration:** It is important to build the capacity for collaborative engagement under fluid, heterarchical rather than hierarchical structures.
- (3) **Critical capacity:** Participants in co-creative environments need to develop sufficient critical capacities to establish the appropriate context for their engagement in produsage processes. This requires a critical stance both towards potential collaborators and their work and towards their own creative and collaborative abilities and existing work portfolio. During the collaborative process itself, critical capacities are indispensable in the giving and receiving of constructive feedback on the ongoing collaborative process and the artefacts it produces. Thus critical capacities must extend well beyond the ability to assess the quality of content encountered in standard research processes.
- (4) **Communication:** In a collaborative environment, there is a particular need for an explicit focus on effective and successful communication between participants. Participants need to be able to be constructively critical, and also be able to communicate about the collaborative and creative processes (a meta-level skill). It may be necessary to foster these aspects of communication specifically, as it cannot be assumed that they are inherent in the communication skills of learners.

The European Framework for Key Competences for Lifelong Learning (European Council, 2006) defines eight “key competences necessary for personal fulfilment, active citizenship, social cohesion and employability in a knowledge society”. Apart from traditional key competences like communication (1) in the mother tongue and (2) in foreign languages, (3) mathematical competence and basic competences in science and technology as well as (8) cultural

awareness and expression, four *transversal skills*, particularly important for learning and living in a knowledge society, are highlighted:

- *Digital competence:* Digital competence does not only comprise practical computer skills, but “involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication”. In particular, individuals should be enabled to use IST to support critical thinking, creativity, and innovation. They need to develop a critical and reflective attitude towards available information, a responsible use of the interactive media, and an interest in engaging in communities and networks for cultural, social and/or professional purposes. Furthermore, they should “be aware of issues around the validity and reliability of information available and of the legal and ethical principles involved in the interactive use of IST”.
- *Learning to learn:* “Learning to learn” is defined as “the ability to pursue and persist in learning, to organise one’s own learning, including through effective management of time and information, both individually and in groups”. As such, it requires individuals to learn autonomously and with self-discipline, organising their own learning, evaluating and reflecting upon their progress and seeking advice, information and support when appropriate. However, it also presupposes the individual’s ability to “work collaboratively as part of the learning process, draw the benefits from a heterogeneous group, and share what they have learnt”. Motivation and confidence in pursuing learning goals throughout one’s life are considered crucial for this competence.
- *Social and civic competences:* Social and civic competences cover all forms of behaviour that equip individuals to participate effectively and constructively in their social and working lives, particularly in increasingly diverse societies, and to resolve conflict where necessary. The core skills of these competences include the ability

to communicate constructively in different environments, show tolerance, express and understand different viewpoints, negotiate with the ability to create confidence, and feel empathy. They are based on attitudes of collaboration, assertiveness and integrity.

- **Sense of initiative and entrepreneurship:** Sense of initiative and entrepreneurship refers to an individual's ability to turn ideas into action. It includes creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives. The ability to judge and identify one's strengths and weaknesses, and to assess and take risks as and when warranted, is essential. An entrepreneurial attitude is characterised by initiative, pro-activity, independence and innovation in personal and social life, as much as at work. It also includes the motivation and determination to meet both personal and common objectives, including at work.

Comparing these four competences with the two conceptual frameworks presented before, three common learning objectives emerge as being relevant for learning in a knowledge-based society:

(1) Reflective, critical and evaluation skills:

Individuals must be empowered with the necessary skills to recognise, evaluate and seize opportunities for self-realisation and learning. They need to be able to critically reflect on the content and process of learning, to recognise their own skills, weaknesses and strengths, identify side-effects and limitations of their actions, and respect the legal, social and ethical constraints on their personal endeavours.

(2) Collaboration and communication skills:

Individuals need to be able to communicate effectively in a variety of situations, tolerating diversity and constructively dealing with conflict. They need to be able to collaborate with others in heterogeneous groups, bringing in their competences and seeking support and assistance for their personal goals in an adequate and constructive way.

(3) Pro-active attitude, innovation and creativity:

Individuals must be enabled to take responsibility for their own learning process throughout life, actively seizing opportunities for self-realisation. Motivation and confidence in one's own ideas and capabilities are important pre-requisites for innovation and creativity. Individuals will therefore have to be empowered to creatively and critically develop their ideas in interaction with others, assuming responsibility for and ownership of their actions and products.

These learning objectives mutually support and complement each other. While all key competences subscribe to all three objectives, different emphasis is given to them, reflecting the particular skills that lie at the core of each competence. Similarly, the conceptual frameworks by Siemens (2006) and Bruns & Humphreys (2007), differ in intention and meaning, highlighting different aspects associated with each of the learning objectives. However, accounting for a certain degree of overlap and differences in emphasis, the conceptual frameworks can be juxtaposed as indicated in Table 2-2.

Table 2-2: Synthesis of new skills for learning in a knowledge-based society

New Skills for Learning in a Knowledge Society			
Common Learning Objectives	Siemens (2006)	Bruns & Humphreys (2007)	European Council (2006)
Reflective, critical and evaluation skills	Managing information	Creativity and collaboration	Digital competence; Learning to learn
Collaboration and communication skills	Networking	Communication	Social and civic competences
Pro-active attitude, innovation and creativity	Critical and creative skills	Critical capacity	Sense of initiative and entrepreneurship

■ 3. The Landscape of Learning 2.0

While ICT in general and social computing in particular have brought about disruptive changes in many different areas of society, E&T institutions and systems have so far remained relatively untouched (European Commission, 2008b; Owen *et al.*, 2006). However, a great number of small-scale experiments using social computing in E&T are currently being carried out in Europe, in different educational institutions, with diverse educational objectives, employing various strategies, methods and tools. This chapter provides a bird's eye view of this rich landscape by:

- presenting and analysing the data, collected into a database, from more than 200 projects (Section 3.1),
- summarising the findings of two in-depth case studies that were undertaken as part of this study (Section 3.2), and
- systematising these outcomes in a model that provides a structured overview of the variety of Learning 2.0 initiatives, outlining main characteristics (Section 3.3).

Although the case collection presented in 3.1 does not provide a complete picture of the European scene, it allows us to identify patterns, trends and current practices. It provides the basis for a heuristic understanding of the potential of Learning 2.0 by looking at experiences of real use. The assessment presented in 3.1 focuses on contingencies and dependencies that emerge from statistical analysis. The full data collected has been published separately for the interested researcher to browse through.⁵²

Section 3.2 provides the reader with a brief description of the eight cases selected for in-

depth analysis with a view to gaining a deeper understanding of the dynamics that new tools and practices develop in formal E&T settings, and to generating good practices. The findings of the in-depth case studies will be presented and discussed further in Chapters 4-6. For a detailed analysis of all cases, the reader is referred to the full report.⁵³

Finally, in Section 3.3, the iLANDS model is presented. This model represents the main features of the Learning 2.0 landscape. It illustrates different areas in which social computing tools are used to support learning processes; outlines emerging new educational practices and identifies some of the drivers for the actual transformations in different E&T areas, distinguishing between technological, organisational and pedagogical innovation as the main enablers of transformation. The discussion and assessment of the impact, scope and potential of Learning 2.0 presented in Chapters 4-7 is structured according to the model proposed therein.

3.1. Descriptive Analysis of the Case Collection

To gather evidence on the current status of the adoption and use of social computing for educational purposes in formal educational settings, data from more than 200 Learning 2.0 initiatives were collected in a case database. Cases were assembled by i) reviewing the literature on emerging practices in educational contexts; ii) desk research to identify relevant initiatives; and iii) consultation with stakeholders

52 Cf. Redecker (ed.) (2009). *Learning 2.0: Case Database*. JRC Technical Note 51916, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2461>.

53 Cf. Heid, Simon, Thomas Fischer and Walter F. Kugemann (2009). *Good Practices for Learning 2.0: Promoting Innovation. An In-depth Study of Eight Learning 2.0 Cases*. JRC Technical Note 53212, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2599>.

via an online survey. The consultation process allowed stakeholders to directly feed information into the database via a web-based interface, made available in April 2008. The data collection was advertised on the Learning 2.0 project website, on the eLearning Portal and via the research network of scientists involved in the project.

The resulting collection of initiatives does not provide a complete picture of the current adaption of Learning 2.0 by E&T institutions, nor does it present a statistically representative sample of initiatives. Nonetheless, the rich variety of cases sampled allows us to identify a number of trends that are currently shaping the learning panorama and transforming current educational practices.

In the following section, the sample is briefly described, identifying the learning context in which initiatives were set up (formal, informal or non formal learning context), which types of E&T institutions lead these contexts, and which user groups are targeted. The presentation of the composition of the sample is followed by a bird's eye view of how Learning 2.0 is actually embedded in educational practice. The take up of different social computing tools will be highlighted, together with an overview of the main learning objectives and activities.

3.1.1. The Structure of the Sample

Due to the focus of the data collection, the database contains a sample of initiatives that

mainly come from formal learning and aim to prepare students for degrees and certifications (194 cases, 82% of cases). However, the collection includes a number of non-formal (41 cases, 17% of cases) and informal learning cases (47 cases, 20% of cases).

It is worth highlighting that 15% of all cases report that they address more than one type of learning in parallel. This finding suggests that Learning 2.0 practices are currently being explored as means to overcome the traditional division between formal and informal/non formal education settings.

Concerning the institutional framework, social software tools, in more than half the cases, are applied in higher education settings and general secondary schools, followed by primary schools, vocational training institutions and, to a lesser extent, adult training centres. More than one third of all Learning 2.0 cases take place in more than one institution.

Figure 3-2: Age distribution of learners

	N	% Cases	% Entries
0 to 11	44	19	10
12 to 18	96	41	21
19 to 24	120	51	26
25 to 54	90	38	20
55 to 64	69	29	15
65+	34	14	8
47% address different age groups at the same time.			

Figure 3-1: Institutional Framework of Learning 2.0 (pie chart in % of cases)

	N	% Cases	% Entries
University	95	40	24
General Secondary School	93	39	24
Primary School	63	27	16
Vocational Secondary School	41	17	10
Vocational HE Institution	35	15	9
Adult Training Centre	31	13	8
Other	37	16	9
35% are based in more than one institution.			

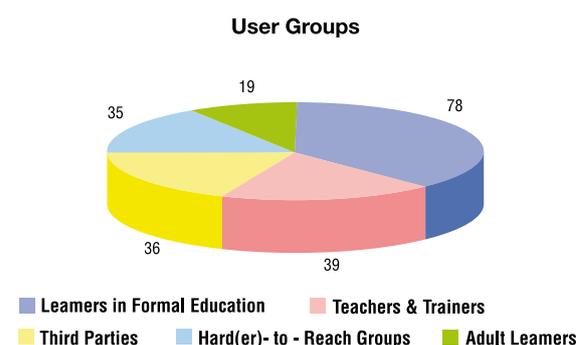
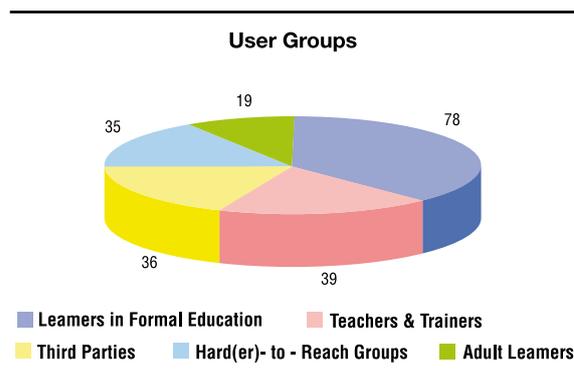


Figure 3-3: User Groups of Learning 2.0 (original and regrouped; pie chart in % of cases)

	N	% Cases	% Entries
Learners in Formal Education	184	78	36
Teachers & Trainers	92	39	18
External Experts	34	14	7
General Public	29	12	6
Adult Learners	26	11	5
Parents & Other Third Parties	22	9	4
Workers	20	8	4
Disadvantaged People	20	8	4
Ethnic Minorities	18	8	4
People with Disabilities	15	6	3
Unemployed	11	5	2
People with Learning Difficulties	11	5	2
Early School Leavers	8	3	2
Others	20	8	4
40% work with more than one user group simultaneously.			

	N	% Cases	% Entries
Learners in Formal Education	184	78	36
Teachers & Trainers	92	39	18
Third Parties	85	36	17
Hard(er)-to-Reach Groups	83	35	16
Adult Learners	46	19	9



The age distribution of the population targeted by the initiatives sampled reflects the previous finding: the highest percentage of learners is aged from 19 to 24 (26% of all entries). Learners in this age range primarily come from universities, vocational higher education institutes and, to a lesser extent, adult education. The second largest group of learners is aged from 12 to 18 (21%), probably reflecting the population of general secondary and vocational schools. The age groups between 25 and 64 are made up of adult learners who constitute the target population of 35% of the cases. Consistent with other findings on the use of ICT, senior citizens aged 65+ use social computing tools less frequently (8%). However, even these smaller numbers further contribute to the high share of adult learners in the sample: of all Learners 2.0, 43% are 25 years old or older, whereas only 10% are young learners, including pupils of 11 years old and below. Finally, slightly less than half of the cases studied work with different age groups.

The primary users of Learning 2.0 applications are in formal education, i.e. students, and their teachers. However the sample shows that social computing tools are being used to open up the

classroom to third parties ranging from parents, external experts, to hard(er) to reach groups, or early school leavers. Adult learners (including workers) are less targeted and involved in the Learning 2.0 initiatives gathered for this study. It should be noted that 40% of the initiatives target more than one user group simultaneously. This result seems to confirm that Learning 2.0 tools best suit practices that are not confined to the closed classroom environment which most often characterises the setting for formal education.

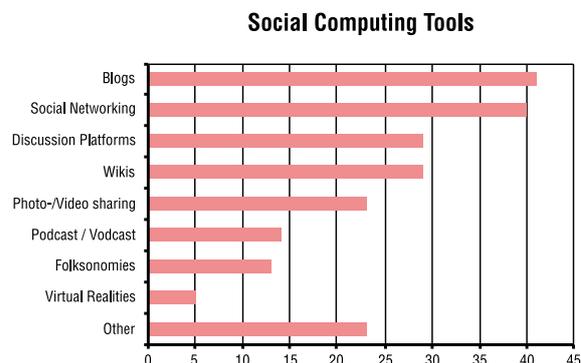
Details of the composition of the user groups targeted by the sampled initiatives are displayed in Figure 3-3.

When analysing the size, scale and status⁵⁴ of the Learning 2.0 cases included, the preliminary results show a majority of smaller cases involving 200 or fewer users (61%). Concerning their scale, national

54 Please note that the sample sizes for size, scale and status differ from the previous variables as not all cases provided the necessary information. Sample sizes are therefore reported separately i.e. 124 cases hold information on their size (i.e. number of users), 227 cases on their scale (i.e. from local to international) and 135 cases on their status (i.e. running vs. finished).

Figure 3-4: Usage of Social Computing Tools for Learning 2.0 (in % of cases)

Tools	N	% Cases	% Entries
Blogs	97	41	19
Social Networking	95	40	18
Discussion Platforms	69	29	13
Wikis	68	29	13
Photo- / Video sharing	5	23	11
Podcast / Vodcast	34	14	7
Folksonomies / Tagging	30	13	6
Virtual Realities	11	5	2
Others (e-Portfolios, Twitter, Ning, Moodle, Elgg, games etc)	55	23	11
53% combine different social computing tools.			



initiatives (45%) appear to dominate the current landscape with a substantially lower percentage of local (7%) and regional (14%) initiatives. The latter findings seem to be in contradiction to the existing body of knowledge which highlights the bottom-up and therefore local and regional nature of Learning 2.0. As a consequence, the data entries have been re-assessed and 11% of the total cases were found to have been misclassified. Nevertheless, 34% of cases can be classified as 'national' examples, which points to the importance of national pilot programmes and initiatives in the take up phase of Learning 2.0.

To sum up, approximately one third of all cases operate at local/regional level, one third at national and one third at supra-national level. Finally, two thirds of the Learning 2.0 cases in the database are currently active and running.

3.1.2. Learning 2.0 Tools, Activities and Objectives

The collection of cases gathered shows that blogs and social networking are the most frequently applied social computing tools for educational purposes. They are followed by discussion platforms and wikis, and also tools for the sharing of photos and videos. Podcasts, vodcasts, folksonomies (and/or social tagging), and virtual realities are currently less frequently

used. Other tools include a wide variety of applications ranging from dedicated tools for E&T, like Learning Management Systems (e.g. Moodle), Virtual Learning Environments, and ePortfolios, to more generic ones including serious games, microblogging applications (e.g. Twitter) and voice-over-IP applications (e.g. Skype).

It is important to stress that the use of dedicated learning support tools is residual with respect to the adoption of more generic Web 2.0 applications. Further data show that in slightly more than half of all cases, a pool of different Web 2.0 applications is used in an integrated manner. This suggests that the take up of social computing tools in the educational environment is not driven by specialised solutions, but results instead from the emergent use in educational contexts of a combination of tools and technologies, initially designed for purposes other than learning.

The objectives, and the activities which aim to achieve them, are remarkably diverse and manifold. The three most frequently named objectives are: (1) developing new ways of learning using social software tools (68% of all cases), (2) improving collaboration amongst actors (57%) and increasing the motivation and thus the participation of learners in the Learning 2.0 experience (49%). Further objectives addressed by Learning 2.0 activities comprise

Figure 3-5: Learning 2.0 Objectives (in % and N of cases)

Objectives

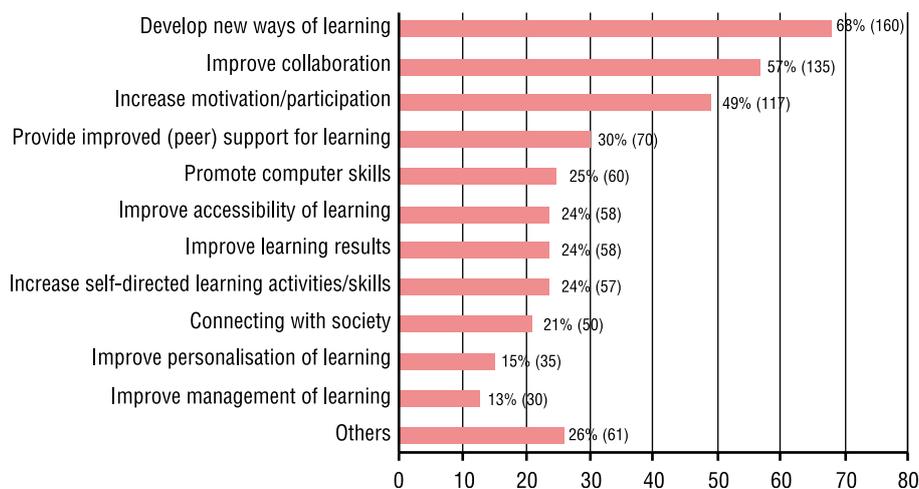
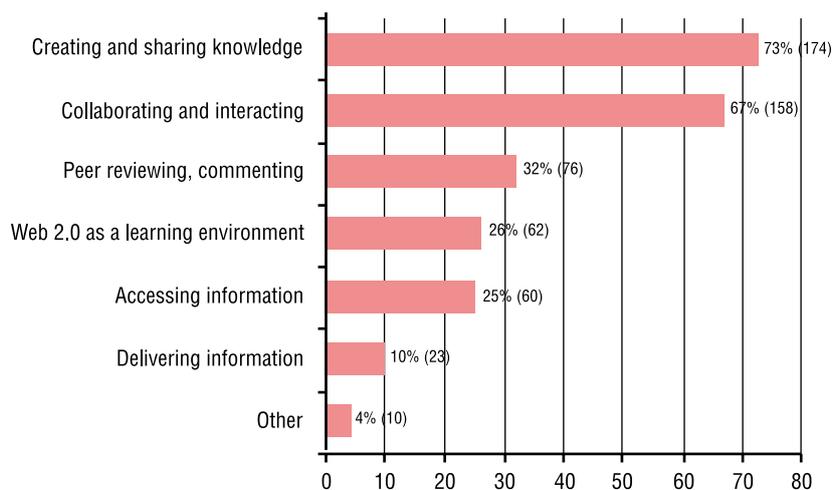


Figure 3-6: Learning 2.0 Activities (in % and N of cases)

Activities



the improvement of (peer) support for learning (30%), accessibility of learning (24%), learning results (24%), self-directed learning activities and skills (24%), the connection of learners with society (21%), and personalisation (15%) and management of learning (13%). Almost 90% of all cases address multiple objectives through the application of Web 2.0 applications in learning and teaching in Education and Training.

Concerning the way in which social computing tools are employed, the survey

indicates that most of the cases are predominantly multi-activity based (70%). The majority of cases target complex, innovative and integrated activities, like creating and sharing knowledge (73%) or collaborating and interacting (67%). Basic activities, like accessing and delivering information (25% and 10% respectively), are far less frequently mentioned and seem to be subsidiary to the main focus of the case activity. Only 10% of all entries include activities such as assessment, evaluation and accreditation.

3.1.3. Contingency Analysis

A contingency analysis was undertaken with a view to discovering associations between different variables.⁵⁵ Contingence coefficients can show relations between two variables, even though the relationship between those variables may not be substantively important. Therefore results are not used for interpretation unless the data shows statistical significance.

The following table, Figure 3-7, maps the variety of social computing tools onto the relevant learning dimensions and thus summarises the contingencies observed. Only statistically significant results are reported, where + represents a significant result with a likelihood of 95% and ++ represents a result with a likelihood of 99% correctness.

While there are frequent statistically relevant associations between the use of certain social computing tools and other variables, no discernable pattern emerges from this mapping exercise. The relationship between social computing tools and the different dimensions considered in the database can hence be summarised as follows: in general, no systematic relationship can be found between different *social computing tools* and:

1. *the E&T institutions* in which they are applied. However, there is some indication that adult training centres and vocational higher education institutions are utilising discussion platforms and blogs, while members of universities are tagging (educational) content by taxonomies or folksonomies.
2. *Age groups*. There are nevertheless trends:
 - i) adults aged 25 to 54 are using discussion platforms, social networking and wikis;
 - ii) discussion platforms are primarily used by adult learners of 25 years of age and older;
 - iii) while tagging of content and using folksonomies is generally carried out in higher education institutions by their members.
3. *Targeted user groups*. Learners in formal education use blogs and share photos and videos, but they use social networking and discussion platforms less frequently. In turn, adult learners (including workers) apply a wide range of Web 2.0 tools e.g. discussion platforms, blogs, virtual environments, pod- and vodcasts, folksonomies and tagging, photo- /video sharing. Hard(er) to reach groups (e.g. the unemployed, early school leavers, people with learning difficulties and disabilities, disadvantaged people, ethnic minorities) are at the moment predominantly addressed by discussion platforms.
4. *Learning Objectives*. Social computing tools are (jointly or separately) used to support the achievement of different learning objectives. Multidimensionality is the main trait shown by the sample. The survey shows that Learning 2.0 – regardless of the technology adopted – is considered to contribute to innovative ways of learning. The most commonly acknowledged benefits of the implementation of social computing-supported educational activities depend on the capability of such strategies to help learners: i) structure their individual learning process (i.e. increase self-directed learning, improve personalisation of learning); ii) acquire digital skills and competences (i.e. promote computer skills); and iii) collaborate with others (i.e. improve collaboration, connect with society).

55 On a nominal/categorical level, the measure of association between two or more variables is the so-called contingency coefficient, which in turn is based on Chi-Square test statistics. The contingency coefficient may take values of between the 0 and 1, where value 0 indicates no association between the variables (or their descriptors), while value 1 points to a complete association or contingency.

Figure 3-7: Contingencies between Social Computing Tools and all other factors

		Social Computing Tools								
Variables	Descriptors	Blogs	Social Networking	Discussion Platforms	Wikis	Photo/Video Sharing	Podcast, Vodcast	Folksonomy, Tagging	Virtual Realities	Others
Institutional Framework	Primary School									
	Secondary School									
	Vocational Secondary School		+							
	Vocational HE Institution	+		+						+
	University							++		
	Adult Training Centre	++		++						
	Other									
Age Groups	Aged 0-11				(+)				(++)	
	Aged 12-19					+				
	Aged 19-24							++		
	Aged 25-54		+	++	++					
	Aged 55-64		+	++						
	Aged 65+			++						
User Groups	Teachers & Trainers		+							
	Parents & Third Parties	++				+			+	
	Adult Learners	++		++		+	+	+	++	
	Workers	++		++		++		++	+	(-) +
	Unemployed			++						(-) +
	External Experts		++							
	Early School Leavers			++						
	People with Learning Difficulties		+	++						
	People with Disabilities			++						
	Disadvantaged People			++						
	Ethnic Minorities			++		++				
	General Public									
	Others		+						+	
Objectives	Develop new ways of learning	++			++	++	++	++		
	Improve collaboration		++	+	++			++		
	Increase motivation/participation	++				++		+		
	Provide improved (peer) support for learning		++	++						
	Promote computer skills	++	++			++		+		++
	Improve accessibility of learning		++	++						(-) +
	Improve learning results		+	++	++				++	
	Increase self-directed learning activities/skills	++		++				++	++	
	Connecting with society	+	++	++				++		
	Improve personalisation of learning	++		++				++	++	
	Improve management of learning		++	++				+		
Others (e.g. language learning, cultural exchange)							++			
Activities	Accessing information	++		++	++					+
	Delivering information (e.g. podcasts, RSS)	++		++	++	++	++			
	Creating and sharing knowledge	++	++		++	++		++		++
	Collaborating and interacting	+	++	++	++	++		++		
	Peer reviewing, commenting	++	++	++				++		
	Using social computing tools as environment for learning	++	++	++	++	++		++	++	
	Others (e.g. gaming, reflective thinking)		+	+						
Type of Learning	Formal			++						+
	Non-formal		+	++		++		+	++	
	Informal			++	+				++	

5. *Educational Activities.* The analysis of contingencies between Web 2.0 tools and educational activities does not show any consistent relation between specific tools and specific educational activities or formats. This confirms the previous finding, i.e. there are no ready-made solutions. The Learning 2.0 panorama is being shaped by experimentation. Tools, activities, learning objectives are mixed and meshed to respond to the specific combination of skills, competences, needs and desires of a specific group of actors.

These data suggest that the Learning 2.0 panorama is characterised by a great deal of heterogeneity. It was found that there are different objectives, different activities and educational formats, and different tools to support them. The analysis of the cases gathered strongly suggests that social computing is not a ready-made solution to be taken up by E&T institutions. Instead, it is a flexible toolbox that allows for the creation of innovative, tailor-made learning practices, enabled by the adoption of modular micro-solutions to be integrated into learning scenarios depending on the goals to be achieved.

3.2. Good Practices for Learning 2.0

A set of eight Learning 2.0 initiatives were studied to gain some evidence on good practices for using Learning 2.0 approaches in organised learning settings to support innovation. The cases studied are different in focus and address a variety of audiences and learning objectives, illustrating the scope and variety of Learning 2.0 for innovation. In particular, different educational contexts are covered, ranging from primary and secondary education, vocational education and training (VET), higher education, to teacher training, workplace learning and continuous professional development (CPD). All cases highlight the vast potential of social computing for promoting pedagogical and organisational innovation, while outlining existing obstacles and barriers.

This section synthesises the results of the study on the eight individual cases and integrates them with a view to formulating overall findings. Following a case overview, the main findings concerning learning outcomes, institutional impacts, success factors, obstacles and barriers, and, last but not least, the potential for innovation, will be presented in this section. A more detailed analysis of the innovative dimension will follow in Chapters 4-7.

3.2.1. Descriptive Case Overview

Figure 3-8: Overview of cases analysed to explore the potential of Learning 2.0 for promoting innovation in E&T

	Case Description	Case Assessment
Welker's Wikinomics	<p>Welker's Wikinomics is a collaborative online learning environment which supports classroom teaching in a secondary school in Zurich, Switzerland. It is an example of a grass roots initiative, developed by a single teacher. The online environment offers cooperation, communication and information spaces for students. For instance, there is a blog, where the teacher provides real-life examples related to lessons learned in the classroom and the students have the opportunity to comment. There is also a wiki, where students collaboratively develop a subject-related information environment that supplements, and may later replace, textbooks. Additionally, discussion forums provide a tool for communication between students. The online tools are not used in classroom sessions; they form a platform for students' homework.</p>	<p>Identifiable success factors include the level of support and technical equipment of the school, an inspired and motivated teacher, students with good technical equipment at home and adequate basic ICT skills, reasonable use of the Web 2.0 tools within a well-structured online environment and meaningful connection to classroom teaching. The case demonstrates that Learning 2.0 can be successfully implemented as a compulsory part of classes in secondary school, although initial knowledge of Web 2.0 tools and the teacher's ongoing motivation are crucial. It is equally important that students have a good introduction to the tools and their value for learning, that navigation is intuitive, information easily relocated, the structure straightforward and that there are regular updates of the online environment.</p>
SecondReiff - WISE	<p>SecondReiff is the first pilot project in a series of planned projects using WISE, a 3D space in the virtual world SecondLife, for combining real and virtual learning for the study of architecture. This higher education project is part of the RWTH Aachen University in Germany. The environment contains user-generated 3D models of architectural design drafts (1:1 models to reality), 3D-structuring of elements similar to a Web 2.0 tag cloud, user-user rating and various communication mechanisms and separate personal experimentation and communication spaces, as well as spaces for virtual meetings and classes. Compared to similar initiatives, the special characteristics of this project are the explicit implementation of Web 2.0 approaches and philosophies, as well as the structured use of the advantages of virtual world learning.</p>	<p>The initiative capitalises on the potential of virtual worlds to support architectural design and learning and interaction processes. A hybrid space combines Web 2.0 mechanisms with features of virtual world learning, sustaining the motivation and interest of participants by developing a comfortable, attractive and usable learning environment, realised through a small-scale, selective pilot approach. The main barriers identified have been the complexity of the technical environment, accessibility issues and the system stability of SecondLife. The case shows that Massive Multi-User 3D Virtual Environments (MUVEs) support spatial understanding and enable advanced virtual communication. However, learning in virtual worlds that also employ Web 2.0 approaches and tools requires a high level of effort in order to take advantage of the added value offered by using MUVEs for learning. Many educators have little knowledge of, or interest in, using virtual worlds, and may be further discouraged by the technical obstacles to using SecondLife in education.</p>
Protovoulia	<p>Protovoulia is a Greek 'umbrella' site for innovative online services for teachers and pupils in Greek primary and secondary schools. Protovoulia started as a grass roots activity of eight Greek foundations and developed into an institutional programme. The initiative combines four complementary and integrated actions: i) school innovation and corresponding teacher training for change ('Network of School Innovation'); ii) collaborative development of educational content; iii) serious games for learning (for pupils aged 11 to 15) and iv) guidance about tertiary education studies in Greece and related job and employability perspectives (for ages 16 to 19). In this context, a number of Web 2.0 or social computing applications, e.g. wikis, blogs, discussion platforms, tagging, e-Learning platforms, have been embedded and are currently being piloted.</p>	<p>The evaluation of Protovoulia showed that the teacher training programme corresponded to the needs of teachers, which in turn increased the motivation of participants. Although the majority of participants are e-Learning and Web 2.0 first timers, the drop-out rates of participating schools and teachers were extremely low. The teacher training fostered inter- and intra-institutional, and cross-professional exchange and collaboration in order to achieve self-defined goals. This case's main success factors (which overcome corresponding barriers) are the critical mass of participants, a comprehensive pedagogical and technological introduction for all participants; the provision of adequate digital competences (of a basic and higher nature); a reasonable use and integration of Web 2.0 tools in E&T; and support on all levels (i.e. individual, administrative, managerial, financial, technical, political, societal).</p>
IBM	<p>Web 2.0 Knowledge Management at IBM. This case study examines the internal use of Web 2.0 tools for knowledge management and workplace learning at IBM. Following a "use what you sell" approach, products developed for commercial use are tested and further developed internally. These products and methods aim to improve internal information exchange, informal learning, collaboration among employees and between employees and people outside the organisation, improve knowledge sharing at the workplace and make corresponding work flows and learning processes more efficient. A variety of Web 2.0 tools are being used extensively within IBM Germany and worldwide: 'bluepages' - a directory of employee contact and information data for expert search, personal blogs, subject-related wikis, discussion forums, social bookmarks, social communities and virtual meeting software.</p>	<p>Success factors identified for this case are the open organisational culture, the added value of the tools for the employees, the possibilities of easy integration of new tools into existing systems, a voluntary participation strategy and social computing guidelines. The case demonstrates that there are various potential benefits of Web 2.0 implementation in the corporate sector. The corresponding need for organisational cultural change is a challenge; the added value of tools for individual organisation members is a key factor for success. The case indicates that software mash-up technologies and virtual worlds may become important trends in the near future.</p>

	Case Description	Case Assessment
Kool	<i>Kool</i> was developed at a vocational school for glass professionals in Rheinbach, Germany, and offers an integrated, collaborative online environment for English language learning. Subject-related media is produced by students using a blog, wikis, podcasts and self-produced videos. The following parts of the <i>Kool</i> learning programme have been studied in detail: the online environment for teaching and learning English as a foreign language, and the Glass Compendium Wiki, an online collection of learning resources developed by students and teachers in collaboration.	In this case, the self-organised quality management by students has been an important asset. Further success factors include the presence of a stable technical environment, an integrated, complex and process-oriented online learning environment, scientific monitoring and guidance, and supportive management at the school. The existing digital divides among students and teachers were identified as a barrier. The case study shows that Web 2.0 can potentially bridge the gap between different learning locations, and provides an excellent opportunity for new methods in foreign language training. It can also improve students' engagement, motivation and computer skills. However, there is a need for external project funding to overcome initial barriers.
ELKOnet	The <i>Elektro-Technologie-Zentrum (ETZ) Stuttgart</i> online community is a further development of an online learning platform that was started in 1999 and has been enhanced step by step with additional tools and features. Since 2004, discussion forums support learner interaction in a blended learning approach and recently a wiki, blogs and social bookmarks have been added. The aim is that learners extend and share their knowledge in collaboration with each other.	The main success factors identified for this case are regular support of participants and integrated software solutions. Some potential dangers include the digital divide among participants and negative cost-benefit ratios for some groups of participants, courses and forums. This case demonstrates that integrated solutions can offer advantages compared to the use of isolated tools. It shows that users can actively contribute to keeping learning content up-to date and that online communities can help to keep students in continuous learning processes.
LeMill – Calibrate	<i>LeMill</i> has developed a web-service for the exchange of learning materials in the framework of the Calibrate project. The Calibrate project, which began in 2005, advances the idea of free and open learning resources and international transfer of online learning material. <i>LeMill</i> follows an open grass roots approach whereby teachers can create learning material that they can use and share with each other. The collaborative development of learning material is possible.	This case shows that the exchange of ideas for learning activities and innovative teaching methods is just as important for teachers as the exchange of learning materials. Teachers also expressed the wish to share multimedia and interactive content. The user-interface was adapted to respond to these needs. Furthermore, the case demonstrates that online social communities can support the exchange of learning resources. Some key success factors include the adaptation of the structure and functionalities of the platform according to demand, the simplicity and clarity of the user interface, filtering functionalities, self-organised user-based tagging of resources and a critical mass of materials and community members. One of the main insights of the project is that services should respect the needs of the target group addressed and that multilingual content and metadata is a challenge for international projects.
Nettilukio	<i>Nettilukio</i> , an online Finnish upper secondary school, offers a comprehensive study programme aimed at adults, aged 17-75. In exceptional circumstances, younger students are also accepted onto the programme – for example, Finnish students living abroad. The initiative is fully and officially integrated into the normal national school programme and financed by the national support for schools, which means that it is free of charge for students. The initiative offers a complete online study programme leading to the Finnish University entrance qualification, using a learning platform, virtual classroom technology, wikis and blogs.	The project's success factors can be identified as the full integration into the national school system, the mix of an open course subscription system and scheduled courses, personal learning plans, learning portfolios and learning diaries, mentor support and teachers fulfilling the dual roles of teacher and tutor. Potential barriers are privacy issues, limited communication among students due to self-organised learning schedules and the need for long-term self-motivation of students. The case demonstrates that wikis and blogs can open a window from learning environments to the real world; virtual classroom technology can successfully bridge the gap between different locations; encouraging inter-course communication can be important for motivation; and students' long-term motivation can be successfully supported by teacher guidance and mentoring.

3.2.2. Learning Outcomes

The assessment of the eight cases studied in depth revealed that Learning 2.0 initiatives require and support certain specific and general *skills and competences*. It should be noted that all of these skills and competencies are, at least to a certain extent, pre-conditions for successful participation, while they are at the same time

further developed and improved by taking part in Learning 2.0 activities.

Basic and more complex ICT and multimedia skills: Participation in Learning 2.0 activities can train users in basic as well as more complex ICT and multimedia skills (e.g. production of audio-visual or three-dimensional web-content). The level and speed of acquisition of these skills

depends significantly on the initial level of digital literacy of the individual user and the user group in general.

Subject-specific and higher-order skills: Learning 2.0 can substantially support the development of subject specific knowledge and skills (e.g. for language learning, as exemplified in the case of KooL). Moreover, it trains users in higher-order skills like reflexive thinking, learning to learn and self-organisation.

Specific and general communication and networking skills: Web 2.0 learning activities are related to general and special communication and collaboration skills. The nature of the necessary competences being fostered depends strongly on the approaches and tools used in a specific activity. Online social networking tools, supporting community building are also useful for acquisition of networking skills, e.g. learning to use personal contacts as learning resources, or the ability to build up, maintain or enlarge a personal learning network.

Multi-tasking and complexity management skills: Multi-tasking and using several different tools at once in a certain learning activity becomes more important in Web 2.0 environments, as there are few integrated environments to date and tools usually possess a high level of specification. Multi-tasking and cognitive overload issues become especially important when looking at navigation and communication processes in more complex environments like virtual worlds.

Meta-cognitive and quality management skills: Meta-cognitive and self-reflexive skills become relevant especially where user-based content production and feedback circles in collaborative activities (e.g. working on a wiki) are concerned. A lack of environment structure can be a problem for the effective development and application of meta-cognitive skills.

Motivation: Finally, the use of Web 2.0 applications in educational settings has the

potential to increase the motivation of learners, teachers and project organisers, by allowing for new and diverse learning and teaching experiences, that are fascinating and engaging, emotional and social, personalised and collaborative, and trigger the discovery of new learning pathways.

3.2.3. Institutional Impacts

Learning 2.0 projects tend to trigger changes in the *institutional framework*, i.e. the organisational and pedagogical embedding of learning.

New interfaces emerge between formal and informal learning environments and settings: The case assessment shows that Learning 2.0 can be successfully implemented in formal education. In many cases, the limitations of formal learning were transcended by extending the classroom so that it became a virtual learning environment, accessible at all times and places. In other cases, the focus lay on embedding self-organised learning in a supportive online learning community. To ensure the sustainability of these new virtual learning spaces, interfaces between different learning settings need to be well-defined; the tools employed must be fitted to learners' needs and course requirements; and assessment and certification issues need to be addressed.

Opening up E&T organisations to society: In several of the cases, it was found that Web 2.0 tools can be used effectively to open windows from the closed formal E&T environment to the outside world, allowing learners to pursue new ways of accessing information and gaining knowledge, and to link the subject content back to real life experiences. This impact can be transferred from the project to the institutional level by implementing similar tools and elements in the organisation as a whole.

Promoting institutional flexibility and openness: Web 2.0 projects can help E&T institutions to implement more open and

dynamic structures and can bring about changes in organisational culture. The case studies furthermore indicate that successful experiences with Learning 2.0 projects within an educational organisation tend to lead to more heterarchical management processes, which further improve organisational flexibility.

3.2.4. Factors for Success

Adequate and stable technical infrastructure: Sufficient technical equipment and a stable technical infrastructure were identified as key success factors by several case managers and users. Unstable or insufficient technical equipment and connections put the whole project at risk.

Organisational and financial support: A highly relevant factor for the success of projects is the general support of the organisation where the initiative is based. This support can express itself in different dimensions like financing, equipment, personnel, or the readiness to adapt organisational structures like time schedules. A relevant intermediate factor for success is the presence of sufficient funds to establish and maintain the necessary technological infrastructure and keep the project running. The existence of a flexible organisational structure and a general openness to pedagogical innovation is an asset.

Targeted use and tailored integration, respecting learners' needs: For Web 2.0 tools, it is essential that they support learning in a targeted way and are not used in a self-serving way. When deciding which tools to use, their special advantages and limitations should be respected. Tools need to be integrated into existing learning settings and environments in a meaningful way. Learning 2.0 environments should be fitted to the specific needs of the users, in terms of function and usability.

Well structured online environments: Web 2.0 environments by nature are more unstructured

than traditional web environments. While they enable more freedom and creativity, there are also dangers that the lack of formal structure could jeopardise learning processes. The case assessment indicates a trend towards using more structured tools and platforms which integrate successful features from more traditional online learning environments.

Critical mass of content and users and regular updates of the environment: A critical mass of initial content and users is crucial for the project's success. Regular updates are a key success factor for all online learning environments, but are especially important for Web 2.0-based environments which are built on user-generated content and communication.

Teachers should adopt new roles: Teachers planning to implement Web 2.0-enhanced projects should be ready to take on new roles, e.g. as learning facilitators, tutors, and mentors, and allow learners to assume more responsibility for their own learning process while, at the same time, providing them with the guidance they need.

3.2.5. Obstacles and Barriers

Technical requirements: Overall, the implementation of Web 2.0 tools in educational settings only demands a standard level of hardware and internet connection speeds for both individual users and institutions. However, not all E&T institutions and students' homes are fitted with this standard level of ICT infrastructure. Consequently, adequate access and availability for all students, at school and at home, need to be ensured. Inequities concerning access need to be addressed. Furthermore, special technical requirements exist for the use of 3D environments, like SecondLife, including fast computers with 3D accelerated graphics cards and stable broadband internet connections. In these cases, the quality of technical equipment directly affects the quality of the learning process.

Digital skill divides: Both teachers and learners vary substantially in their level of digital skills, reflecting prevailing digital divides. Hence, learners need to be trained to use the Web 2.0 tools employed in the project, not only initially, but also on an ongoing basis, to ensure that all students are able to use all functionalities of the tools offered. Teachers need to critically examine individual learners' contributions to identify and eliminate problems in the use of the Web 2.0 tools employed.

Teachers' digital and didactic competences: One key result from the case studies is the general need for a systematic development of ICT and Web 2.0-related skills and competences in teacher training. Teachers must be able and willing to continuously enhance and develop their digital skills to be able to guide and support their students. For a wider scale deployment of Learning 2.0 approaches, more teacher training opportunities are needed, which systematically develop teachers' digital skills and the new didactic competences emerging as a result of more collaborative and personalised learning opportunities.

Lack of (continuous) motivation: The success of Learning 2.0 is highly dependent on the initial and continuing motivation of all participants involved in the project. This motivation, in turn, depends on the digital fluency of teachers and learners, and the added value of the tools for users and the project layout. In initiatives taking longer, such as whole study programmes (e.g. Nettilukio), it can be a challenge to keep learners constantly motivated for self-organised learning activities.

Lack of quality insurance mechanisms for user-generated content: The quality of user-generated content is a common concern when discussing the implementation of Web 2.0 environments in educational settings. The results of the case studies show that there is clearly an awareness of this problem among project organisers, teachers and learners. In some of the cases, quality control

mechanisms have been implemented, e.g. in KooL, where learners set up a quality evaluation committee among themselves. Other initiatives, however, have not used any such mechanism.

IPR-management, protecting identity and privacy, on individual and organisational levels: A further widespread concern voiced by practitioners and users are IPR-management, and identity and privacy issues. These aspects need to be addressed by each individual initiative separately according to the pre-conditions, demands and needs of the respective target groups. There are recommendations on terms of use, the use of copyright and privacy regulations, and social computing guidelines, that can be adapted to the specificities of each case.

3.2.6. Innovation

On the whole, the cases studied indicate that Web 2.0 tools have considerable potential for enhancing innovation in formal E&T. In particular, the following innovation aspects have been identified:

New ways of collaborative creation and exchange of learning content and metadata: In traditional environments, user activities are usually limited to communication about the content. Users of Web 2.0-enriched environments, however, can work directly on the content itself. Learning content is not delivered in a top-down approach as in traditional (e-)Learning environments, but generated, modified, commented on and rated by the learners themselves. Different kinds of content (text, pictures, sound, videos, etc.) can be combined, allowing for creative and diverse forms of expression.

New forms of communication among learners and teachers/trainers: The different Web 2.0 tools each come with new forms of communication between users. Some tools explicitly promote new communication structures and processes

(e.g. virtual classrooms and meetings), while for others, new communication structures are an accompanying phenomenon (e.g. commenting in blogs, self-presentation and user-tagging in communities, commenting and rating in content-sharing tools).

More personalised and learner-centred environments; individual documentation of competencies; e-portfolios; personal learning plans and learning diaries: Web 2.0 tools support self-presentation and thereby put more focus on the individual learner than traditional web-based learning management systems. Web 2.0 tools support a more playful and experimental approach to learning, and allow learners to present themselves and their insights in original ways. Personal blogs can be used as individual homepages, which can be used for setting up learning plans and diaries, for showcasing work and documenting competences, and as a personal repository of links and resources the user frequently consults for learning and leisure.

New forms of blended learning scenarios (formal/informal; classroom/distance; intra-/extra-institutional; mixed learning scenarios and pedagogical approaches): By its very nature, Web 2.0 is predestined for informal learning scenarios. The eight case studies in this report give examples of its implementation within formal learning, whereas the tools typically are connected to the more informal aspects within a formal learning situation. Web 2.0 tools can offer new ways for blended learning, implementing mixed classroom/distance learning scenarios. They also support new pedagogical approaches (e.g. anchored instruction by using blogs in KooL).

Motivational advantages from active, enjoyable, discovery-based learning approaches and learners' sense of ownership of produced content: Web 2.0 tools support more active learning processes and support the learner's

sense of ownership of content, which in turn encourages motivation. In all eight case studies, motivational aspects were highlighted by the project organisers and most learners reported high levels of motivation. A moderating variable was the digital literacy of the user. Low digital literacy is related to low levels of motivation to use new ICT-based tools.

Trend towards embedded or integrated solutions vs. isolated tools: In most of the cases studied, a trend away from the use of isolated tools (e.g. stand-alone wikis or blogs) towards integrated solutions (e.g. blogs and wikis embedded in learning management systems) was visible. The developmental line of Web 2.0 in educational settings seems to be moving from more unstructured and creative tools in the past towards more structured and organised environments, which is also a current trend for Web 2.0 applications in general. Some disadvantages of isolated tools could be detected and some additional advantages of integrated solutions can be reported, concerning, for example, navigation processes and data transfer.

Virtual worlds and mash-ups are near-future trends; the extended integration of external social communities and tools is emerging: Virtual worlds are already being used in two of the case studies: in the SecondReiff project, SecondLife is used as the main learning environment, and at IBM, virtual worlds are used within the context of research and experimental development. As a further near-future trend, mash-ups, flexible individual combinations of functions from different applications, are expected. Several project managers of different case studies plan to improve their initiatives by integrating external social communities like Facebook and content from other external Web 2.0 environments like del.icio.us, Flickr or YouTube. The latter tools are seen as especially rich resource databases for learning material that could be integrated in different teaching and learning scenarios.

3.2.7. Analytic Case Overview

Figure 3-9: Overview of the case contribution to the study findings

Case Contribution to Overall Findings (‘++’ = strong contribution; ‘+’ = moderate contribution; empty cells indicate no contribution)	Welker’s	SecondReiff	Protovoulia	IBM	Kool	ELKOnet	LeMill	Nettilukio
Innovation								
New ways of collaborative creation and exchange	++	++	++	++	++	+	++	+
New forms of communication among learners and teachers	++	++	++	++	+	++	++	++
More personalised and learner-centred environments	++	++	+	++	+			++
New forms of blended learning scenarios	++	++	++	+	++	+		++
Motivational advantages; learner’s sense of ownership	++	++	+	++	++	+		+
Trend towards embedded or integrated solutions	+		++	++	++	++		
Near-future trends: Virtual worlds, mash-ups, integration of tools		++		++				
Learning Outcomes								
Basic and more complex ICT and multimedia skills	+	+	+		++	+	+	+
Subject-specific and higher-order skills	++	++	+	++	++	++	++	++
Communication and networking skills	+	+	++	+	+		++	
Multitasking and complexity-management skills		++	+	+				+
Meta-cognitive and quality management skills	+	+	++		++	+	+	+
Motivation	++	+	+		++	+		++
Institutional Impacts								
New interfaces between formal & informal learning environments	++	+	++		+	+	+	+
Opening E&T organisations towards society	+		++	++	++			
Promoting institutional flexibility and openness	+		++		+		+	+
Success Factors								
Adequate and stable technical infrastructure	++	+	+	+	++			
Organisational and financial support	++	+	+	++	++	+		+
Targeted use and tailored integration respecting needs	++	++	++	+	+	+	+	+
Well structured online environments	++	++	++	+	+	+	++	+
Critical mass of content and users; regular updates	++		+	++		+	++	+
Teachers assume new roles	++	++	++			+		++
Obstacles and Barriers								
Technical requirements	+	++	+		++		+	
Digital skill divides	+	++			+	+		
Teachers’ digital and didactic competences		++	+		+	+		
Lack of motivation	+	+	++	++	+	+		++
Insuring quality of user-generated content					++	+		
IPR-management, identity and privacy issues				+				+

3.3. Key Impact Areas of Learning 2.0

The in-depth analysis of existing practices outlined in the previous section provides a snapshot of an extremely diverse landscape and corroborates the findings of the database analysis. The take up of social computing for learning is a multidimensional and dynamic phenomenon, undergoing constant evolution, which makes it difficult, if not impossible, to model all activities that emerge in this area in a common framework. However, at the same time, some common and differentiating features become visible when we look at the current state of the art. Moving from the core to the periphery, the following impact areas can be discerned when looking at current practice:

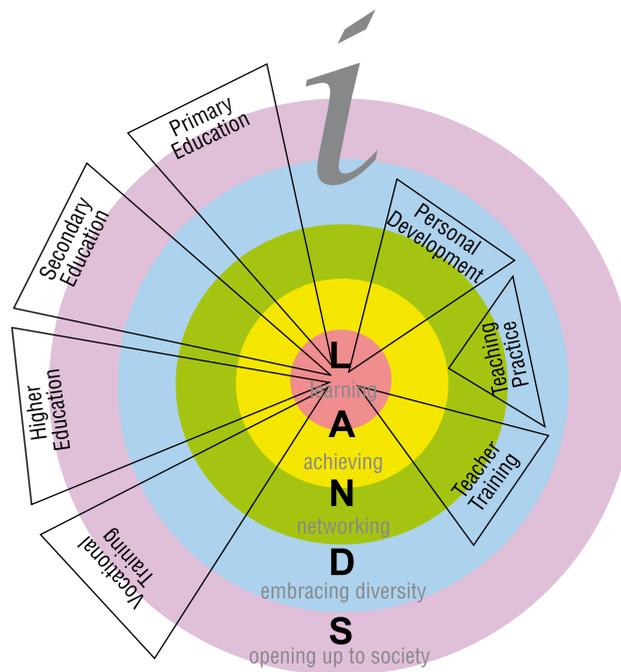
1. (L) **Learning:** Social computing tools are used as “scaffolds” to implement pedagogical strategies intended to support, facilitate, enhance and improve learning processes and knowledge transformation. In particular, Learning 2.0 approaches can accommodate a diversity of learners’ individual learning preferences by addressing different sensory channels that supply more engaging (multimedia) learning environments; by supporting personalised ways of retrieving, managing and transforming information; by supplying learners and teachers with a variety of adaptable tools; and by integrating students into collaborative networks that facilitate the joint production of content and offer peer support and assistance. Thus, under the “Learning” dimension, social computing is conceived of as a means of personalising learning pathways and promoting the students’ individual learning progress, ultimately leading to an empowerment of the learner.
2. (A) **Achieving:** Social computing can increase academic achievements by offering individually-tailored learning opportunities that more adequately support learners in their individual learning needs and strategies,

leading to better learning outcomes. Learning 2.0 can enhance individual motivation, improve learner participation and foster social and learning skills. Social computing tools can further contribute to the development of higher order cognitive skills like reflection and meta-cognition, increasing self-directed learning skills and enabling individuals to better develop and realise their personal potential.

2. (N) **Networking:** Social computing can be used as a communication tool among students or teachers and between students and teachers. They (1) support the exchange of knowledge and material in different networks; (2) facilitate community building, providing teachers and learners with social environments that offer assistance and (emotional) support; and (3) provide platforms for collaboration, allowing teachers and learners to jointly develop (educational) content.
3. (D) **Embracing Diversity:** Social Computing can be thought of as a means of integrating learning into a wider community, reaching out to virtually meet people from other age-groups, backgrounds and cultures, linking to experts, researchers or practitioners in a certain field of study and thus opening up alternative channels for gaining knowledge and enhancing skills.
4. (S) **Opening up to Society:** Finally, social computing can be conceived of as a tool for making institutional learning accessible and transparent for all members of society, promoting the involvement of third parties like parents, and also facilitating the access of current and prospective students to information.

Together these five approaches to Learning 2.0 give rise to new areas for innovation in learning, to *innovative lands for Learning*, which is why we refer to them as iLANDS.

■ Figure 3-10: iLANDS for innovation in learning



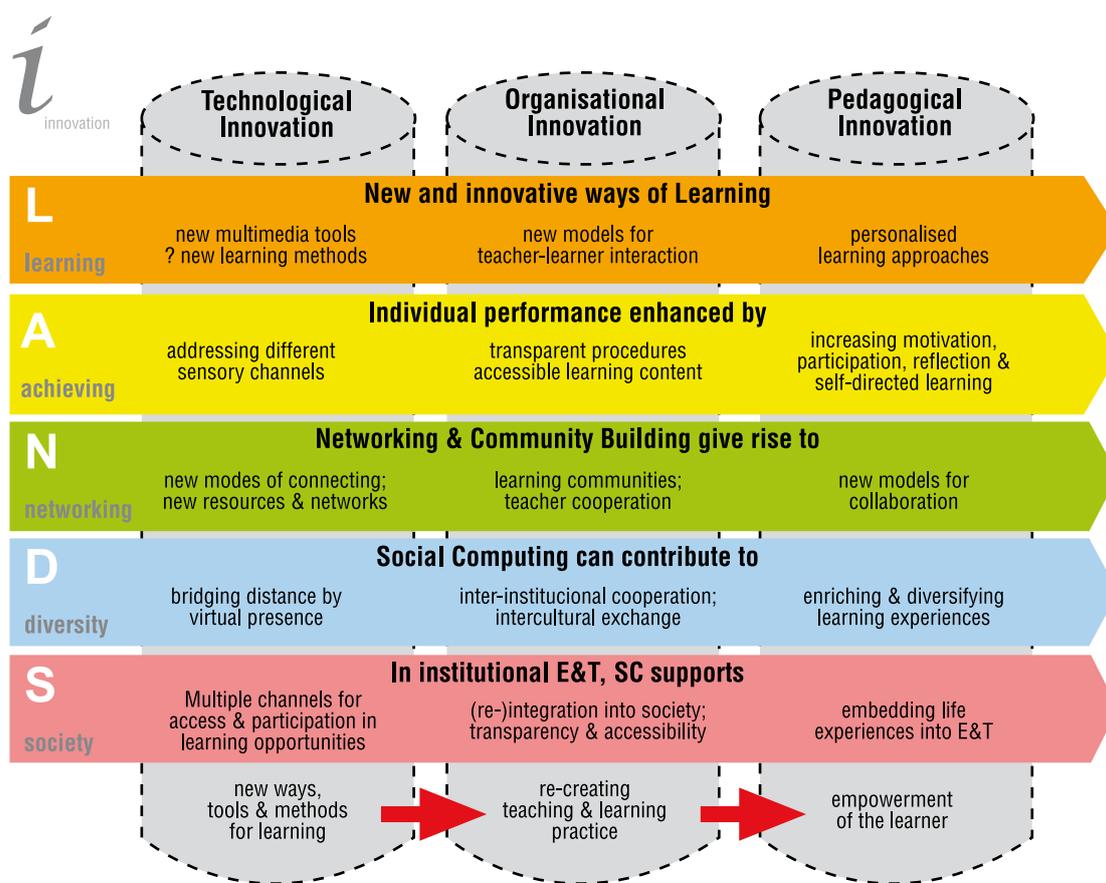
This model aims to show how social computing is currently used in formal educational contexts. Although these different perspectives are partly overlapping and often jointly targeted, each dimension indicates different approaches, strategies and objectives related to using social computing in E&T. Education institutions are susceptible to all of these strategies, although focus and implementation differ substantially between higher and secondary or primary education. Learning 2.0 opportunities outside the institutional framework arise in particular by combining networking potential of social computing with its strength in providing learning opportunities tailored to individual needs and preferences. Teachers profit in particular from social networking tools, which allow them to build up communities of practice for the exchange of knowledge, material and experiences. Evidence on adult education, workplace training and informal learning in general is scarce; the scope of Learning 2.0 strategies in this area is indicated under the heading “personal development”.

Figure 3-11 below shows how Learning 2.0 in its iLANDS dimensions builds on the synergy and convergence among technological, organisational

and pedagogical innovations (cf. European Commission, 2008c) to empower the learner.

Technological Innovation. The Learning 2.0 phenomenon emerges from both technological and social innovations. Social computing tools give rise to new ways of producing, using, storing and managing digital content and also the production of digital learning resources of high quality, interoperability and accessibility. The emergent properties of the evolving technological landscape are flexibility, modularity and adjustability, and allow for the adaptation of existing solutions to different contexts. Thus, social computing contributes to technological innovation by offering enhanced networking capabilities. It also fosters personalisation, creates opportunities for new learning environments and offers new platforms for knowledge distribution. Furthermore, new creative approaches, such as simulations, gaming, virtual reality and immersive environments, trigger technological innovation in E&T. Multimedia applications, visual and audio tools, immersive environments and serious games, and mobile learning devices also give rise to individualised learning opportunities, by addressing different

Figure 3-11: The innovative potential of Learning 2.0



sensory channels and supplying more engaging learning opportunities. Tools for collaborative content production enable learners to jointly produce digital content, and assume authorship and ownership for their products.

The networking potential of social computing, together with its capacity to overcome time and space barriers, contributes to creating a virtual presence that supports interaction and collaboration among and between teachers and learners and facilitates inter-institutional and inter-cultural cooperation. Furthermore, it enables students to broaden their horizons, and collaborate across borders, language barriers, and institutional walls, thus anchoring their learning experiences in a rich world of diverse cultures, traditions, languages and opinions. The ubiquity of and easy of access to these tools contribute to making educational material and information on learning opportunities accessible and transparent

to the general public and open up new ways for E&T institutions to re-connect with society.

Chapter 4 will provide an analysis of how the technological aspect of social computing applications can transform learning and teaching and promote innovative education models.

Organisational Innovation. The innovative technological potential of social computing facilitates organisational innovation in E&T institutions by creating a learning environment that is open to society, transparent and which accommodates all individuals involved in and affected by organised learning. Social computing promotes organisational innovation by allowing institutions to better address students and parents as customers of the learning service. It respects their need for information, easy access and quality control and meets them in a public virtual sphere that is customised to their needs rather

than the institutions' priorities. Furthermore, social computing allows educational institutions to intensify their collaboration with other organisations, across borders, language barriers, and sectors. Networking within and outside institutions leads to the emergence of new communities for learning, disconnected from place and time, in which participants can transcend the limits of traditional communication, and develop new learning strategies together with their peers.

Thus, social computing supports organisational innovation by re-integrating the institution into the community (S), transcending borders between organisations, countries and cultures (D), strengthening the social interactions between all participants involved in the learning process, transforming E&T institutions into communities (N), allowing for new and creative forms of assessment and grading (A), and forcing E&T institutions to provide an infrastructure that is supportive to creative methods for learning and teaching (L).

As a consequence, E&T institutions will have to become reflective organisations that critically evaluate and revise their corporate strategies to support innovative pedagogies. They will have to ensure an infrastructure in which social computing tools are accessible to all learners and teachers, create an atmosphere of support for Learning 2.0 and encourage teachers and learners to grasp the opportunities offered by social computing. They will have to allow for deviant assessment and grading procedures, foster and integrate new teaching and learning models and embrace the opportunities offered for transversal and peer learning among their staff.

Pedagogical Innovation. Social computing promotes pedagogical innovation by supporting teaching and learning processes that more adequately take into account individual learning needs. Social computing tools allow learners to mix and match, and create their own individualised knowledge repositories and networks. They support different sensory

channels for learning, more engaging learning environments, and collaboration and peer support which enables learners to tap the tacit knowledge of their peers and develop their own ideas in a creative and supportive environment.

As a consequence of the power of social computing to support collaboration and personalisation, learning becomes a process in which motivation, participation and reflection are fostered. Individual learners are empowered to develop self-directed learning skills, which help them to better develop and realise their personal potential.

Networking and collaboration also give rise to new interaction patterns between and among students and teachers, changing the roles of participants in the learning process. Teachers become designers, coordinators, moderators, mediators and mentors, rather than instructors or lecturers, while students not only have to assume the role of (peer) teachers, supporting each other in their learning endeavours, but also jointly create both the learning content and context, developing their own rules and strategies for cooperation and content production. The openness and embeddedness of social computing in the wider societal context allows students to seize new learning opportunities, transcend the boundaries of institutional education to connect learning back to its original societal and scientific context.

In the following chapters, the innovative potential of Learning 2.0 will be discussed, differentiating between technological (Chapter 4), organisational (Chapter 5) and pedagogical (Chapter 6) innovation. Chapter 7 is then devoted to a detailed presentation and discussion of the potential of social computing in supporting inclusion and equity. Chapter 8 discusses the main challenges preparing the policy implications and options that will be presented and discussed in Chapter 9. Chapter 10 presents the main conclusions.

■ 4. Technological Innovation

According to the European Commission (2008c), technological innovation in education and training “implies a need for new models of production, distribution and access to digital resources, both in the public and private sectors”. Technological innovation comprises new ways of producing, using, storing and managing digital content, as well as the production of digital learning resources of high quality, interoperability and accessibility. Social computing tools promote technological innovation by offering enhanced networking capabilities, supporting personalisation, creating opportunities for new learning environments and offering new platforms for knowledge distribution. Furthermore, new creative approaches, such as simulations, gaming, virtual reality and immersive environments, facilitate technological innovation in E&T, from early school years to specialised professional training.

This section provides an overview on the variety of ways in which Learning 2.0 gives rise to technological innovation, outlining different areas in which social computing provides learners and teachers with new technological solutions which give rise to innovation in E&T, even if this is not complemented by, or embedded in, pedagogical or organisational strategies.

4.1. Learning and Achieving: Innovating Subject-specific Methods

The characteristic properties of certain social computing tools can be exploited to provide innovative ways and methods of learning that better reflect the nature of the subject matter under study and thus enhance learning processes and outcomes. In particular, social computing sites which allow the production, publication, sharing and modification of audio, photo and

video content can support more creative and active student engagement in arts, design, music, composition, etc. Reid (2008) reports, e.g., on the incorporation of “iTunes University” in combinations with other Web 2.0 tools, into writing and new media composition instruction in a US university, linking student activity closer to the subject matter. Similarly, at the University of Mary Washington, students on the course “Approaches to Video Art” study video as an art form and then create short video pieces as final projects.⁵⁶

Moreover, 3D virtual worlds, like Second Life, are suited to replicating and investigating a three-dimensional reality, as is done in medicine, architecture, geography, art history and the study of metaphysics. Ramasundaram *et al.* (2005), for example, developed a Web 3D-based virtual field laboratory that provides students with a simulation environment to study environmental processes in space and time; Campbell *et al.* (2002) report on the “Virtual Big Beef Creek” project, where a real estuary has been reconstructed to allow users to learn about ocean science, using different avatars (human beings, fish, etc.) whose viewpoints and navigation constraints are different. Similarly, the WebTOP system helps in learning about waves and optics by visually presenting various kinds of physical phenomena, such as reflection and refraction (cf. Mzoughi *et al.*, 2007). Web 3D technologies are used frequently and effectively in medical training, providing complex 3D animations of anatomical models and bodily movements as well as allowing the simulation of surgical procedures (cf. John, 2007). Within its WISE project (cf. Heid *et al.*, 2009), the German RWTH Aachen School of Architecture set up SecondReiff,⁵⁷ a virtual extension of the

56 Course blog at cgar.umwblogs.org/.

57 <http://www.w-i-s-e.net>.

university's architecture campus in Second Life. One of the three zones of SecondReiff contains a workbench, a 1:1 scale modelling environment enabling the students to collaboratively design their artefacts in real time and full scale in a virtual environment. Architectural drawings can be uploaded and transformed; the "terraformer" tool helps students to manipulate the topography. Virtual worlds and 3D environments promote and facilitate topic-related learning: MUVes support spatial understanding; this is particularly good for topics which require a 3D visualisation, like architecture or chemistry.

Hence, 3D simulations can contribute to transforming scientific methods in many subjects that scientifically investigate or manipulate a three-dimensional reality. In all of these cases, social computing tools are used primarily to replicate reality, tying learning experiences and procedures back to the nature of the subject at study and professional reality. Thus, social computing can, on the one hand, contribute to overcoming the discrepancies between theoretical training and professional practice by supplying innovative ways of integrating practice into training. On the other hand, 3D simulations give rise not only to new learning tools, but transform scientific methods of investigation. Thus technology can trigger the innovation of subject specific methods of investigation.

Social computing furthermore supports learning projects in formal educational settings by offering new environments that facilitate collaborative knowledge production. The "Soziologische Klassiker" wiki,⁵⁸ for example, is a collaborative "Wikibook" project among students of sociology at the University of Salzburg (Austria), with the aim to set up an encyclopaedia of important sociologists. The project started in 2006 with a group of 70 students working on articles and was enlarged and improved in the following year by another set of 60 students.

"Campus: Second Life" is an initiative to support schools, colleges and universities to utilise Second Life to teach different subjects. As an example, Bradley University offers a course in field research methods in Second Life.⁵⁹ Similarly, the Rochester Institute of Technology has developed a custom collaborative virtual environment where students can program and interact with virtual objects as well as create two and three-dimensional data visualisation schemes.⁶⁰ These communities are operating in new and often creative ways to support a range of learning processes that are usually not curriculum based (de Freitas, 2007). These examples illustrate that new technological tools, like wikis and 3D virtual worlds, even without being embedded in a pedagogical approach, can innovate educational content production and can support innovative ways of teaching course content.

4.2. Networking and Community Building

One of the strengths of social computing tools lies in their potential to facilitate social networking, bringing together people with common interests and allowing them to exchange knowledge and intensify collaboration (Cachia, 2008). The existence of easily accessible and adaptable tools that facilitate networking and community building has led to a rise in platforms and portals for knowledge exchange among educators and researchers.

ResearchGATE,⁶¹ for example, is a new online social network for scientists aiming at establishing a global Facebook-like community for researchers. The objective of the platform is to provide a global and powerful scientific web-based environment, in which scientists can interact, exchange knowledge and collaborate

58 http://de.wikibooks.org/wiki/Soziologische_Klassiker.

59 Cf. The Horizon Report, 2007; slane.bradley.edu/com/faculty/lamoureux/website2/slstuff.html.

60 Cf. Horizon Report, 2007; muppets.rit.edu.

61 <https://www.researchgate.net/>.

with researchers of different fields. Similarly, the Eurotrainer Virtual Community is a virtual learning network for Vocational Education and Training (VET) professionals offering the possibility to share experiences and opinions, capitalise knowledge, and to work in partnership on common documents in the field of competence management of VET professionals.⁶²

The majority of these networks are shaped by a specific common interest, in many cases teachers of a certain subject or subject domain are targeted, encouraging them to exchange ideas, opinions, information, didactic material and good practices, in some cases including the collaboration on projects. The Public Administration School of Catalonia, for example, has recently launched a wiki for the design of e-learning materials for its courses with the aim of providing teachers, trainers, and course editors with an environment that allows them to place their knowledge and ideas into a common structured and shareable space.⁶³ The European Schoolnet (EUN) supports a number of online communities in which primary and secondary school teachers of certain subject areas or of common educational interest form a social network, exchanging experiences and good practice and contributing to a common workspace.⁶⁴

The Protovuolia⁶⁵ project (cf. Heid *et al.*, 2009), stands as a successful example of integrating in the same platform different educational actors. The portal is addressed to school teachers, education experts, families and students alike. Aimed at reaching a wider public and at proposing different educational solution, the initiative consists of several complementary actions, which provide 1) the promotion and standardisation of school innovation, including pedagogical background and Teacher Training

Labs; 2) the online development and sharing of educational content and material; 3) guidance for perspective students and families about tertiary education studies; 4) the development of educational games. Success factor of the initiative were the critical mass of participants and the positive reaction and participation of different actors, which could happen thanks to the relevance of the initiative for all participants and to a comprehensive and thorough introduction to motivate and support participants. The project final aim is to reach all Greek schools, therefore promoting institutional co-operation.

These are only few of the many more examples that will be mentioned in the following, outlining the potential of social computing tools in supporting networking and collaboration activities in such a way that organisational and pedagogical innovation are also facilitated. The examples mentioned here illustrate that the possibility to set up virtual networks as such – even if this knowledge exchange is spurious, uncoordinated and not supported by a common organisational structure or collaboration purpose – constitutes an innovation for E&T, giving rise to new ways of exchanging knowledge and pooling a variety of sources and resources that would otherwise not be accessible.

4.3. Embracing Diversity: New Learning Experiences

Social Computing tools allow users to overcome the restrictions of space and time, bridging distance by creating a virtual presence to replace or supplement real presence. The vast majority of projects from the eTwinning initiative and similar European partnership projects among schools use ICT to (virtually) connect learners from different cultural backgrounds and encouraging them to discuss common cultural values and different cultural traditions and rites. Some of these projects focus more on exploiting the technological potential of ICT to support collaboration, while others (which

62 <http://community.eurotrainers.net/>; www.eurotrainer.org/.

63 <http://eapc.continguts.net/doku.php>.

64 Cf. <http://community.eun.org/eunCommunity/manual/EN/index.html> and http://community.eun.org/eunCommunity/enter_old.cfm?cat=yes.

65 <http://www.protovuolia.org/en/prwtovuolia.htm>.

will be presented in the following chapters) concentrate on inter-institutional cooperation or the pedagogical collaboration in certain subjects or on certain topics.

The eTwinning podcast project,⁶⁶ for example, explores how podcasts can be used as a learning tool supporting intercultural dialogue. The students of four secondary schools in UK, France, Spain and Italy are encouraged to produce podcasts which are shared by RSS feed and other communication technologies among all partners. The objectives of the project are to share cultural experiences, explore each others environment, motivate and excite students with the idea of becoming internet broadcasters. A blog has been used to initiate and share project ideas.⁶⁷ In addition online chats within the VLE and video conferencing have been used to reinforce the relationship. A shared web based whiteboard has been used as a collaborative environment, where all material is posted for discussion prior to publication. The project has its own area on the iTunes podcast directory. The initiators found that the students' motivation levels are so high that the project has become student led. Students themselves generate ideas, identify the new skills required and produce the final product. Strong friendships between schools, teachers and learners have been established.

The iCamp project,⁶⁸ to give an example from higher education, is a cross-border collaborative problem-based learning project under FP6, in the first trial of which a total of 36 (graduate and post-graduate) students from four different partner universities in Turkey, Poland, Estonia and Lithuania participated. Eight cross-cultural groups of four or five students were formed encompassing members from all four participating countries.

These teams collaborated on a given task making extensive use of social computing tools such as Wordpress for individual and group blogs, Flickr for image sharing, delicious (for bookmarking blogs, reading lists and questionnaire delivery addresses), Flashmeeting (Teleconferencing), Nextspace (shared workspaces for projects and facilitators), Google docs (Shared document production in the questionnaire development) and MSN (for Email, chat, and teleconferencing) (Kuru *et al.*, 2007).

Both examples illustrate the power of technology in overcoming geographical (and also cultural) barriers, in supporting functioning and functional environments for cross-border collaboration and establishing a sense of community among learners that have never met face-to-face.

4.4. Interacting with Society: New Learning Opportunities

Social computing can open up a vast variety of new channels for accessing knowledge and offering alternative learning opportunities. In particular, there are many online communities which connect learners and teachers creating new opportunities for informal learning (cf. Ala-Mutka, 2009). LiveMocha,⁶⁹ for example, is a community that enables language learners and native speakers to connect with each other to learn language in interaction, providing also available learning resources for language learning. The "School of Everything"⁷⁰ is a European (UK based) social learning network that connects people who can teach with people who want to learn.

Social computing can also offer the opportunity to change traditional educational patterns by allowing more personalised learning

66 Cf. <http://www.andeducation.co.uk/etwinpodcast.htm> and <http://www.andeducation.co.uk/blog/>. For more information see: http://www.etwinning.net/ww/en/pub/etwinning/ideas_and_practice/gallery/galleryitem.cfm?fuseaction=gDetail&lang=en&gLang=en&piD=9201&mode=1.

67 <http://www.andeducation.co.uk/blog/>.

68 <http://www.icamp.eu/learnmore/project/>;
<http://www.icamp.eu/watchwork/models/>.

69 <http://www.livemocha.com/>.

70 <http://schoolofeverything.com>.

paths. In Finland the *Nettilukio*⁷¹ initiative creates an online learning environment which is fully integrated into the national school system and provides accredited qualifications. It is a comprehensive online study programme aimed at upper secondary school learners. Most of the students are adults (age range 17-75), with some younger exceptions (e.g. Finnish living abroad). The initiative is based on pure online learning with no obligatory traditional classroom teaching sessions. Learning takes place through an online platform, consisting of virtual classroom environment, wikis and blogs. This system allows for students' flexibility, bridging location and time gaps. Students are actively taking control over their learning pace and timing and are empowered by the creation of their own learning portfolios and learning e-diaries. Evidence collected as part of this study⁷² indicates that reflective learning and self-confidence are boosted, and differentiation according to learners needs is facilitated. This example illustrates that the new generation of digital tools can be appropriated to substitute more traditional educational formats.

Furthermore, social computing supports Open Educational Resources (OER), i.e. initiatives offering educational materials and resources freely and openly for anyone to use and under some licenses to re-mix, improve and redistribute. *Connexions*,⁷³ for example, is an initiative offering an environment for collaboratively developing, freely sharing, and publishing scholarly content on the Web. All content is free to use and re-use; material is organised non-linearly in the form of modules that can be linked together and arranged in different ways. *Wikiversity*⁷⁴ is an initiative encouraging the collaborative creation and revision of learning and teaching materials, allowing everyone to take part through using, adding and discussing content.

As part of this trend, many E&T institutions are making (part of) their teaching and learning material freely available to a broader audience. MIT *OpenCourseWare*,⁷⁵ for example, is a web-based publication platform that makes MIT course content – including lecture notes, exams, and videos – openly and freely available. Similarly, in 2006, The Open University (UK) launched its “*OpenLearn*”⁷⁶ platform to make part of its course materials freely accessible. By April 2008 *OpenLearn* had seen over 2 million visitors and had 5,400 learning hours of content in its “*LearningSpace*” content repository and 8100 hours in its collaborative “*LabSpace*”⁷⁷ environment, covering a broad range of subject areas. Within *OpenLearn*, a number of social networking tools are used to facilitate the creation and support of elearning communities, while allowing Open University to investigate and evaluate their use in the open content environment.

Social computing tools furthermore support teachers in integrating ICT into their teaching. For example, “*XTEC-Blocs*”⁷⁸ is a public service of blog-hosting provided by the Ministry of Education of Catalonia. Schools and teachers can create educational blogs and invite pupils and other teachers to post contents on it. Since its opening in November 2007, more than 10,000 blogs have been created. There are different types of educational blogs: school news, classroom diaries, project blogs, literary notebooks etc. The platform provides connections between blogs by means of tags, and cross-search capabilities. It has also a user's forum and several tutorials. It is based on the open-source project “*WordPress Multiple*”. Similarly, the Italian “*BlogER*”⁷⁹ project, initiated by the region of Emilia-Romagna, promotes the use of blogs by educational institutions, teachers and learners. The *BlogER* project has been running

71 <http://www.nettilukio.fi/fi/sisalto/>. See also: Heid *et al.* (2009).

72 Cf. Heid *et al.* (2009).

73 <http://cnx.org/>.

74 <http://www.wikiversity.org/>.

75 <http://ocw.mit.edu/>.

76 <http://openlearn.open.ac.uk/>.

77 <http://labspace.open.ac.uk/>.

78 <http://blocs.xtec.cat>.

79 <http://blog.scuolaer.it/BlogER>.

for five years (since, 2003) with currently more than 1,000 projects and 6,312 active posts.

The recently launched EDU3.cat project⁸⁰ of the Spanish regional government of Catalonia aims at offering audiovisual material for educational use. The resource section of the portal consists of a catalogue of interesting web educational references that cover webtv, radio, cinema, photography and other new formats, to disseminate relevant and interesting experiences as well as foster the meaningful use of ICT in the teaching practice. There are also sites facilitating the distribution of school lessons via podcast. For example, the “SmartBoard lesson podcast” website,⁸¹ hosted by two Canadian primary school teachers, promotes the sharing of podcasts of SMARTboard lessons among teachers. Teachers can freely up- and download Interactive Whiteboard lessons, including a lesson podcast and user comments. The service is used worldwide, including many EU countries, but most contributions come from Canada, the USA, Australia, and the UK.

As these examples indicate, social computing opens up new learning opportunities for learners and teachers outside formal educational settings, which in turn can contribute to improving and enhancing learning and teaching in formal education. They also provide educators with easily accessible and adaptable electronic tools and resources which can contribute to diversifying and enhancing teaching methods and practices.

4.5. Main Messages

Social computing triggers technological innovation in E&T by providing new formats for knowledge dissemination, acquisition and management. Social computing tools increase accessibility and availability of learning content by providing learners and teachers with a wide range of platforms offering a broad variety of educational material. Furthermore, social computing supports new strategies for studying a subject matter by making available a range of dynamic tools for transforming content and displaying information in different formats. Social computing can also contribute to diversifying and enhancing teaching methods and practices by supplying educators with accessible and adaptable tools and resources. Learners can profit from flexible and dynamic applications that are better suited to their individual learning styles, preferences and needs.

Moreover, social computing facilitates networking and community building among teachers and learners, allowing for knowledge exchange and collaboration among geographically dispersed groups. It can, in particular, facilitate intercultural exchange and cross-border, cross-institutional collaboration by providing environments capable of establishing a sense of community among learners that have never met face-to-face.

80 <http://www.edu3.cat>. See also the project's blog: <http://blocs.xtec.cat/edu3cat>.

81 http://pdтого.com/smart/?page_id=2.

■ 5. Organisational Innovation

Organisational innovation addresses the envisaged change, supported by ICT, whereby “schools [evolve] towards open learning centres, universities towards learning service providers, companies towards learning organisations and cities and regions towards learning support environments”(European Commission, 2008c). This change is supported by (1) new collaborative approaches using ICT; (2) new assessment systems, e.g. e-assessment, on-demand testing with immediate feedback for diagnostic purposes, interactive simulation-based testing; (3) new accreditation mechanisms, e.g. in the form of e-portfolios which could be used to provide a digital record of learning achievements in formal, non-formal and informal learning settings and offer a showcase for students’ work (European Commission 2008c).

This chapter provides an overview on the diverse ways in which Learning 2.0 strategies and tools can serve to support organisational innovation.

5.1. Learning and Achieving: New Participative Interaction Modes

Social computing can open up a vast variety of new channels for knowledge distribution, which substantially facilitate the access to and exchange of learning materials allowing multi-directional interaction. Especially tertiary education institutions are exploiting these new means of information production and distributions to facilitate organisational procedures, involve learners in personalising their learning pathways, improve communication processes and increase collaboration, support and guidance.

The University of Edinburgh’s Web 2.0 strategy exemplifies the perceived opportunities

in enhancing the university’s virtual learning environment with social computing tools: Blogs and RSS feeds are used instead of newsletters; social bookmarking technologies facilitate the management of course reading lists in a collaborative way, linking the service with Library resources and WebCT; podcasts of public lectures can be downloaded after the event; and services such as Frappr⁸² can help building a sense of community amongst international postgraduate students prior to arrival (cf. Franklin & van Harmelen, 2007). Similarly, many other universities (particularly in the UK) have recently integrated various social computing applications into their services package.⁸³ Most of these projects, however, are still in a pilot stage.⁸⁴

The “Puikkari” project among three Finnish Universities of Applied Sciences, for example, aims to set up an open, collaborative and accumulating eLearning environment for knowledge sharing and networking, supplying teachers and learners with tools for online collaboration and networking (Suhonen & Uimonen, 2007). The Italian initiative “LTEver”, which started in January 2007, aims at joining students and alumni interested in continuing self-training within an online community. Students, alumni, teachers and collaborators of LTE can have their own personal space for free, they can create a blog, subscribe to pages (e.g. of their friends) and build communities (Calvani *et al.*, 2007).

There are further examples, where social computing tools used as course platforms

82 <http://www.frappr.com/>.

83 See for example, the Universities of Brighton (<http://community.brighton.ac.uk/>), Leeds (<https://elgg.leeds.ac.uk/>; <http://www.lts.leeds.ac.uk/elgg/>), and Westminster (<https://connect.wmin.ac.uk/>). As far as these tools are used to support networking activities, they are discussed below, under the Networking stance. For a discussion, see: Franklin & van Harmelen, 2007.

84 Cf. Suhonen & Uimonen, 2007; Calvani *et al.*, 2007.

facilitate organisational innovation by improving transparency and information distribution. For example, the “Blog de Pedagogía Comunitaria” project at the University of Salamanca (Spain) employs a blog environment together with a wiki and other tools such as Youtube, Slideshare or chat to facilitate learning exchanges between students and teachers of the subject “Community Pedagogy”. Teachers can store and manage learning materials and information relevant to the subject on the blog, which is periodically updated and distributed through RSS. Students can share their insights, assignments and practices and comment on other students’ content, improving their collaboration and writing skills. Through the wiki, students develop a collaborative glossary with the most relevant terms of the discipline.

Similarly, Porto (2008) uses blogs, podcasts and group discussions in an US distance master course to facilitate information exchange. She employs a class blog to post information, provide links and add audio-clips in the form of podcasts, by recording her messages over the phone using a toll-free number. Students receive alerts of any new information added on their computers or iPods and can post follow-up comments. Free podcasts and videos from YouTube, linked to the class blog, are part of the course materials. Through a “blogroll” inside the classroom blog, all participants are able to keep up with a collection of all learning logs. All class documents, including instructions for assignments are developed using Google Documents, which allows for faster and easier editing and sharing, facilitating student collaboration and teacher’s assessment of individual progress.

These examples demonstrate that social computing tools can contribute to innovating the organisational framework of knowledge generation and distribution by allowing teachers and learners to connect and communicate in a variety of new ways using a range of different media. As a result access to information and learning content is improved; peer support and teacher guidance are facilitated; a greater range of learning materials,

sources and resources, recommendations and experiences is available to learners.

5.2. Networking: Community Building and Collaboration

Higher education institutions, in particular, are starting to offer social computing tools within their virtual learning environment with the aim of creating research and learning communities in a more informal manner. The underlying objective is to establish social networks within the institution, which improve the communication among participants, offer assistance, orientation and support, and ultimately enhance learning processes by creating a positive working atmosphere. While knowledge exchange might take place within these networks, the main focus lies on creating an environment of understanding and assistance.

The University of Brighton, for example, set up “Community@Brighton”,⁸⁵ a social networking system for students and staff, who are using it as an online social community for shared academic interest, personal development planning, and for the creation of e-Portfolios. Students are also able to incorporate material from other social networking platforms such as MySpace. All course cohorts are automatically added as communities, though students and staff are free to create their own communities, which many of the student societies have done. New forms of student support are provided by students or student services responding to students who blog about problems with their studies.⁸⁶ Similarly, the University of Leeds (UK) uses Elgg to build a community of staff and students based on the creation of personal and community blogs.⁸⁷ “Connect”, a more recent initiative at the University of Westminster, “is a pilot project

85 <http://community.brighton.ac.uk/>.

86 Cf. Franklin & van Harmelen, 2007; Childnet International, 2008.

87 Cf. <https://elgg.leeds.ac.uk/>; <http://www.lts.leeds.ac.uk/elgg/>.

to create a social network for students and staff at the University of Westminster - a democratic space where you can blog, share files and videos, meet new friends and talk about your life and studies".⁸⁸ Here a more encompassing system, including different social computing tools, is envisaged.

Networking also offers opportunities for vocational training, providing peer support for students during intern- and traineeships. Within the EU-funded Socrates-Minerva ESMOS project, for example, a group blog was employed among a group of students from the BSc Adult Nursing degree at the University of Salford during their practical internship in the UK and abroad. The aim of the blog was to nurture an online community of practice which would enable geographically dispersed students to discuss and reflect on their placement learning experiences, offering one another feedback and sharing key observations. The preliminary qualitative evaluation indicates that the student-tutor and peer-to-peer communication via blogs is an effective way of enhancing academic, practical, social and psychological support, particularly for those students who travelled abroad for their clinical placement. As these students became more psychologically stressed, their regularity of posting increased. The blog was additionally used as a collaborative bibliography and a reflective 'space' for the group, who also uploaded their final seminar presentations so that other members of the group could ask questions and provide feedback (cf. Keegan, 2007).

Another example of the use of social computing tools for vocational studies is the Elkonet⁸⁹ virtual learning community (cf. Heid *et al.*, 2009), which started in 1999 as an online learning platform for vocational training and further education. It gradually extended implementing new features and Web 2.0 tools. It is currently moving from a collection of isolated

tools towards an integrated solution. Since 2004 discussion forums support learner interaction in a blended learning approach and recently a wiki, blogs and social bookmarking have been added. The aim is that learners mutually extend and share their knowledge even once they finish their course of study. In this way, not only there is an established peer-to-peer social network, but there is also an emphasis on life-long learning opportunities. This integrated learning environment fosters collaborative content production while giving learners an active role in up-dating and improving material or providing new resources.

The networking potential of social computing is of particular importance for teaching practice and teacher training. Over the last couple of years, many networks have been set up with the aim to increase collaboration and knowledge exchange among teachers, which in turn enhances their teaching skills, enriching their didactical, methodological and pedagogical skills, and subsequently promoting institutional innovation from the inside.

As one example, the EUN eCLIL community⁹⁰ is a European virtual community among science teachers to share ideas and materials, exchange experiences and promote the use of English as a common language. The aim of this community is to exchange experiences in teaching science subjects using English as a working language, or language of instruction. Teachers will develop CLIL materials and lesson plans, share them with the other colleges, and have them tried and tested with their own students. Similarly, the eTwinning Teacher Blog,⁹¹ while employing a blog environment, is at its core a social networking site where teachers in Europe can discuss their experiences with eTwinning programs, exchanging experiences.

88 <https://connect.wmin.ac.uk/>.

89 <http://community.etz-stuttgart.de>.

90 http://community.eun.org/entry_page.cfm?area=1912.

91 <http://blog.eun.org/etwinning/>.

Among teachers' virtual communities, LeMill⁹² (cf. Heid *et al.*, 2009), stands out for its international and multimedia-centred approach. This project offers the creation, collaborative development and sharing of teaching multimedia resources, covering discussion and sharing of materials, methods and technological tools. It is a free and open web service with open-source software that can be used by anyone and is customisable, hence answering teachers' needs to find free multimedia, interactive and adaptable material. LeMill is a very successful initiative where no points for improvement have been highlighted. The key success factors of the initiative can be found in the simplicity of user interface and in the adaptation of the platform structure to users' demand.

Some services focus on help, advice and peer support rather than subject oriented knowledge exchange. The "Classroom 2.0" site,⁹³ for example, is a social networking site for teachers, offering help and advice with online tools and access to Web 2.0 tools for learning; discussion forums offer opportunities to exchange views and experiences. The network currently comprises 8520 members worldwide. The German "Lehrerforum"⁹⁴ uses a more traditional forum-approach to build a network of peer support around common – often social, psychological or legal – problems encountered by teachers in their daily lives. Talkabout Primary MFL,⁹⁵ started in the UK in 2007, is a social network run on Ning for people teaching, or considering teaching, foreign languages in primary school. It is a place to share worries and successes with supportive colleagues.

Other initiatives concentrate on setting up collaborative knowledge repositories that enable teachers to exchange learning material and mutually extend their didactical and methodological resources. The German ZUM-

wiki project⁹⁶ for secondary schools teachers employs a wiki to allow teachers to collect ideas, materials and links for education, creating a resource that is permanently kept up-to-date and can easily be extended. The Glarnerschulen wiki⁹⁷ is a collection of learning material and ideas, edited in form of a wiki, to which anybody can contribute. Targeted at teachers in training, the Share project,⁹⁸ a multilingual exchange and collaboration platform initiated by the University of Cologne (Germany), encourages the sharing, collaborative production and re-usage of educational materials. Several tools are offered to support teamwork, collaborative writing, copyright handling, and open content. A document repository, open to all interested teachers, is provided. Similarly, the Icelandic "Wikilessons" project⁹⁹ comprises a collection of over 100 wikilessons written by teacher education students and their instructors.

In all these cases the technological innovations supporting networking are taken a step further by engaging learners, teachers in social communities with a common interest or objective. These online communities lead to new collaboration modes, transcending institutional and geographical barriers. Communication and collaboration in these communities transform the way in which information is exchanged and learning material is generated, allowing learners and teachers to actively engage in the development and transformation of learning content.

5.3. Embracing Diversity: Inter-institutional Cooperation

There are a number of initiatives, especially in primary and secondary education that approach

92 <http://lemill.net>.

93 <http://www.classroom20.com>.

94 www.lehrerforum.de.

95 <http://primarymfl.ning.com>.

96 http://wiki.zum.de/ZUM-Wiki:%C3%9Cber_ZUM-Wiki.

97 <http://www.prowiki2.org/glarnerschulen/wiki.cgi?TourBusHaltestelle>;
<http://www.prowiki2.org/glarnerschulen/wiki.cgi>.

98 <http://www.share.uni-koeln.de/>.

99 <http://is.wikibooks.org/wiki/Námsefni>;
<http://is.wikibooks.org/wiki/N%C3%A1msefni/Wikilessons>.

social computing as a means of integrating learning into a wider community, reaching out to virtually meet people from other age-groups, backgrounds and cultures, linking to experts, researchers or practitioners in a certain field of study and thus opening up alternative channels for gaining knowledge and enhancing skills. These examples illustrate the potential of social computing for improving the cooperation between different institutions or spheres of society.

The vast majority of projects from the eTwinning initiative and similar European partnership projects among schools follow this approach by using ICT to connect learners from different cultural backgrounds and encouraging them to discuss common cultural values and different cultural traditions and rites. For example, the “Once Upon a Blog” eTwinning project¹⁰⁰ between a Maltese and Irish primary school allows students aged 4-11 to exchange national myths and legends using podcast technologies and interacting through a project blog. A weekly live link between the two schools was established to strengthen the cooperation and cultural exchange. As a side effect, the eTwinning project has resulted in the setting up of a permanent podcast studio and increased the teachers ICT skills, in particular the use of studio equipment and webcams.

In the “Telling Lives” eTwinning project,¹⁰¹ 13-16 year old students from a Finnish and a Norwegian secondary school produce their own digital stories made of personal photos, drawings, media clips or private archives, and personal English voice-over based on a written manuscript. The digital stories are based on agreed topics between the twinned schools. The digital story is then uploaded on the project’s Twin Space at the European eTwinning website. Students are encouraged to download films from their partner

pupils, watch these, and comment (in English) on the films by using the Forum and the Bulletin Board available on the Twin Space.

The “Share IT with friends” project¹⁰² is a collaborative media production project between primary school pupils from Knockaclarig NS, Ireland, and Vindängen, Sweden. Students collaborate and build knowledge together by producing media material, publishing it on the project blog and giving feedback. Two main themes have been running on the blog since spring, 2007, “Wild Flowers of the Countryside” and “A study on small animals in a pond next to school.” The EU Socrates partnership project “Languages from the Cradle” (The Lullabies of Europe)¹⁰³ between different European primary schools, uses a wiki to collect lullabies in 7 European languages, submitted by primary school students all over Europe.¹⁰⁴

There are some globally interesting cooperation projects using social computing. The Horizon Project,¹⁰⁵ like its predecessor, the Flat Classroom Project¹⁰⁶ is a global collaboration project for middle and senior high school students at International Schools in Bangladesh, Georgia, Australia, Austria and China. Students were paired with a global partner to discuss a certain subject and create videos using a wiki, Twitter, MySpace, e-mail and Skype for collaboration. The “KMIKY (Knowing Me Is Knowing You)” project,¹⁰⁷ initiated by a Romanian secondary school and currently involving partner schools in 15 European and non-European countries, encourages primary and secondary school students to engage in cross-cultural activities, exchanging opinions, stories, customs and traditions. Each activity provides teachers with practical guidance. Many pupils (including children with special needs)

102 <http://blog.eun.org/film2/>.

103 Cf. <http://www.lullabies-of-europe.org/>.

104 <http://lullabiesofeurope.wetpaint.com>.

105 Cf. <http://horizonproject.wikispaces.com>;
<http://horizonproject.wikispaces.com/About+Us>.

106 <http://flatclassroomproject2006.wikispaces.com/>;
<http://flatclassroomproject.wikispaces.com/>.

107 www.geocities.com/optionalcourse7a191.

100 http://slua.com/?page_id=171; <http://slua.com/>.

101 For more information see: http://www.etwinning.net/shared/data/etwinning/booklet/etwinning_handbook_2007/etwinning_en.pdf.

have submitted texts and photos related to these activities, thus creating a global archive of personal accounts about different cultures that aims to increase cultural awareness and foster tolerance and understanding among the peoples of the world. A set of online interactive exercises has been designed to help pupils reinforce the information learned in the project. The project encourages the development of co-operation, communicative skills, initiative and research skills.

There is another set of examples exploiting the potential of social computing to foster inter-institutional cooperation. Witte (2007), for example, reports on a blog project in which middle school students (USA) collaborated with pre-service teachers, i.e. university students on reading a novel through blogging. In the first trial, collaboration was disappointing, mainly due to communication problems between the two groups. The project was re-launched with major modifications, including a focus on blog collaboration and conversation (rather than literature), more guidance of pre-service teachers in how to interact with middle school students, face-to-face meetings between the two groups and enhanced technology, e.g. including videos. With these corrections, the project became a huge success and role model for similar projects in the US. The “e-Yethu” collaboration project between a South African university and teachers from the local community set up a virtual community using a wiki and mailing lists, to support ICT take-up in local schools by developing communities of practice, aiding schools in sourcing computer and other ICT equipment, supporting schools technically while providing transfer of technical skills to teachers and learners; facilitating collaboration amongst schools, and providing ICT literacy training for teachers and learners (Hodgkinson-Williams *et al.*, 2008).

As these examples illustrate, social computing tools are extremely well suited to overcome institutional, geographical and cultural barriers in a vast variety of ways. They contribute to organisational innovation by supporting E&T institutions in their

efforts to open up to society, improving internal communication strategies and embedding their organisation into networks of cooperation that jointly enhance their innovative potential.

5.4. Opening E&T Institutions up to Society

Many higher education institutions are embracing social networking services to present their institution to society and to connect with current and prospective learners. The University of California, Berkeley, USA, was the first to make full course lectures freely available through YouTube.¹⁰⁸ It runs its own channel as a YouTube partner and provides over 300 hours of content (cf. Childnet International, 2008). The University of Warwick,¹⁰⁹ UK, was one of the first European universities to set up a MySpace profile that provides information about the university and acts as a meeting place for current, prospective and past Warwick students. The Case Western Reserve University in the US uses the “Cleveland Plus” representation in Second Life to actively recruit prospective students, offering a virtual tour of the campus guided by student ambassador avatars, to conduct classes and showcase students’ work (Shapiro *et al.*, 2007). Following suit, many European universities are now creating profiles on different social networking sites. The Spanish open university of Catalonia (UOC), for example, has a web presence on Facebook and Twitter, a YouTube channel¹¹⁰ and participates in Netvibes.

Some universities are experimenting with combined approaches. Martin Weller writes in his blog about the Open University (OU) course

108 <http://youtube.com/ucberkeley>.

109 www.myspace.com/warwickuniversity.

110 See overview: http://www.uoc.edu/portal/english/difusio_i_publicacions/uoc_20/index.html. Sites: <http://www.facebook.com/pages/Barcelona-Spain/Universitat-Oberta-de-Catalunya-UOC/21651276645>; http://twitter.com/UOC_University; http://www.netvibes.com/uoc_eng#Home; <http://es.youtube.com/uoc>.

profile application,¹¹¹ which allows Facebook users to look up OU courses by code or title and list the courses they have studied on their profiles. Additional applications are currently being developed which will allow students to find people who have studied the same course and get a study buddy; the associated course books will be displayed and can be bought online (from online bookshops or second hand from fellow students); links to associated networks will be supplied, student suggested resources can be viewed, the library set of materials will be accessible through Facebook, etc.¹¹²

The main objective in all these cases is for the educational institution to be present where its students are, alerting the attention of current and prospective students, making information more readily available, and increasing the visibility of the institution's educational endeavours to a greater audience.

Secondary, primary and pre-primary education institutions are also trying to encompass social computing to increase transparency and accessibility. However, in most of these cases, the intention and approach is slightly different from the case of universities. First of all, integrated solutions prevail with the institution's web site being the main entrance gate to information. Secondly, instead of the learner, actual and potential parents are the main target group; and thirdly, the information made available using social computing mostly concerns internal learning processes and results. The main objective in these cases is therefore to make the institution's educational strategy, daily work, special activities and the outcomes thereof more transparent to parents.

Some examples of the use of social computing in schools include the display of students' work and school projects to a greater audience, inviting parents and outside experts to participate in the learning process. The "Schoolbox 2.-4." Blog,¹¹³ for example, functions as a website of a mixed-aged Swiss primary school class, where class projects, including stories and podcasts, are displayed and students and parents are kept up to date with important information. The French "podcast de radios scolaires" project¹¹⁴ offers a central website for sharing podcasts that are produced by primary and secondary school radio projects. The site allows schools to make their school radio broadcasts available to a greater audience, facilitating the creation and distribution of emissions. Social computing sites can also be used with the aim to showcase students' work. Linda Hartley, a UK primary school teacher, for example, administers a Flickr group,¹¹⁵ where (primarily primary school) groups can publish their classroom displays. The Flickr group works as a visual archive to capture interesting and original displays that would otherwise vanish unrecorded, and to promote discussion.

The increasing importance to respect and address the interests and concerns of parents is accentuated by the recent trend to install webcams in pre-primary institutions that allow parents to monitor their children's activities via the internet during the day.¹¹⁶ In Spain, this movement was triggered by documentary on the appalling conditions in a crèche in Madrid, raising the awareness of parents and education institutions to the fact that educational procedures

111 The application can be found at: http://www.facebook.com/r.php?referrer=112&app_id=4472914735; to gain access to the application as a non-user, enter "T171" as a course code.

112 http://nogoodreason.typepad.co.uk/no_good_reason/2007/10/first-ou-facebo.html.

113 <http://www.sofresh.ch/school/index.php>.

114 <http://podcast.ac-rouen.fr>.

115 www.flickr.com/groups/classrmdisplays.

116 See for example: <http://cherryblossomcreche.com/webcams.htm> (UK); http://www.cocoonchildcare.ie/watch_me_live.asp (Ireland); <http://www.escuelainfantileltnet.com/es/seccion/inicio.html> and www.supermamy.es (Spain); http://www.issy.com/index.php/fr/parents/petite_enfance/les_cyber_creches__1/les_webcams (France).

are not transparent. While this movement is discussed rather controversially by parents, educators and employers, it exemplifies that with the emergence of new technological solutions, established institutional procedures become challenged and new ways of involving all actors can be experimented with.

To summarise, social computing services trigger organisational innovation by allowing educational institutions to make information and services linked to the institution more readily accessible and more transparent to current and prospective students and parents. Social computing can thus create more participative and integrated interaction modes between the educational organisation and the cultural and societal context it is embedded in.

5.5. Main Messages

When employed within E&T organisations, social computing contributes to changing communication and collaboration patterns and strategies among learners and teachers, changing the roles, requirements and competences of teachers and learners. It can promote organisational innovation by offering tools that allow E&T institutions to open up to society embedding learning experiences in a broader societal context and to better address their learners' needs. Social computing also facilitates collaboration and knowledge exchange among institutions and educators, enabling schools and universities to become reflective E&T institutions, creating their own networks and strategies for addressing the changed learning needs in a digital society.

■ 6. Pedagogical Innovation

Pedagogical Innovation addresses the potential of ICT in general and social computing in particular to transform learning and teaching processes, offering novel ways of learning by supporting, among other things, learner-centred learning approaches, group work and inquiry projects, interactive forms of learning that lead to more reflective, deeper and participative learning, learning-by-doing, inquiry learning, problem solving and creativity (cf. European Commission 2008c). Social computing facilitates pedagogical innovation by disrupting traditional learning and teaching patterns, giving rise to new and innovative ways of acquiring and managing knowledge.

Social computing tools are expected to enhance learning processes and outcomes in a number of ways. Firstly, it is believed they will respond better to the changed cognitive processes and learning patterns that have evolved due to the ubiquity and widespread use of information and communication technologies, thus facilitating knowledge acquisition. Furthermore, they reflect current communication and working patterns and are thus better fitted to preparing learners for the demands of society and endowing them with the necessary skills for a successful professional career (Attwell, 2007). Moreover, social computing tools recognise the diversity of users and are thus expected to contribute to the personalisation of educational experiences, offering opportunities for flexible, distributed learning, which could provide learners with more varied opportunities to engage with learning and develop their own creative skills (Rudd *et al.*, 2006a,b,c; Green *et al.*, 2005; Fischer & Sugimoto, 2006). Thus social computing applications are expected to promote independent, autonomous and self-directed learners endowed with a variety of social skills that enable them to connect, interact and collaborate successfully with a variety of people on different tasks and in diverse environments.

This chapter will try to provide evidence of the actual potential of social computing in promoting and supporting these and further skills and learning pathways. It will provide an overview on how Learning 2.0 strategies can be employed to support pedagogical innovation. First, it will look at how social computing can shape new and more engaging ways of learning (6.1); then, it will take into account social computing's potential to improve personal achievement (6.2); subsequently it will analyse networking communication models (6.3) and new ways to account for diversity (6.4) to finally evaluate how learning opportunities are embedded in their societal context (6.5).

6.1. Learning and Achieving: Personalised Learning Pathways

Social computing displays a huge potential for enhancing and improving personal learning outcomes, by creating learning experiences that more adequately address and suit individual preferences. In particular, individual performance can be boosted by (1) facilitating personalised learning strategies; (2) increasing motivation and participation, (3) promoting self-directed learning skills, and (4) supporting reflection and meta-cognition.

6.1.1. Motivation and Participation

Social computing tools are often employed to improve personalisation and promote individual learning strategies. They also support individual knowledge management strategies, by supplying new research network building tools and allowing for the establishment of personalised knowledge repositories.

Social computing applications lend themselves to being used as research and

knowledge management tools. Tagging and bookmarking services in particular allow teachers and learners to build individual or collective collections of resources, share personally classified bookmarks, recommend, comment and rate sources, and set up reading and resource lists (cf. Vuorikari, 2007). The Penntags project at the University of Pennsylvania¹¹⁷ is an example of an internal bookmarking platform, where links can be stored, tagged, organised and exchanged (cf. Alexander, 2006). Similarly, blogs can be used among a group of learners, using their individual blogs, to build up a corpus of interrelated knowledge via posts and comments (cf. Baggetun & Wasson, 2006). Podcasts enable students to better implement learning in their everyday lives, allowing them to flexibly learn when, where and how they want (cf. Evans, 2008; Cramer *et al.*, 2007).

Furthermore, social computing tools can contribute to the personalisation of the learning experience by offering tailor-made courses. The Finnish Nettilukio¹¹⁸ initiative, mentioned above, provides an online learning environment which offers flexible schedules and bridges differences in place and time. In general, students can subscribe to a course at any time they want and compose an individual course and time schedule, so that learning pace and timing can be adapted to their preferences. Personal learning plans, learning portfolios and learning diaries further increase self-directed learning. Research evidence (Heid *et al.*, 2009) suggests that this individual freedom is the most important factor for the success of the initiative.

Research findings indicate that Learning 2.0 strategies that foster personalisation can also contribute to improving learning outcomes (Evans, 2008; Cramer *et al.*, 2007; Carletti *et al.*, 2008).

6.1.2. Motivation and Participation

Social computing tools are used extensively to increase student motivation and participation by promoting collaboration, creativity and active authorship. Immersive environments are particularly suited to supporting experimental and experience-based learning, promoting and improving motivation and learner involvement (cf. Punie *et al.*, 2006). Virtual games can support Education and Training in general by, e.g. motivating, engaging and empowering learners (cf. de Freitas, 2007; Horizon Report, 2007). 3D virtual worlds like Second Life can be employed to create online virtual spaces for learning, where learners, represented through avatars, take part in online courses, classes, meetings, projects. Peter Twining of the UK's Open University, for example, directs the Shome Park project,¹¹⁹ a closed community run within Teen Second Life for 13 to 17 year olds (c. Cullen *et al.*, 2009). The project explores the potential of the virtual world as a creative and engaging alternative to traditional schooling environments. Educational Activities on Shome Park include a wiki pages and discussions on archaeology, ethics and philosophy, physics, languages, research, media and design, a writers' corner and a space project.

Reflecting on the use of Second Life to enhance learning and teaching, Julie Nicholson Bujtas, an English teacher at a US middle school,¹²⁰ argues that student participation is higher due to the fact that adolescents feel more comfortable speaking through an avatar than in front of the class.¹²¹ Diane Whiting, an eighth grade health educator at the same school, was surprised by the high level of communication in Second Life, which she believed could not have happened in a traditional classroom.¹²²

117 <http://tags.library.upenn.edu/>.

118 <http://www.nettilukio.fi/fi/sisalto/>. See also: Heid *et al.* (2009).

119 Cf. <http://www.shome.ac.uk/> and http://www.shome.ac.uk/wiki/Shome_Park.

120 Project documented in a blog: <http://ramapoislands.edublogs.org>.

121 Cf. <http://smsteacherspeak.blogspot.com/>.

122 Cf. <http://smsteacherspeak.blogspot.com/>.

Virtual realities can also promote an increase in participation in professional development activities and make these more rewarding. The Norwegian “InterAct” role-play project,¹²³ in which workers in different small groups interact online to collaboratively solve a (fictitious) real life “problem”, related to their work, is an example of promoting participation in professional development programmes. The four day simulation exercise aimed to increase the basic communication and digital skills of the cleaning staff of Akershus University Hospital. The participants had no, or very low, ICT skills and poor Norwegian language skills, especially in reading and writing, when starting the training. The evaluation of the simulation revealed that the participants had indeed improved their cooperation skills, learned to use the internet and acquired certain basic ICT skills. The simulation proved a successful and motivating tool for learning for these participants. Their initial fear of computers had disappeared after only two days. According to the hospital management, the former participants are now more self assured and confident in using computers.

Online writing environments and podcasts are equally suited to promoting motivation and personal and social skills. A US primary school implemented part of its environmental education curriculum by setting up a blog with stories around “Daisy the Duck” who happened to build her nest on the school ground. The “Duck Diaries” blog¹²⁴ and the subsequent “Trout Diary” blog¹²⁵ combine written stories and poems with podcasts and vodcasts, including contributions from kindergarten students using Voicethread. 6th grade students are encouraged to answer questions posted on the blog by their peers. Student participation and motivation is very high, prompted by both the media tools used and the collaboration between different age groups and subjects on a common topic of interest.

123 www.statvoks.no/InterAct.

124 <http://duckdiaries.edublogs.org/>.

125 <http://www.mcddblogs.org/trout>.

Similarly, in the “Blog in der Grundschule” project,¹²⁶ the 27 fourth grade students at a German primary school contribute weekly to a blog, by posting stories. Teacher and students are encouraged to comment on posts. According to the initiators, the blog contributes to the personalisation of learning processes and to the acquisition of the rules of orthography, and increases motivation by making the stories publicly available.

Research findings confirm that the use of social computing in learning can enhance motivation and participation. De Laat (2007) investigated how participants in an online Master’s programme in E-Learning at the University of Sheffield, who were expected to participate and organise community activities, built up a learning community. His findings indicate that the students were actively engaged in collaborative learning activities, developed an open learning climate, motivated and encouraged each other to contribute, thought of and co-designed course activities, developed tasks and planned and discussed group activities together.

Using reflective online journals in a Greek distance postgraduate programme in physical education, Antoniou & Siskos (2007) found that reflective online writing encourages active participation and contributes to beating isolation by promoting communication and interaction between tutor and students, thus generating the necessary feedback for both the learning process and the quality of the lesson. Ultimately, it also enhances learning outcomes. In two empirical studies, involving 176 and 46 vocational high school students in Taiwan, Rau *et al.* (2008) found that instant messaging combined with internet communication media, can significantly increase students’ extrinsic motivation. These findings are confirmed by a study by Cavallaro & Tan (2006) on online collaborative writing. Similarly, the

126 <http://tagebuch.gsgtgssaarlouis.de/>.

evaluation report¹²⁷ of the “Web 2.0 Klasse”¹²⁸ project among students in 9 Austrian middle schools (“Hauptschulen”), where a wiki was used to investigate the topic “National Parks in Austria”, revealed that the wiki significantly improved the motivation and performance of weak students.

Social computing can help to boost learners’ motivation by making some tasks more pleasant and relevant. In a private secondary school in Zurich, an inspired teacher, Jason Welker, developed a collaborative online learning environment to support classroom teaching, called ‘Welker’s Wikinomics’¹²⁹ (cf. Heid *et al.*, 2009). The project started in an American School in Shanghai, where Mr Welker taught initially, and continued at the teacher’s new destination in Zurich. Web 2.0 tools are not used during contact time but instead they supply and substitute homework. Through a blog, the teacher provides real-life examples related to what has been learned in class and students are asked to participate by leaving their comments; meanwhile they collaboratively develop a wiki, which collects subject-related information and aims to supplement – and eventually replace – textbooks. Students’ contributions are compulsory and form part of their final assessment. This initiative has proved that social computing can become a motivating way of learning, replacing the solitary and monotonous homework duty with an interactive and empowering task. Also, thanks to real-life example entries on the blog, learners can perceive the relevance of their studies, and open up the school environment to the outer world.

Podcasts can also be used to increase motivation, make learning more enjoyable and support different perspectives on a subject. The

Italian Videopoesia project¹³⁰ tries to teach poetry to secondary school children by encouraging the production of YouTube videos. The video production is employed as a technological tool to motivate students, to enhance comprehension and metacognition and implement “learning by doing” strategies. Cruz & Carvalho (2007) present and discuss a podcast project conducted among the 27 9th grade History students at the Viana do Castelo school (Portugal), where students collaboratively created their own podcast episodes. It was observed that the students were responsible and engaged in their learning. Most of the students (59.2%) said that listening to the podcast increased their interest in the activities proposed, and the remaining 40.7% of the students partially agreed with this statement. For 88.8% of the students, the use of podcast as a learning resource in History class is not only a useful resource for motivated pupils but it is also useful for pupils with difficulties. The great majority of students (77.7%) said they preferred listening to podcasts to reading the content in a book.

6.1.3. Self-directed Learning Skills

Furthermore, social computing can contribute to enhancing social and learning skills. Lee *et al.* (2008) report on a project among a group of Australian first year undergraduates who volunteered to engage in a collaborative task of scripting and creating educational podcasts for their peers. These authors’ findings suggest that the production of podcasts by students is a powerful way of stimulating both individual and collective learning, and supporting social processes of perspective-taking and negotiation of meaning that underpin knowledge creation. Frydenberg (2007) asked higher education students to summarise course content by creating podcasts. He observed that the students were thus empowered to assume responsibility for the course and to become both, teachers and multimedia producers.

127 in German: <http://web20klasse.weblife.at/static/web20klasse/media/Evalutationsbericht-Web-2-0-online.pdf>.

128 Cf.: <http://web20klasse.weblife.at/>; <http://www.web20klasse.at/schoolwiki/index.php/Hauptseite>.

129 <http://welkerswikinomics.wetpaint.com/?t=anon>.

130 http://www.cyberscuola.it/podcast/wordpress/?page_id=10.

A number of studies underline the potential of social computing tools to increase self-directed learning skills, empowering students not only to take responsibility for their personal learning process, but also endowing them with the feeling of authorship and ownership of digital content. Analysing 32 independent studies on ICT-facilitated collaborative learning activities, de Laat (2007) observes that all the studies present some empirical evidence that students are actively taking control of their learning agenda and also show that students are thinking about how to approach their learning task. They all indicate that individual interests and learning goals are the main drivers and that peer feedback and help is appreciated by students as a support to their own learning. Personal interests and goals can be negotiated and married into a shared collaborative project.

The strength of social computing lies in providing an attractive, encouraging and engaging environment, which facilitates unusual and creative learning experiences. Evidence indicates that it can thus support motivation, learner engagement, social skills and self-directed learning.

An example of this strength of social computing tools could be provided by the IBM¹³¹ case (cf. Heid *et al.*, 2009), where employees are using a number of Web 2.0 applications - bluepages, personal blogs, discussion forums, bookmark sharing, feed raters – to exchange knowledge and information. There is extensive collaboration among employees and between employees and externals, making the workflow and informal learning processes more efficient, attractive and engaging for certain user groups.

6.1.4. Higher Order Skills: Reflection and Meta-Cognition

Research findings indicate that online collaboration in learning projects requires

and fosters the development of meta-cognitive knowledge and skills (de Laat, 2007). Blogs and similar online journal tools in particular have been shown to successfully promote reflection and meta-cognition. Xie *et al.* (2008), for example, used an empirical design to investigate the interaction effects of peer-feedback and blogging on 44 US first and second year undergraduates' reflective thinking skills and their learning approaches. They found that over the period of one semester, in which the students had to update their individual blogs on a weekly basis, the students' reflective thinking levels had increased significantly. In his empirical study on the role of a wiki as a knowledge management tool in the acquisition of competencies, Barth (2007) found that the wiki environment supported the acquisition of competencies by encouraging self-directed processes and enhancing reflection processes.

Antoniou & Siskos (2007) studied the use of pre-structured reflective online journals in a Greek distance education postgraduate programme in physical education. Their findings suggest that online writing encourages active participation, meta-cognition and critical thinking. Carletti *et al.* (2008) studied the use of different social computing tools, among them in particular blogs and reflective work diaries, in an Italian post-graduate online master programme in education, which was attended by a total of 280 teachers from primary and secondary schools. While blog entries showed a relatively low level of reflective activity, the rigidly structured reflective work diaries displayed a noticeable shift from practical and technical concerns towards reflective activities, supporting the development of meta-competences, which provided the basis for the teachers' development of professional competences.

These examples illustrate that the effectiveness of online writing environments in promoting reflection in lifelong learning depends to a large extent on the structure provided. A study by Kanuka *et al.* (2007) underlines the need to provide a structured approach if higher order

131 www.ibm.com/software/de/web20/.

cognitive skills are to be attained. Analysing undergraduates' postings in an online discussion environment, they found that the proportion and number of contributions categorised in the most advanced phases of cognitive presence were highest during activities that: (1) were well structured; (2) had a clear definition of roles and responsibilities; and (3) provoked students to explicitly confront others' opinions.

6.2. Networking: New Collaboration Models Supporting Learning

There are numerous initiatives which employ social computing tools to facilitate collaboration among peers, thus allowing learners to extend their personal knowledge base, benefit from peer support and develop their skills through a more active engagement in the collaborative process.

The Catalanian "Ciberaula de filosofia" project,¹³² for example, encourages learners of *philosophy* at secondary school level to collaborate and interact on philosophical topics. The project employs a wiki, blogs, discussion fora and a repository of learning materials. At a Spanish secondary school,¹³³ Moodle is used together with forums and wikis in a *mathematics* class with 15-16 year old students, in order to improve cooperative work and individual skills. Apart from mathematics, linguistic and social skills are supported and interdisciplinary ideas are promoted.

The "Wiki meets youtube" project¹³⁴ at the Delft University of Technology (The Netherlands) (August, 2007-May, 2008) encouraged the participating 100 students to explain the teaching material of the course "Advances in Networking" using movies, graphics etc. While students found it difficult to find and use visual information, they were satisfied about using the wiki as

a collaboration environment. The instructor appreciated being able to monitor the learning process of his students through the wiki. At the same university, master students in the Systems Engineering, Policy Analysis and Management programme use a wiki (Twiki) for collaboration and knowledge sharing in a 14 week R&D project, which runs each year from February till June in a course with 20-25 participants.¹³⁵ The Twiki serves as a platform for collaboration, as a memory of the grounded theory process employed in the project and for preparing case studies and writing a communal report.

Wikis are especially well suited for collections of materials, and arranging different contributions in an organised way. The German "Zentrale für Unterrichtsmedien im Internet e. V." (ZUM) set up the ZUM-Grundschulwiki¹³⁶ for primary schools, which encourages primary students, assisted by their teachers, to contribute to setting up a children's encyclopaedia. The "19th century wiki" project¹³⁷ at an Israeli Junior High School collects inventions and discoveries in the 19th century using an Edu-wiki. The content is written and edited by students which results in them being jointly responsible and involved.

The already mentioned "Welker's Wikinomics" project (cf. Heid *et al.*, 2009), is a collaborative wiki-project among economics students of the Zurich International School. The wiki currently comprises 195 pages covering every topic of the micro- and macroeconomics AP syllabus. As the project advanced, new features were added to the wiki, such as the "Student Thought Forum", the "AP Econ in the News" pages, the "Test Review Centre" (where live chats are hosted the night before tests), and many other interactive and engaging features which aim to enhance and extend collaboration and learning. Student appreciation of the wiki

132 <http://www.infofilosofia.info/ciberaula>.

133 Cf. www.iesvalsequillo.org.

134 <http://wiki.e-merge.nu/bin/view/TUDelftET4285>.

135 Cf. <http://twiki.e-merge.nu/bin/view/TuDelftSPM9618/WebHome>.

136 <http://grundschulwiki.zum.de/index.php/Hauptseite> and <http://wiki.zum.de/ZUM-Grundschulwiki>.

137 <http://edu-wiki.net/rogozina/index.php> ישיאר דומיע

and the accompanying tools is extremely high and the vast majority of students consider that online collaboration has improved their general and specific knowledge as well as their qualifications.

For the Kool¹³⁸ project (cf. Heid *et al.*, 2009), students in a vocational school for glass professionals were asked to produce resources relating foreign language learning to glass design production. The group blog displays podcasts and a video produced by the students using external sources, and their cooperatively-written wiki integrates textbook knowledge. Key to the success of this project was the self organisation of students, who set up a rotating evaluation committee to validate the exactness and relevance of new entries.

Collaboration projects between different education institutions further contribute to pedagogical innovation. In the “Secretos de Argos” project¹³⁹ students from three different Spanish secondary schools collaborate on searching, writing and sharing knowledge on the classical tradition and the influence of Greek and Roman culture on the European world, using a blog. Students have to find and explain to their peers the traces the classical ancient world has left in Spanish culture: in films, in literature, in music, in architecture, in painting, etc. The “Mostra de fotofilosofia” project¹⁴⁰ is a collaboration project between several secondary schools in Catalonia (Spain), where philosophy students post a philosophic question illustrated by a picture to their school or class blog, which is linked to the other participating school blogs. Students can comment on each others’ pictures and questions and get inspiration from their peers’ contributions. At the deadline, they choose the best posts according to explicit criteria.

These examples illustrate some of the manifold uses of social computing applications to facilitate the learner collaboration on a certain subject or joint project in order to increase individuals’ knowledge, skills and competences, in novel and creative ways. The cases furthermore indicate how social computing tools can empower the individual participants to become authors of content, and at the same time integrate them into a network of peer reflection and support. *Research results* suggest that social computing tools help overcome the weaknesses usually encountered in collaborative projects, such as coordination, communication, organisation of materials, negotiation, interactivity and lack of mobility (cf. Zurita & Nussbaum, 2004; Désilets & Paquet, 2005; Antoniou & Siskos, 2007). Evidence further suggests that collaboration facilitated by social computing can significantly increase learning outcomes (cf. Cavallaro & Tan, 2006; Gibson, 2004 & 2005; Makri & Kynigos, 2007; Laurinen & Marttunen, 2007; Cobos & Pifarré, 2008; Liaw *et al.*, 2008).

6.3. Embracing Diversity to Enhance Individual Skill Development

Some projects, particularly in primary and secondary education, employ social computing tools to increase **digital skills** and facilitate **e-learning**. The eTwinning DigiSkills project,¹⁴¹ for example, aims to promote social computing tools as learning and teaching methods. Teachers and students from 10 secondary schools in 8 European countries are jointly contributing to different electronic learning environments. A blog¹⁴² and a wiki¹⁴³ keep partners informed about ongoing projects; on the social networking site¹⁴⁴ 365 members keep in touch. Furthermore, a Google group¹⁴⁵ has been set up and additional tools are

138 <http://www.rheinfit.de/GlassProfessionals.htm>

139 <http://sogradargos.blogspot.com>.

140 <http://blocs.xtec.cat/filoconvocatoria>; for examples see: <http://filoangeletaferre.blogspot.com/>.

141 www.e-digiskills.eu.

142 <http://e-competences.blogspot.com>.

143 <http://e-digiskills.wikispaces.com>.

144 <http://classroom20.ning.com/group/digiskills>.

145 <http://groups.google.com/group/e-digiskills>.

provided to encourage the use of podcasts,¹⁴⁶ Squidoo,¹⁴⁷ search engines,¹⁴⁸ Voicethread, Slideroll, Mindmeister, online presentations, eyejot, E-mail, Video and slideshows.

Since wikis and blogs are fundamentally writing environments, they lend themselves to the acquisition of **reading** and **writing skills**, encouraging even primarily school students to publish their written work on the net. For example, the Ministry of Education of Catalonia also initiated the “La Prestatgeria” (The Bookshelf) project,¹⁴⁹ based on the open-source project “OurScrapBook”,¹⁵⁰ which allows schools to create “virtual books” and invites pupils to write pages on it. The pages can have rich content and multimedia elements. The platform provides connection between the books by means of tags. Books with common tags (like poetry, history, tales...) are sorted to the same bookshelf. The “Wikis for writing” project¹⁵¹ at an Austrian middle school (“Hauptschule”) invites pupils to collaboratively write a crime story using a wiki. Each team or single author is allocated a sub-story which is embedded by hyperlink into the overall story. Starting from a common introduction, the reader can click through different chapters and discover different variants of the story.

The Icelandic “Bookworms” tool¹⁵² is designed to help teachers encourage (primarily primary school) students to share their reading experiences by publishing their own authentic descriptions and opinions of books they have read, thus improving their reading and writing skills. Entries by group members are displayed in a gradually growing column with the graphical appearance of a worm. Worms, titles and authors can be compared statistically and viewed at random or by category, allowing for interesting

inquiries which reflect contributions of readers of different ages and varied abilities. Printable worksheets, drawings and posters encourage further classroom activities tied to reading and literature.

In a similar UK project, the “SJCS Book Review Wiki”,¹⁵³ primary and secondary school students at St John’s school are encouraged to write reviews of books that they have read. The intended audience for the reviews are the children’s peers to help them with their choice of books to read and for parents wishing to purchase or borrow books for their children.

Online writing environments like blogs and wikis are also used widely to increase **foreign language skills**, mainly in English (cf. Kovacic *et al.*, 2007, 2008; Mancho, 2007; Mancho & Larkin, 2008). The “Wikispace for English”¹⁵⁴ project initiated by the secondary school Liceo Amaldi di Alzano (Italy), for example, aims to give students a better opportunity to learn English online and to promote tandem projects with schools from all over the world. Ducate & Lomicka (2008) used blogs to encourage university students enrolled in German or French to develop an insight into a foreign language culture and facilitate language skills. Hirvela (2007) encouraged students to enter into discussions with the author of a novel they had read using an online writing environment.

3D virtual worlds can also be employed to enhance learning processes. Reihman (2007), for example, used Second Life in a US philosophy course to support the study of philosophical theories on reality and existence. At the University of British Columbia (Canada), students in Art History, Classical Studies and First Nations Studies can navigate through game-like 3D virtual learning environments which display ancient sites, annotating, critiquing, and amending them

146 <http://edigiskills.podomatic.com>.

147 <http://www.squidoo.com/sixapart.digiskills/>.

148 <http://digiswicki-swicki.eurekster.com>.

149 <http://phobos.xtec.cat/l1libres>.

150 <http://sourceforge.net/projects/ourscrapbook>.

151 <http://wiki.storage-space.org/wiki/index.php/Hauptseite>.

152 <http://bokaormar.khi.is/>.

153 <http://childrenreviewingbooks.wikispaces.com/>.

154 <https://amaldi-english-corner.wikispaces.com/>.

in collaboration with their peers (cf. Rauch & Wang, 2007).¹⁵⁵

Hence, social computing tools can facilitate learning processes in a variety of subjects by supplying environments which allow learners to exchange ideas with learners and experts outside their educational institution; get inspired and learn from the ideas of their peers; and broaden their horizons by looking at their own reality from a different perspective. Learning 2.0 approaches thus allow them to make the diversity of opinions and ideas they encounter around them relevant and beneficial for their individual learning progress.

6.4. Society: Embedding Learning Opportunities in their Societal Context

Social computing tools can be used within educational settings as a means of re-integrating learning experiences into society. Langhorst (2006), for example, employed blogs in two school projects with (US) junior high school students, where a historical novel was read, commented by their students in a collective book blog, involving parents, other community members and the author of the novel. He records the involvement of the author and the parents as most rewarding, as they significantly enhanced student motivation.

3D virtual worlds can be employed as a creative means to prepare students for their future working life. For example, the “Learning and Teaching Scotland (LTS)”¹⁵⁶ organisation encourages students to take part in a “virtual work experience”,¹⁵⁷ which allows them to discover different professional profiles and job roles in a 3D animated environment, encouraging them

to investigate their own career options.¹⁵⁸ At the Glasgow Graduate School of Law (GGSL) at the University of Strathclyde the virtual town of Ardcalloch¹⁵⁹ was set up with the objective to facilitate the transition from academic law studies to vocational legal practice in Scotland. It allows learners to take up the role of legal practitioners operating in Ardcalloch, supported by databases of legal documents and templates, forums for discussion with practitioners as tutors, video course lectures and other additional multimedia tools.

Social computing can also assist in teaching civic competences and dealing with social problems. The “aVataR@School” project,¹⁶⁰ an EU-Minerva project involving schools in the UK, Romania, Germany, Italy and Spain, employs virtual role plays to assist in dealing with social conflicts arising in secondary schools, like social exclusion, school bullying and violence, racism, absenteeism, vandalism, problems with multiracial and gender integration. The overall objective of the project is to use virtual role plays to find a new way of conflict resolutions with a playful and cooperative approach, using peer mediation techniques.

This selection of cases already indicates the range of activities that can be implemented with social computing tools to build bridges between the E&T institutions and the society in which they are embedded. The particular strength of social computing lies in supplying playful environments in which learners can safely experiment with different strategies for behaviour without being subjected to the societal sanctions associated with their choices. Furthermore, social computing allows learners to experience themselves as part of a broader societal context, overcoming, at least occasionally, the artificial separation and isolation of E&T from society as a whole.

155 See: <http://ancient.arts.ubc.ca/> and <http://artsmetaverse.arts.ubc.ca/>.

156 <http://www.ltscotland.org.uk/>.

157 <http://www.ltscotland.org.uk/virtualworkexperience/index.asp>.

158 http://www.nesta.org.uk/assets/Uploads/pdf/Case-Studies/virtual_work_experience.pdf.

159 See <http://www.ukcle.ac.uk/vle/bespoke/ggsl/> and <http://www.ukcle.ac.uk/vle/bespoke/ggsl/ardcalloch/view>.

160 <http://www.avataratschool.eu/>.

6.5. Main Messages

Social computing promotes pedagogical innovation by supporting teaching and learning processes that encourage collaboration and personalisation. Social computing tools allow learners to mix and match, creating personalised learning strategies, adapted to their particular preferences, interests and needs. Learning 2.0 approaches make use of different sensory channels for learning and can provide more engaging learning environments; they support the implementation of collaborative projects, which enable learners to tap the tacit knowledge of their peers and develop their own ideas in a creative and supportive environment; and they allow learners to connect with societal players outside of the boundaries of formal education, enriching

learning experiences and better preparing learners for life in a globalised world.

Learning 2.0 approaches support motivation, participation and reflection, empowering learners to develop self-directed learning skills, and helping them to better realise their personal potential. They give rise to new interaction patterns between and among students and teachers, changing the roles of participants in the learning process. Teachers become designers, coordinators, moderators, mediators and mentors, rather than instructors or lecturers, while students not only have to assume the role of (peer) teachers, supporting each other in their learning endeavours, but jointly create both the learning content and context, developing their own rules and strategies for cooperation and content production.

7. Promoting Inclusion and Equity

This chapter is devoted to an assessment of Learning 2.0 opportunities for groups at risk of exclusion. Its main aim is to outline how social computing can contribute to re-connecting individuals who – for a variety of reasons – are disconnected or excluded from traditional learning opportunities, opening doors for personal and professional development and fostering their re-integration into a knowledge-based society.

Since the use of Learning 2.0 strategies for social inclusion is only slowly starting to emerge, there are few initiatives, most of them in the early stages of implementation. Correspondingly, research insights are still limited. To better

understand the potential of social computing for inclusion, eight Learning 2.0 initiatives were studied in depth as part of this study. Section 7.1 summarises the findings, outlining outcomes, success factors, barriers and innovation aspects. For a more detailed assessment, the reader is referred to the full report on this part of the study.¹⁶¹

Sections 7.2 to 7.6 highlight the potential benefits of Learning 2.0 for some marginalised

161 Cullen et al. (2009). *Good Practices for Learning 2.0: Promoting Inclusion. An In-depth Study of Eight Learning 2.0 Cases*. JRC Technical Note 53578, <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2600>.

Table 7-1: Overview of cases selected to examine the potential of Learning 2.0 for supporting inclusion

Name	Description
Notschool	Alternative on-line school for drop-outs, including students with phobias. 70% of students from inner city areas with high crime and other social pathologies. Asynchronous learning platform using Firstclass. Constructivist pedagogic model involving researchers-mentors-experts-buddies. Learning materials were collaborative and peer-produced – 150 courses, blending traditional with unconventional learning.
Assistive Technology Wiki	Supports knowledge creation about assistive technologies. Addresses low level of ICT use among disabled people. Uses wiki – free ‘wetpaint’ platform; Moodle for courses and YouTube to compile video database on products; discussion forum to share learning. Adopts a ‘routes of desire’ pedagogic model which aims to direct users to material that is most useful for them.
Mundo de Estrellas	Aimed at young people in hospital; their carers and family – 11,300 young people involved. Integrates formal learning; recreational learning; normalisation of illness through shared stories. Uses interactive games; text; video; interactive forum.
ALPEUNED	Involves 480 students with disabilities from the Spanish Open University. Supports peer counselling, provides a news service, and coordinates user involvement in related research projects. Applies low level Web 2.0 via interactive Forum and peer counselling.
Conecta Joven	Overall, provides e-skills for a wide range of at risk and excluded groups in 23 telecentres in Spain. The Web 2.0 tools are aimed at trainers and motivators who support end users. Incorporates an inter-generational learning model, supporting collaborative content generation and good practice sharing using social networking; ning; blogs and an interactive Forum.
MOSEP	‘More self-esteem with my e-portfolio’ - targets early school leavers by improving the skills and qualifications of their teachers and career counsellors. Integrates Wiki, Moodle, FlashMeeting, blogs, Skype, bookmarking, tagging, RSS feeds, Flickr, SlideShare. Pedagogic approach involves tutors as ‘learning companions’ to support self-organised and self-directed learning for end users.
Schome Park	Initially aimed at ‘gifted’ students who were underperforming in school – including students with autism. Another target group was the National Association for Gifted and Talented Youth’s GOAL cohort – students from socially disadvantaged or ethnic minority backgrounds who are currently underrepresented in higher education. Explores the potential and pitfalls of ‘Teenage Second Life’ as a learning platform. Uses an ‘open pedagogy’ model based on collaborative learning, incorporating Second Life; Machinima; blogs; wikis.
BREAKOUT	Initiative for offending and drug use prevention, including young people ‘at risk’ of offending in schools. Uses a blended e-learning approach, incorporating Web 2.0 with drama and video workshops. Involves a ‘life-swapping’ model based on promoting ‘empathy’, with links to San Quentin prison ‘Death Row’. Integrates traditional text-based courses with podcasts; blogs; interactive forum; social bookmarking.

Table 7-2: Target groups

Target Group	Notschool	ATW	Mundo	ALPE	Conecta	MOSEP	Schome	Breakout
Young People	X		X		X	X	X	X
Unemployed					X			
Disabled/Chronically Ill	X	X	X	X				
Ethnic Groups					X		X	X
Older People		X			X			
Poor, Homeless					X			

Table 7-3: Inclusion Objectives

Inclusion Objective	Notschool	ATW	Mundo	ALPE	Conecta	MOSEP	Schome	Breakout
Educational Re-insertion	X					X	X	X
Supporting Disability		X	X	X				
Digital Literacy	X							X
Overcoming Low ICT Use	X	X			X			
Addressing Social Isolation	X	X	X		X		X	X

groups, i.e. learners with special needs (7.2), hospitalised children (7.3), disengaged teenagers (7.4), socio-economically excluded individuals (7.5), and immigrants and ethnic minorities (7.6). The final section summarises the preliminary findings derived from the in-depth case studies.

7.1. Good Practices for Promoting Inclusion with Learning 2.0

As part of this study, a set of eight cases were studied to analyse the use of Learning 2.0 approaches and tools to support social inclusion. Table 7-1 provides a brief summary of the main features of these cases.

7.1.1. Case Characteristics

The cases represent a broad spectrum of target users, technical platforms and Web 2.0 configurations, learning and inclusion settings and scenarios and objectives. While the cases involve different user groups – encompassing older people, young people who are ‘hard to reach’, ethnic minorities, unemployed and people from deprived social backgrounds – two target groups stand out. These are, firstly, young people, who were involved

in six of the eight cases analysed, and people with disabilities or medical conditions, targeted in four of the eight cases. As Table 0-9 shows, a wide range of excluded groups are involved – including young people in hospitals with chronic and long term illnesses; people with disabilities; young people at risk of offending; school ‘drop outs’ and early school leavers; unemployed; ethnic minorities; older people.

Across all cases, the specific needs of the target groups studied revolved around gaining access to learning opportunities. Thus, a common objective across all cases studied is to facilitate the physical accessibility to learning opportunities, increase engagement in learning opportunities and promote social inclusion. The general focus on supporting participation in learning (Notschool, Schome, ALPEUNED, Mundo de Estrellas) and on addressing issues around low ICT use (Conecta Joven, MOSEP, AT Wiki) highlight the extent to which social inclusion is currently being linked, on the one hand, to engaging the ‘hard to reach’ in learning, and, on the other, to promoting digital literacy.

Concerning the learning objectives, there is a significant variability across the cases in terms of

Table 7-4: Learning Objectives

Learning Objectives	Notschool	ATW	Mundo	ALPE	Conecta	MOSEP	Schome	Breakout
Access	X	X	X	X		X		X
Computer skills		X						X
New learning	X						X	X
Self-directed learning	X		X					
increase motivation	X	X				X	X	
Personalisation	X							
Improve results	X			X				
Management					X			
Collaboration		X	X		X			X
Connect with society		X				X	X	X

Table 7-5: Technical Platforms and Tools

Technical Platform	Notschool	ATW	Mundo	ALPE	Conecta	MOSEP	Schome	Breakout
Wiki		X				X	X	
Blog	X				X	X	X	X
Social Networking	X	X	X	X	X	X	X	X
Podcasts	X							X
Online office/Forum	X		X	X	X	X		X
Social Bookmarking						X		
Personal Learning Environment	X		X	X		X		
Virtual environment			X				X	
VideoConferencing			X					
Co-authoring					X	X		
E-Portfolios						X		
Media sharing		X			X	X	X	X
Moodle		X				X		
Syndication						X		

objectives, with the exception of promoting learning accessibility which is a common theme addressed by six of the eight cases. All of the cases encompass at least two learning objectives, with Notschool, Assistive Technology Wiki and BREAKOUT addressing a range of objectives embracing accessibility, promoting new forms of learning, increasing motivation for learning, supporting user collaboration and promoting social engagement.

The cases illustrate that currently a wide range of social computing tools are being used to support inclusion, including social networking tools, from wikis, blogs and podcasts to virtual environments (Second Life), media sharing (mainly

YouTube) and syndication tools (RSS feeds). The two groups of tools most frequently used are social networking and on-line office tools, mainly interactive Discussion Forums. However, all cases involve combinations of different Web 2.0 tools. The cases reflect both relatively 'low tech' technical solutions, based primarily on discussion platforms, but also involve sophisticated technical platforms, such as immersive technologies and games in combination with tools like podcasts, blogs and social networking. There is strong evidence of positive outcomes, for both learning and inclusion, associated with the use of Learning 2.0. These outcomes are, however, independent of the level of sophistication of the tools employed.

Table 7-6: Learning 2.0 Activities

Learning 2.0 activities	Notschool	ATW	Mundo	ALPE	Conecta	MOSEP	Schome	Breakout
Access information		X			X			X
Peer review		X			X			X
Deliver information		X			X			X
Learning platform	X		X				X	X
Create/share knowledge	X	X	X	X	X	X	X	X
Collaborate/ interact	X	X	X	X	X	X	X	X

Table 7-7: Learning Settings

Learning Setting	Notschool	ATW	Mundo	ALPE	Conecta	MOSEP	Schome	Breakout
Secondary School						X		X
Remote School	X		X					
Vocational E&T		X						X
Higher Education				X				
Teacher Training								
Workplace Learning		X			X			
Lifelong / Adult training		X			X			X
Informal Learning		X			X			X
Completely Virtual	X						X	

Two learning themes are common across all cases: supporting, creating and sharing knowledge and promoting collaboration and interaction. A common objective across all cases is to promote accessibility to learning.

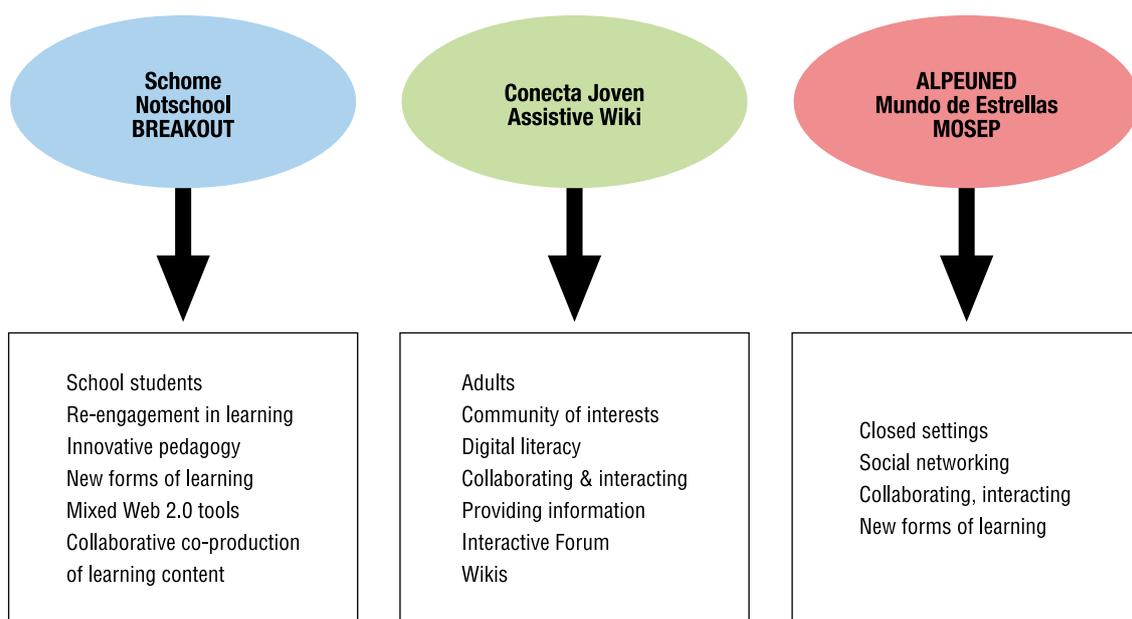
Innovative learning approaches using Web 2.0 are being promoted across different educational institutional settings, including formal (ALPEUNED, BREAKOUT), informal (AT Wiki, Conecta Joven) settings as well as initiatives which bring a virtual ‘non-formal’ institutional paradigm to what are essentially closed educational settings (Schome, Notschool, Mundo de Estrellas, MOSEP).

Drawing together the characteristics of the cases analysed, three types or clusters of Learning 2.0 for inclusion can be identified: (1) School students in re-engagement in learning using open pedagogy methods to support new forms of

learning and collaborative co-production of learning content; (2) Adult users promoting a ‘community of interests’ through supporting digital literacy, collaborating and interacting and providing information mainly through Interactive Forums and Wikis; (3) Closed settings – e.g. hospitals, universities – involving social networking to support collaboration and interaction and to promote new forms of learning.

Type 1 includes Schome, Notschool and BREAKOUT. All three examples focus on hard to reach, ‘at risk’ and disengaged young people of school age. They share a common focus – the re-engagement of young people in learning through the use of innovative pedagogic approaches involving collaborative learning and new forms of learning. This is supported by a combination of Web 2.0 tools, to promote collaborative production of learning content.

Figure 7-1: Learning 2.0 Clusters for Inclusion



Conecta Joven and the Assistive Technology Wiki represent Learning 2.0 innovations targeted at a diverse spectrum of adult learners and excluded groups. What binds them together is a shared ‘community of interests’. In the case of the Assistive Wiki, the focus is on sharing and evaluating knowledge about disability and tools and services to support disabled people. In the case of Conecta Joven, the focus is on helping people who are disadvantaged to gain the skills to enhance their life opportunities. In both cases, a key component of the inclusion strategy adopted is based on supporting the acquisition of ICT skills. Another common feature is the emphasis placed on providing information through discussion forums and wikis.

Type 3 reflects a more complex configuration of Learning 2.0 environments. On the one hand, Mundo de Estrellas stands out with its distinctive setting – in hospitals – and its use of sophisticated Web 2.0 tools, although MOSEP reflects a similar adoption of a range of Web 2.0 tools including blogs, wikis and social

networking. The common feature that connects the three cases centres on their adoption of a similar social networking approach, one that emphasises collaborating and interacting through using Web 2.0 tools. All three cases reflect the social isolation of their user groups – ALPEUNED through disability, Mundo de Estrellas through illness and MOSEP through educational failure. In all three cases, the common objective is to promote the wider engagement of users in social life by sharing experiences and problems in order to arrive at shared understanding and ‘sense making’ of the dynamics that lead to their exclusion – and hence the strategies required to promote inclusion.

7.1.2. Case Assessment Synthesis

Table 7-8 on the following pages summarises the main findings of the case assessment. Findings will be represented in more detail in the following sections, where applicable. For a full and complete account, the reader is referred to: Cullen *et al.*, 2009.

Table 11: Good practices for Inclusion: What lessons can be learned from which case?

	Profile	Outcomes	What works	Lessons learned for future
Notschool	'Low tech'. Asynchronous Web 2.0 using Firstclass. Constructivist 'open pedagogy' model. High degree of collaboration between all stakeholders. Strong and stable institutional base	98% of learners re-engage in education process. Results show increased confidence and self-esteem. Web 2.0 develops technical skills – e.g. photoshop, web design. 91% achieve Level 1 accreditation (GCSE Grade D) The initiative shows poor results with children in care and in dysfunctional families.	Constructivist 'open pedagogy' – empowers the learner. 'On-demand' learning improves accessibility. Mentoring support and democratisation engages hard to teach in learning.	Problems encountered in accreditation –value and equivalence of certificates questionable. Improve links between Notschool and formal education system (referrals; accreditation) in order to make students achievements valuable. Need support from home environment
AT Wiki	Moodle; Media sharing – YouTube; Wiki; 'Routes to desire' – self-directed learning pedagogy	Small number of users. Discussion Forum most used – other Web 2.0 less used. Wiki used mainly by professionals – low level of disabled users. 'Dynamic learning' supported by combining video with social networking and discussion forum. High levels of satisfaction and reported impacts but high % passive users	Cost-effective using open source. Blending of Web 2.0 tools promotes 'on demand' learning. Feedback loop inputs user needs into product design	Build critical mass of users. Manage and balance needs of diverse users Ensure that 'less powerful' (i.e. non-professionals) are actively represented.
Mundo de Estrellas	Sick children create and collaborate in 'virtual worlds' to learn about illness management; co-operation and some curriculum-based content. Media rich environment (Interactive games. Blogs; social bookmarking). Clear pedagogic model and strong delivery partnership	Very large user base and high utilisation. Significant success in promoting collaboration between disparate groups (young people, families, professionals, administrators). Normalising institutionalisation and reducing dependency culture. Basic ICT skills delivered. Advanced ICT skills gained through Web 2.0 – e.g. gaming	Substantial funding breeds success. Strong partnership crucial. Web 2.0 supports learning and motivation. Significant involvement of health professionals crucial	Institutional and professional buy-in is necessary. Integration within hospital culture supports success Web 2.0 can enable excluded young people to share their experiences and make sense of their condition
ALPEUNED	Low-tech platform (interactive Forum) but highly developed collaborative working and e-inclusion approach	Uses dotLRN 2.4. (disability standard) to make learning accessible. Organisational innovation – new support service for disability. Gathers evidence on disability needs. Shared problem-solving improves academic performance. Contributed to getting funding for 2 EU-funded projects	Institutional support from University. Accessibility compliance - AA level compliance with W3C WAI WCAG. Creating community identity	Institutional buy-in required. Integration of initiative into University culture and structure is crucial for success. Relevance in terms of contribution to courses is required
Conecta Joven	Incorporated in initiative based on regional/community 'telecentres'. Aims to support digital literacy and e-skills for the socially and economically isolated. Web 2.0 emphasis is on staff development (not end users). Tools include Wikis, blogs and collaborative learning platform	High staff turnover affects continuity and knowledge loss. Lack of evaluation data on outcomes at regional centres makes it difficult to measure impacts. Some evidence that Web 2.0 improves training skills and production of learning content. New content created for end users.	Users obtain diplomas in ICT – increases motivation and buy-in to the initiative. Strong partnerships ensure continuity and sustainability. Volunteers make it viable and cost-effective.	Importance of 'motivators' in e-skills development. Partnerships with business, local councils and third sector crucial for sustainability. Volunteers pivotal to success
MOSEP	Collaborative content development system enables teachers and trainers to develop customised learning modules, in form of 'e-portfolio'. Created content is uploaded into wiki to provide evolving knowledge repository	Improved soft skills e.g. time-management and team-working. Improved student self-esteem. Advanced technical tools improved learning participation and outcomes especially for kinaesthetic learners. Web 2.0 supported teacher CPD.	Active student participation in designing e-portfolio increased learning motivation. Shared roles between students and teachers supports co-production of knowledge. Consistent encouragement and support by 'learning companions'.	Technical support vital in multi-media rich environment. New collaborative teacher roles vital.

Table 11: Good practices for Inclusion: What lessons can be learned from which case? (Cont.)

	Profile	Outcomes	What works	Lessons learned for future
Scheme	Aims to use virtual worlds to explore new educational possibilities. Media-rich environment – Second Life; Machinima; blogs; blikis (collaborative blogs); social bookmarking. Innovative ‘Open pedagogy’ model - Students are given a high level of responsibility and control	Supports active citizenship – students have control over governance of ‘Schome Island’. Expands learning horizons through virtual field-trips Virtual world Builds confidence – safe environment. Develops high-level e-skills.	Virtual world supports safe environment and encourages confidence. Evolving and adaptive technical and pedagogic approach incorporates learning from failure. Supportive community of practice.	Build learning into evolutionary technical/pedagogic model. Engage users in constructing governance rules. Different capabilities and backgrounds of students creates tensions.
BREAKOUT	Project developed ‘lifeswapping’ collaborative learning model – getting range of actors in ‘offending scenarios’ to step into each others’ shoes. Technology combines on-line Forum; content co-production and editing; blogs; podcasts; social bookmarking	Project created empathy and awareness of problems of crime and drugs. Users rated programme very useful for realising importance of using their talents. Significant variability in use of Web 2.0 – linked to gender, ethnicity, educational performance. Problems with timetabling and organisational culture of the school inhibited outcomes.	Life-swapping model enabled students to step into the shoes of others. Blended model enriched learning outcomes. Team working amongst students. Social bookmarking – especially YouTube – enabled Web 2.0 to be relevant to student lives.	Context is everything – some students have exceptional social networking skills and poor knowledge application skills. Need management and staff buy-in. Need sustainability strategy to promote long-term impacts. Keep it simple – students find content management difficult.

7.2. Learners with Special Needs

The *ALPEUNED* project exemplifies the potential of social computing tools in accommodating the special needs of disabled students in higher education (cf. Cullen *et al.*, 2009; Santos & Boticario, 2006). ALPE (Accessible eLearning Platform for Europe) is an accessible, open source, standards-based collaborative platform and learning management system developed at the Spanish National University and tailored to support the more than 4,000 students with different types of disabilities studying at the Spanish National University for Distance Education (UNED). These students represent 2% of the total number of students at UNED and almost half of all students with disability enrolled at Spanish universities. Disabled students face all kind of barriers which, in the case of ALPEUNED, were drastically reduced, by supplying them with accessible learning platforms, and also allowing them to access peer counselling, learning materials and learning itself.

The platform allows accessible virtual communities to be built, where users with and without special needs can share common interests,

ideas, and feelings, and be aware of each other’s presence on the web. Moreover, it allows the building of virtual learning communities which include mechanisms which adapt the response to students, with or without special needs, so that they can organise themselves in communities of interest and promote dynamics in learning. The community was created so that disabled students could share their experiences and make their views heard. The fact that the platform is open to the UNED community enhanced the feeling of being part of a wider community.

Research findings indicate that the main asset of the community was peer support: Students tended to search for other members studying the same courses. They made new connections, shared materials, and updated information concerning events, funding opportunities etc. The community provided a source of practical support at short notice, and as needed. This proved particularly beneficial for those students who experienced feelings of isolation because of their disability. While only about 10% of disabled students used the platform actively, these students benefited substantially from the new possibilities for community building, using the platform

primarily for social exchange and networking (though this had not been the intention of its initiators), rather than more targeted learning activities. ALPEUNED is an example of successful organisational innovation, where an institutional space within a higher education institution was set up to allow disabled students to socially participate in the broader learning community and at the same time to collectively build a common interest community, thus bridging isolation and enhancing subjective learning experiences.

The *Assistive Technology (AT) Wiki*, while also addressing disabled people, is completely different in scope and approach. Started in July 2008, its main objective is to foster knowledge exchange on assistive technologies. The AT Wiki initiative was developed and implemented by AbilityNet, a national UK charity which develops adaptive and assistive technologies and delivers online e-learning to facilitate the use of these technologies. The AT Wiki aims to provide flexible, up-to-date information on all aspects of assistive technology, including the latest products available. It allows its members to share knowledge and opinion on this information, as well as suggest and discuss new products and services. In October 2008, there were 72 members in the AT Wiki community and since then it has grown steadily. Most of the members are Assistive Technology professionals. A minority are people with disabilities. Users also include therapists, health professionals and parents.

Research findings (cf. Cullen *et al.*, 2009) indicate that the AT Wiki helps to develop networks that provide learning opportunities. It also helps members to feel more involved in the community, and provides better information. The AbilityNet AT Wiki offers real value and benefit for users by providing a comprehensive resource on assistive technology, including up-to-date information (ranging from Learning Disabilities to VAT exemptions), a detailed list of FAQs, a discussion option on each page, and a series of fascinating and informative video tutorials and stories. The 'Products in practice' section allows

members to get information directly from vendors and/or other users about the technologies they are considering. Many of these videos have been collated by AbilityNet in their dedicated YouTube channel, to address the problems users had in finding and accessing such information.

There are a variety of further initiatives which explore the potential of Learning 2.0 strategies for different groups of learners with special needs. Tan & Cheung (2008) investigated the effects of computer collaborative group work, facilitated by an adult, on peer acceptance of a 7-year-old boy with Attention Deficit Hyperactivity Disorder (ADHD) in a Singapore junior school. It aimed to ascertain whether collaborative group work on a computer, with the facilitation of an adult, could help to increase his acceptance by classmates. The results do indeed indicate encouraging improvements. Tan & Cheung (2008) argue that, although this was a discrete setting, the findings are promising and this strategy may be replicated in schools to support mainstream inclusion for children with ADHD.

A study by Hogan-Royle (2006) underlines the potential of digital technologies to facilitate the inclusion of *disabled people* and, in particular, their access to learning opportunities. In a pilot study "iVocalize", a web- and voice-based assistive tool was employed to support 100 blind and visually impaired people in Canada by making learning opportunities on the internet accessible to them and by establishing, among others, an online community of blind learners. First results indicate that the project increased self-esteem and community building among participants. Unmet social, learning and employment needs were identified, which can now be addressed by policy makers and implemented through "iVocalize".

The "Make IT Yours"¹⁶² project uses digital technologies to facilitate new approaches to

162 See www.windmillhillcityfarm.org.uk/miy for examples of the participants' work and more information.

learning for adults with *mental health* issues, by supporting creative expression through digital photography and editing technologies, and additionally facilitating communication through e-mail. According to Grant & Villalobos (2008) the project highlights the huge potential the creative use of technologies has for developing confidence and skills.

The “Click2Meet” initiative¹⁶³ is a collaborative digital film project between two *learning disability* classrooms in Israel, one in a Jewish school and one in an Arab-Muslim school. During the school year, students documented both school and local community events, selected according to shared categories, using a digital camera. They then sent the pictures together with an explanation to their partners in the project. The digital album is documented on a shared dual-language (Hebrew/Arabic) website, and is the basis for a continuing dialogue between students using an active Internet forum, distance online learning lessons, and face-to-face meetings at each school. The two schools succeeded in overcoming Hebrew-Arabic language barriers by using ICT and even improved the foreign language levels at each school.

De Freitas (2007) discusses the deployment of the virtual world Second Life for therapeutic purposes. For example, Brigadoon¹⁶⁴ is an island in Second Life which provides its (currently 12) members, who have *autism* or *Asperger’s Syndrome*, with an environment within which they can interact with one another, learn to communicate in different ways and develop social skills in a safe and risk free context. Community members find this a more comfortable training context – less threatening than direct face-to-face contact. Another Second Life environment de Freitas lists, is Live2Give,¹⁶⁵ which supports an online virtual community of people dealing with

cerebral palsy and similar physically disabling conditions, encouraging them to share their thoughts, experiences and feelings.

The diversity of these examples shows that social computing tools can be exploited in a vast number of different ways to support learners with special needs. A common feature across these cases, however, is the fact that social computing applications mediate new forms of communication and collaboration which – for a variety of reasons – might be more accessible for learners with special needs.

7.3. Hospitalised Children

There have been many projects over the past few years, which try to make school education accessible via videoconferencing for *children who have to stay in hospital* for long periods.¹⁶⁶ Some of these projects are now adding social computing applications to enable hospitalised students to not only keep up to date with the learning material, but also to participate socially in a school environment. After observing that hospitalised children have a major predisposition to school failure, Mora Plaza *et al.* (2002) developed a virtual eLearning platform using social computing applications to offer these children quality education and opportunities for social interaction with their peers and educational centres. The virtual learning environment was well-accepted by resident children, who appreciated being able to participate, at least to some extent, in the activities from which they are excluded during their time in hospital. The lack of direct human contact proved to be a disadvantage, which could be alleviated however by the participation of the child’s school centre and habitual teachers, achieving a successful integration.

163 http://www.carmelvayam.org.il/click_f/.

164 http://braintalk.blogs.com/brigadoon/2005/01/more_about_brig.html.

165 http://braintalk.blogs.com/live2give/2005/01/all_about_live2.html.

166 See the eHospital Project (2008) research report for examples; additionally there have been large-scale initiatives in Italy, namely “schoolhost” (www.aoumbertoprime.marche.it) and subsequently “HSH@ Network” (<http://hsh.istruzione.it/portal/home.jsp>) and the “MyZone” project in Belgium, www.my-zone.be.

The “Virtual Classroom”¹⁶⁷ of the Bonifacius Hospital in Lingen, Germany, offers videoconferencing tools, e-mail exchange, and an online library, and encourages hospitalised learners to interact with their classmates through an online forum and chat facilities. The Áit Eile [Another World] project¹⁶⁸ in Ireland is an online community for children in hospitals which allows them (apart from accessing educational content) to communicate with one another, their classmates, families, and teachers via e-mail, live chat or video link.

The Spanish “Mundo de Estrellas” project,¹⁶⁹ studied in depth as part of the present study, provides videoconferencing tools to connect patients to their regular schools and employs a virtual world environment to encourage its young patients create characters and stories, share activities, be part of a group, and share their hospital experiences. In the first phase of the project, a virtual classroom and a virtual surgery, both with interesting educational features, were created. First findings on the pilot project in the Hospital Universitario Virgen de Rocío (Seville), indicate that 98% of children claim that this activity makes the day go by more quickly, almost 100% stated that thanks to Mundo de Estrellas their stay in hospital was more enjoyable, and 71% of parents noted that their children’s spirits rose after the use of the pioneering programme (eHospital Project, 2008).

Results of a survey among users, conducted as part of the present project’s in-depth case studies, indicate a high level of satisfaction in most areas, particularly when using the recreational activities and those tools and services for communication with other children in similar circumstances, such as chat facilities and videoconferencing. Professionals engaged in the system confirmed these results in their comments in interview.

Entertainment and recreation were the principal reasons for engagement and benefits from participation in Mundo de Estrellas activities, and these aspects are to be further developed in the new version. The main problems identified with the present system relate to technical issues and, to a lesser extent, variety of content. The in-depth study revealed that the benefits of this project were its reach, its level, flexibility and efficiency of access and the degree to which it was integrated with other healthcare initiatives.

The main factors contributing to the successful outcomes of the initiative are (1) the *successful implementation* of a technologically advanced suite of tools, services and content types to a high number of end users in a large number of public hospitals over a wide geographic area; (2) *dedicated staff* responsible for facilitating and encouraging engagement in project activities by patients on a regular basis, sometimes in situations where motivation can be difficult; (3) the *integration* of the project in a wider programme of initiatives where cross-fertilisation and technology transfer can take place; and (4) the firmly held *belief* that innovative technology can have a huge impact on health initiatives and particularly on the lives and well-being of young people in hospital.

The main lessons to be learned from the case study are that *institutional buy-in* is necessary for a project’s success; adequate *funding* ensures that project objectives can be met; *integration within hospital culture* and also *integration with related projects* support successful deployment; and the *dedication of key staff* are crucial to how activities are approached and received.

7.4. Disengaged Teenagers

A number of projects employ social computing tools to re-involve disengaged teenagers in learning. Learning 2.0 approaches tend to be particularly successful in this area, because they provide learning environments

167 Cf. <http://virtuelles-klassenzimmer.connectiv.de/>.

168 Cf. <http://yuriko.cs.tcd.ie/>.

169 Cf. http://www.juntadeandalucia.es/servicioandaluzdesalud/principal/documentosAcc.asp?pagina=gr_sabermas_yademas1.

that are more appealing to this audience, like computer games and virtual worlds.

Mackenzie (2007) investigates whether it is possible to use game-based learning techniques to re-engage teenagers in learning, particularly boys between the ages of 12-15, who are alienated from the learning process in schools. He implemented the “InQuizitor” software in UK secondary schools. The primary aim to re-engage children in study and give them confidence in their ability to remember and learn key information, was attained in the experimental setting. Mackenzie (2007) observed a steady increase in scores, demonstrating the gradual assimilation of information as the quizzes were played repeatedly. Additionally he found, that contrary to expectations, girls seem to be just as engaged with the product as boys. However, the first children to disengage (after around 80 minutes play) were highly achieving girls aged 16 to 17. They asked for the game rewards to be switched off so that they could concentrate purely on answering questions on the subject content. This behaviour and reaction is consistent with the observation that getting a high mark in the academic content seemed to supersede the reward implemented through the mini-games as being the prime motivator in repeated games.

The *Schome* project – studied in depth as part of this project – uses the SecondLife 3D environment to explore educational possibilities for underperforming students. The project supports students, aged 13-17, from the UK National Association for Gifted and Talented Youth (NAGTY), who were identified by their schools as underperforming despite being ‘gifted’. Gifted and talented students, although often seen as unproblematic, frequently have difficulties in social interaction and may become isolated and marginalised at school. In some cases, these students experience severe bullying. Some students in the project have been identified as being on the Autism spectrum and for them, face-to-face communication is very difficult. They find, however, the text-based chat in-world very

liberating as they do not have to read people’s body language or facial expressions. In general, the use of an avatar allows students to increase their self-esteem and their abilities to socialise and interact, without discomfort about physical appearance or awkwardness.

Research evidence suggests that the Schome virtual environment empowers and encourages learners to create and collaborate on topics of mutual interest. The anonymity afforded by the use of an avatar and a login name unrelated to real life provides a greater sense of equality, creating a more inclusive community, where, theoretically, participants are valued for their input, while age, appearance and qualifications are not central issues. Furthermore, students are in an environment where they feel safe, are not pressured to achieve and therefore do not feel as worried about failing. Technical skills seem to develop rapidly and there is much peer-support to help learners progress quickly.

Whilst there is plenty of scope for independent learning, one of the main benefits of Schome arises from the fact that the virtual environment naturally lends itself to collaborative learning. Community building is further enhanced by the Schome Park wiki and the Schome Park community blog, where all participants can discuss issues and make collective decisions. A significant number of students wrote some form of blog to record their learning experiences during the project. In their blogs, students can store ‘snapshots’ of Schome Park and receive comments and feedback from other users. Many students are also involved in Machinima projects, i.e. in creating Second Life films. With these 3D real-time animations, students work together in different roles - script-writing, filming and acting. These films are collated on Schome Park’s Blip.tv and YouTube channels along with other non-Machinima videos created by Schome Park students. Some students also set up their own internet radio station, which was then streamed into the island. Evidence shows that the students who made observable progress were those who were engaged in several of these sub-projects.

Notschool – another Learning 2.0 initiative studied in depth – also uses an online learning community to re-engage adolescents at risk as regards learning, but is different in scope and approach. The main groups targeted are young people, normally between the ages of 14-16, who have not been able to cope in a traditional school environment due to sickness, pregnancy/motherhood, phobia, disaffection, exclusion, bullying, reluctance to learn or travelling. Those eligible for Notschool will have been out of education for an extended period and have not responded well to other methods such as home tutoring or pupil referral units.

Notschool employs a constructivist, learner-led pedagogical approach which aims to be as far removed from the traditional educational experience as possible. The content and curriculum are established by the student and there is no fear of failure or pressure to achieve. Informal achievements are recognised and included as part of student progress. This focus on being ‘not school’ is further enhanced by the structural arrangements and semantics. Rather than the traditional student-teacher-headteacher structure, learners become ‘researchers’, who are guided and supported by ‘mentors’. Mentors devise a learning plan for each researcher and communicate regularly with them, setting learning goals and targets.

In contrast to Shome, Notschool uses relatively low-tech Web 2.0 tools, essentially supporting an asynchronous on-line community, which runs on the FirstClass platform. This platform allows mentors and researchers to incorporate Web 2.0 technologies into the learning process. Students will use and encounter podcasting, blogging, e-portfolios, and social networking. They will also use their ‘homepage’ (which has similar functions to Myspace and Facebook), stickies, musical stickies, hotlinking (like social bookmarking), and share videos. Most of the Web 2.0 tools used by young people within the Notschool community are for social networking purposes.

As every piece of work by researchers is tracked and monitored, students quickly build up a body of work, which can be seen as their e-Portfolio, which can become very valuable in helping students to gain acceptance for college placements, work experience or jobs. For some students, the majority of this portfolio evidence will be from their homepage, where they can share items with mentors and peers and pick up feedback. Others work hard to build up their own ‘community spaces’, which they may manage individually or collaboratively with other students. The content of these spaces can be used as evidence for their portfolio.

In total, since May 2000, over 5,000 students have been a part of Notschool.net. On average, students stay at Notschool for about 1-2 years. Over 80% of pupils are from the lowest economic groups. In the UK, the core group of pupils are identified by the school as ‘white working-class’. Through its informal approach where students have access to learning at any time and can begin to build responsibility for their own learning goals and progress, Notschool has successfully enabled 98% of young learners to re-engage in learning at some level and make observable progress. Additionally, evidence suggests that Notschool successfully empowers learners to take control of their own learning process, and builds up self-esteem, technical skills and self-directed learning skills.

*MOSEP*¹⁷⁰ (“*more self-esteem with my e-portfolio*”), is a pan-European initiative that started in 2006 with a view to encouraging young people in the transitional phase of their education (age 14-16) in setting up an ePortfolio to increase life opportunities and combat early school leaving. The target audience of the MOSEP project, however, are teachers, trainers and vocational counsellors who work with these young people ‘at risk’. A variety of social computing tools are used, including an open-source wiki, FlashMeeting, bookmarking and tagging, SlideShare, Flickr, RSS

170 <http://www.mosep.org/>.

feeds and blogs. These tools are employed for delivering, sharing and modifying course content; for networking teachers and trainers; and by the students themselves for creating and updating their electronic portfolios. Teachers and trainers are enabled to employ ePortfolios to help students 'at risk' to identify their skills, and areas where they can achieve, to increase self-esteem and to ultimately enable them to become self-directed learners, capable of making informed decisions about their future.

These examples illustrate that Learning 2.0 approaches can be very successful in re-engaging teenagers, not only because they provide rich and more creative learning environments, but also because they can support pedagogical approaches that put the learners at the centre of the learning process, enable them to assume responsibility for their individual learning progress while, at the same time, providing guidance and assistance.

7.5. Socio-economic Exclusion

Grant & Villalobos (2008) report on several Futurelab projects which aim to increase *social justice* using digital technologies.¹⁷¹ "London Digital Dialogues", for example, was a six-month programme for groups deemed to be in danger of *digital exclusion* for economic, cultural or financial reasons in Lambeth, London, UK. Projects included film-making with digital cameras and mobile phones, the creation of podcasts with local community groups, bio-mapping and creating live feeds for an artist's performance. All the projects' participants came together for a party in the Hayward Gallery that showcased their work and, ultimately, brought the disparate and diverse virtual networks into the real world in a fun way that celebrated the project and the communities that were part of it. This project used digital technologies as part of a new approach to learning, personalising each

project to appeal to the specific group of people who would be using it, and using digital tools to facilitate creative expression in many different ways.

Deery (2007) discusses the example of Dunhill Multi-Education Centre, a *community-based adult learning facility located in rural southeast Ireland*. The mission of the centre is to "provide opportunities for learning for all sections of the community" and to be inclusive of individuals from disadvantaged groups. Based in a village of 300 individuals, Dunhill serves the needs of approximately 25,000 people within a 50 kilometre radius. Since its inception, the centre has worked to foster relationships with postsecondary educational institutions to address niche education gaps using a learner-centred approach, develop working partnerships with a range of education and training providers, and conduct research and training programmes to meet the evolving needs of the community. A cooperation with the University of Wisconsin-Stout (USA) assists in conducting needs assessments and in building relevant training programmes. Through the use of videoconferencing technology and online education platforms (e.g., Blackboard.com; Desire2Learn.com), students are able to participate in training programmes that are unavailable locally due to lack of expertise or opportunity. Learning takes place through multiple formats, depending on the specific needs of the group.

The "Digital Live Moisling" project promotes video-blogging as web-TV for underprivileged kids in the Lübeck suburb of Moisling, Germany (cf. Hasebrook *et al.*, 2007). The project enables young people to express their views, develop their creative skills and build up self-esteem. The overarching objectives are social integration and crime prevention.

The BREAKOUT initiative aims to address problems of offending and drug-related offending. It employs an interactive learning environment to help young offenders, offending drug users, and

¹⁷¹ For these and further case studies see: www.futurelab.org.uk/themes/digital_inclusion/project_showcase.

young people at risk of offending to 'break out' of a vicious circle of bad experiences and low expectations of education, and hence limited life chance opportunities. Along with other tools, social computing, for example interactive forums, blogs and media-sharing sites, blended with interactive drama workshops, is used to encourage young people to develop and act out themes about crime and drugs, exploring and developing skills around 'empathy'. Research evidence (Cullen *et al.*, 2009) suggests that this blended e-learning model using Learning 2.0 tools had positive and tangible outcomes among young people in raising awareness about the key issues involved in crime – particularly knife and gun crime – and drugs, and how these issues can hold young people back from realising their talents and making the most of life opportunities.

Whereas these projects directly target marginalised groups, social computing applications can also be used to build up an infrastructure of support for the socially disadvantaged, as illustrated by the Spanish *Conecta Joven* project. *Conecta Joven* provides basic ICT skills to digitally excluded groups – in particular women over 45, older people and immigrant populations – by involving young people as (volunteer) trainers and mediators. The project is based in Catalonia, Spain and, in 2007, supplied ICT courses to 4,601 adult learners in 23 centres throughout the country, mediated by 814 young trainers. Social computing tools are used to overcome geographical barriers, coordinate tasks, collaborate and create a community. The coordinating staff of the project uses social computing tools to develop new course content and support methodology development; motivators – recruiting and supervising the young trainers – use Ning and discussion fora, chat and e-mail to share knowledge and collaborate in work groups and the young trainers themselves are linked through a blog.¹⁷² Apart from the

training platform used, the project also uses an e-learning platform and mobile platform.

Again, these examples illustrate the variety and diversity of Learning 2.0 approaches to target socially and economically disadvantaged groups. Although similar in spirit, there is no common approach to the deployment of social computing tools visible in the above cases. Rather, the richness and flexibility of these tools allow different approaches and address or alleviate the specific challenges and obstacles encountered in each particular case.

7.6. Immigrants and Ethnic Minorities

Some pilot projects are experimenting with social computing approaches to ease the social integration of migrant pupils. For example, the French *Nénuphar* project¹⁷³ (2004-2007), aims to help children and teenagers from migrant families recently arrived in France with integration into primary and secondary schooling. *Nénuphar* provides an easy-to-use online platform with videos, sound, flash animations, texts, and mail, which introduce students to the new school environment, addressing the difficulties they might encounter in their integration process, including cultural and language barriers.

The majority of these projects focus on language skills and intercultural competences. The German *LIFT* project¹⁷⁴ (2005-2007) aims to build and expand migrant pupils' language skills and intercultural competence, also training them in the proficient use of new media. Targeted at disenfranchised young people, aged 12-16, from migrant backgrounds, *LIFT* provides an online learning environment with access to web-based learning units and games. The Czech *CH@VE*¹⁷⁵ (2006-2008) has established a network of Internet

172 <http://conectajoven.blogspot.com/>.

173 <http://nenuphar.cfeditions.com/>, <http://cice.londonmet.ac.uk/TEAM/CSFR1.pdf>.

174 <http://www.lift-web.de>.

175 <http://internetovekluby.cz>.

clubs in 14 primary schools and 1 community centre, targeted in particular at children of the Roma community and their teachers. The project employs games and courses to stimulate pupils' creativity and interpersonal skills, develop their e-skills, and teach them how to use e-learning programmes.

Ebenhofer & Knierzinger (2007) observe that ICT, by offering text, sound, picture and video resources, can support the integration process of *migrant children in primary schools*, by facilitating (1) foreign language acquisition; (2) first language usage; and (3) intercultural learning. They argue that a computer is more motivating and versatile in supporting the simultaneous acquisition of oral and written foreign languages. Learning material in their first language (usually not spoken by the teacher or their peers) can be supplied, individualising the learning process and making learning more accessible to students. Furthermore, ICT can be used to access information on the children's countries of origin and support cross-border and school partnerships.

Similar initiatives exist for adult learners. In the *ICT for A8 migrants*¹⁷⁶ project in Dublin, innovative multimedia and Web 2.0 learning materials and courseware have been developed for Polish and Lithuanian immigrant learners which can help them to attain recognition of prior learning, gain ICT competencies and improve their English language skills. The *Europe for all*¹⁷⁷ project aims to develop an integral (digital) tool to measure and develop intercultural competences and language for immigrants in EU countries, guiding and supporting immigrants in their individual integration process. *ITpreneurs*¹⁷⁸ develops products to prepare immigrants for the Dutch integration exams, mandatory for attaining residence permits. A blended course combines e-learning, television, classroom, practical assignments, coaching and an exam preparation

guide. In a 3D virtual neighbourhood, students are placed in situations where they can practice their language skills, start a dialogue with the residents of the neighbourhood, visit a virtual bank, school, library, local government, etc.

Many projects combine language acquisition with the training of other skills that will facilitate employability and social integration. The European cooperation project *Wikim*¹⁷⁹ aims to provide computer-based language training tailored to the needs of newly arrived immigrants. The innovative training environment employs multimedia tools and enables personalised learning pathways, involving the immigrants themselves in preparing the content used during the training. The Swedish *Safir*¹⁸⁰ and *SafirEnglish*¹⁸¹ projects aim to rapidly integrate people with low computer and language skills into society and the labour market. *Safir* can be used as a course material in classroom teaching, or for distance learning with a tutor, but it can also be used as an individual language programme, allowing for personalised learning of the Swedish or English language. *AutreMonde*¹⁸² is a programme to eliminate illiteracy among around 200 residents of four centres for immigrant workers living in Paris. The programme provides free access to computers, training on basic computer skills, and multimedia educational applications dedicated to the elimination of illiteracy. A 'media library' supplies educational support to the trainers.

Additionally, there are quite a number of initiatives which support educators in addressing the needs of immigrant pupils and implementing intercultural education into their teaching. The Spanish *Aula Intercultural*¹⁸³ initiative offers a rich source of teaching materials and information for teachers at primary and secondary schools with immigrant pupils. It provides (a) best practices

176 <http://www.fit.ie>.

177 <http://www.e4all.eu/>.

178 <http://www.itpreneurs.nl>.

179 <http://wiki.wikim.eu/>.

180 <http://www.larcentrum.org/Safir/safir.cfl.se/safir/index.html>;
<http://www.larcentrum.org/Safir/omvardnad/index.htm>.

181 <http://www.larcentrum.org/Safir/english/index.htm>

182 <http://www.autremonde.org/>.

183 <http://www.aulaintercultural.org/>.

of how to manage intercultural relationships at school, (b) networking opportunities through an e-mail distribution list, and (c) examples of how to address cultural diversity at school. In particular, resources support second language acquisition and intercultural communication.

In the UK, *EMA*¹⁸⁴ (“Online Support for Ethnic Minority Achievement”) provides an online resource base mainly for ethnic minority teachers, but also for pupils and parents. The teaching and learning resources aim to increase educational achievement for children and young people with English as an additional language and those from minority ethnic backgrounds. The National Association for Language Development in the Curriculum (*NALDIC*)¹⁸⁵ releases weekly video broadcasts through its YouTube Channel¹⁸⁶ to support the learning and teaching of English as an additional language.

The Leonardo da Vinci initiative “Cultural Awareness in Technical and Industrial Training Project” (*CATIT*)¹⁸⁷ aims to improve vocational training for immigrants and ethnic minorities by supporting the training of teachers and tutors (cf. Bruce *et al.*, 2007). The tailored course is designed to enable tutors of specialised technical subjects to use effective tools and methods for the meaningful professional development of immigrants, employing, among others interactive web-based communication structures (Moodle). An emphasis is put on enhanced technologies to develop and deliver training in remote locations (Lapland, Euzkadi and western Ireland).

Other projects concentrate on social integration and respect for ethnic minorities. In Scotland, the *Anti-racist Toolkit (ARTKIT)*,¹⁸⁸ supplies an online toolkit available for all teachers

to improve anti-racist education. The material includes examples of good practice, exercises for staff development and electronic links to practical ideas about including racial equality in approaches to learning and teaching. The *iRespect* website¹⁸⁹ is a resource provided by the Gloucestershire Race Equality and Diversity Service to promote positive tolerance, cultural diversity and active citizenship. The website provides lesson plans on diversity themes and Web 2.0 functionalities for sharing and developing stories, including multi-lingual ‘talking books’. The *BE-ME* initiative¹⁹⁰ supports a website with authentic audio/video material and on-line learning packages to bring the experiences and history of black and ethnic minorities to the classroom.

Social computing can also be used to support immigrant youth in defining their own identity at the crossroads of the two different cultures they belong to. The *XénoCLiPse* cooperation project¹⁹¹ between Norway, Belgium, Spain and Germany encourages ethnic minorities to produce and distribute digital and media content, promoting media literacy, and, at the same time, improving the visibility of minorities in the media, and empowering minorities to become media agents. *Roots&Routes TV*¹⁹² is a web-TV targeted at young people of migrant origin. It started in 2007 in six German cities, and there are plans to extend it to Finland, France, Greece, Hungary, Italy, the Netherlands, Spain, Sweden and the UK. Young people with different cultural roots get together in workshops and young journalist groups, producing creative products and a web-TV magazine on urban culture and cultural diversity in their everyday life. The Spanish *Bordergames* initiative¹⁹³ offers workshops that give young people of migrant background the opportunity to learn 3D animation, video-editing, Photoshop, script writing, photography, drawing and social

184 <http://www.emaonline.org.uk>.

185 <http://www.naldic.org.uk/>.

186 <http://www.youtube.com/user/NALDICvideo?gl=GB&hl=en-GB>.

187 http://www.adulta.fi/catit/catit_sivut/english/index_eng.htm

188 <http://www.antiracisttoolkit.org.uk/html/mainmenu.htm>;
<http://www.antiracisttoolkit.org.uk/html/020101.htm>

189 <http://www.irespect.net/index.htm>.

190 <http://www.be-me.org/>.

191 <http://www.xenoclipse.net/>.

192 <http://rootsnroutes.tv/>.

193 <http://blog.sindominio.net/blog/bordergames>;
<http://jovesteb.org/ravalgames/weblog>.

skills including team building, self-respect and organisation.

The *Rete G2 seconde generazioni*¹⁹⁴ social network was created by young people of foreign origin in Rome in 2005. It soon disseminated throughout the whole country, emphasising the need for expression among young immigrants and ethnic minorities (cf. Fedeli & Rossi, 2008). The project employs blogs and wikis to promote collaborative writing, a social network site supporting different languages, podcasting and slidecasting facilities. It aims to encourage immigrant (and native) students to produce and share stories, practice different creative and language skills, and collaborate with others, promoting cultural exchange and self expression.

Looking back at these examples, two major Learning 2.0 strategies for promoting the inclusion of immigrants and ethnic minorities emerge: firstly, social computing has benefits for language learning and occupational competence development, and can also assist school teachers in implementing intercultural education. Secondly, virtual environments and networks can be created that encourage cultural expression and build bridges between the native and the host community and thus allow participants – in particular young people – to develop their cultural identity at the interface of the different cultures they belong to.

7.7. Main Findings

As most of these and further Learning 2.0 projects which promote the re-engagement of different societal groups at risk of exclusion from learning opportunities have not reached maturity yet, it is not possible to verify the assumption that social computing applications can indeed improve access and alleviate problems encountered by disadvantaged learners. While more research

on this issue is needed, the potential of social computing to facilitate inclusion seems to be significant. However, it should be born in mind that Learning 2.0 strategies may simultaneously increase existing barriers if no precautionary measures are put in place. In the following, the main findings from the eight in-depth case studies on inclusion are summarised.

In line with the objective of promoting access to learning and employment opportunities, the main outcomes of the initiatives studied in depth as part of this project are, on the one hand, the active educational and social *engagement* of participants, and, on the other, increases in the level of *skills and competences*.

There is strong evidence to suggest that Learning 2.0 tools have the capacity to develop and support ‘basic’ digital literacy, ‘higher level’ e-skills, as well as social and transversal skills, which contribute to opening up labour market opportunities. Across the board, participation in the initiatives studied lead to improvements in basic digital literacy. However, the depth and quality of the skills acquired varies significantly in terms of factors like the extent to which digital literacy is a key objective of the initiative, users’ existing levels of digital literacy, the governance structures and power dynamics within the initiative, and the availability and quality of mentors and tutors. The more sophisticated the applications used, the more elaborated the digital skills acquired.

The case assessment shows that Learning 2.0 approaches are also associated with positive outcomes in the development of personal skills like self-confidence, and social skills like team-working and time management. However, there are some indications that existing ‘skills gaps’ amongst learners in Web 2.0-rich environments could contribute to increasing skills gaps between learners who are computer-literate and those who are not, and, in turn, further feelings of exclusion.

While many projects succeeded in making learning opportunities accessible and increasing

194 <http://www.secondegenerazioni.it/>.

participants' engagement and motivation, active participation rates vary significantly across cases. In the BREAKOUT case, for example, the utilisation of the website by professionals working in drugs and young people's services was disappointingly low. However, participation rates are not always a reliable indicator for the impact or success of an initiative. Although, for example, only 10% of the 4,000 disabled students at the Spanish Open University were active participants in the ALPEUNED initiative, it represents in many respects a 'success' story, because it succeeded in making new learning opportunities available to disabled students, improved their social integration and gave them a voice within a community of learners. Participation and utilisation seem to be linked to factors like the learning and inclusion objectives of the initiative; the scale of the initiative; the kind of Web 2.0 tools used; their complexity and their perceived attractiveness; the quantity and quality of human support available; and the appropriateness of the pedagogic approach implemented.

In some cases, e.g. Notschool, it could be shown that, at least for some participants, the initiative proved to be a stepping stone for further learning, training and employment opportunities. However, given the novelty of Learning 2.0 approaches, most of the projects are too recent to be evaluated in terms of their sustainability.

7.7.1. *Fostering Innovation*

Many examples of *pedagogic innovation* could be identified – particularly new roles for learners and teachers in the learning process, based on the co-production of knowledge, using an open pedagogy model. What is innovative about the cases studied in depth is not primarily the fact that they employ Web 2.0 tools, but the way in which technologies support collaboration and social networking in innovative practices. In all cases, teacher-learner relationships have been replaced by more collaborative roles. Teachers become 'mentors' or 'learning companions' who facilitate independent learning and peer

assessment, while learners take control of their learning processes.

Moreover, the case assessment indicates that Web 2.0 tools can be used to create learning environments which open up spaces to develop creativity and collaboration and which are appealing to learners who find it difficult to flourish in conventional learning environments. Web 2.0 technologies further support inclusion by promoting empowerment, self-esteem and confidence-building. Evidence suggests that Web 2.0 can expand learning horizons and engage learners in rich content environments.

The changing roles of teachers, learners and peers also have a profound impact on the organisational culture, and promote organisational innovation. For example, enabling disabled students to voice their ideas concerning learning material and administrative procedures in the ALPEUNED initiative, has changed how disability is approached within the Spanish Open University. Moreover, traditional boundaries between schools and other environments – particularly the home and the family – are overcome by the creation of virtual learning environments, independent of place and time.

There are a number of examples of good practices that can be transferred to more conventional educational settings, for example Notschool's constructivist pedagogical model, MOSEP's use of 'learning companions' or Schome's use of 'virtual field trips' to provide rich and creative learning environments for students.

7.7.2. *Obstacles and Barriers*

All of the examples studied experienced challenges of different kinds and with varying degrees of severity. The main barriers to positive inclusion encompass technical problems, motivation and engagement, digital skills, accreditation and funding. Additional challenges arise from existing power structures, which are resistant to change and equality.

Technological problems were common across the board. Some technical problems were identified with more complex tools, like virtual worlds, and outdated soft- and hardware, others with interoperability issues. Motivational and engagement problems arise in all phases of the projects. In the first place, overcoming initial resistance to participation is a huge obstacle, given that excluded groups are typically 'hard to reach' and have previous negative experiences of learning and, in some cases, of technology. However, retaining a critical mass of users and addressing power dynamics that militate against the active participation of certain kinds of users, proved to be equally challenging.

Digital literacy, if not addressed, can endanger the successful deployment of innovative social computing tools. For example, the more sophisticated applications – particularly the podcasting and weblog functions – were seen to be too complex and too time-consuming by some learners. However, simple tasks – like logging in – also proved challenging in some cases, in particular when accessing programmes involved several steps and/or visual representations that the learners were not used to.

The cases studied show that Learning 2.0 environments can open up opportunities for the 'hard to teach' to engage in creative and self-paced learning. However, in a world of prevailing educational standards, it remains difficult for learners to gain formal recognition for their achievements. Moreover, organisational problems arise associated with the introduction of new types of learning and teaching roles, which are moving from a transmissive to a collaborative learning and teaching mode.

Finally, financial problems arose in all cases, ranging from acquiring initial start up funding covering the cost of developing and implementing a large scale infrastructure, to developing and maintaining an effective sustainability plan that enables the initiative to continue.

7.7.3. Factors for Success

Key mediating factors in realising successful learning and inclusion outcomes – i.e. an increase in skills and competences and a fruitful participation and engagement in learning opportunities – comprise: existing levels of basic digital literacy; the cultural and social mix of participating learners; and the presence and quality of support available from other sources, for example family and peers. Participants' profiles, group interaction and social support are key mediating factors in realising successful learning and inclusion outcomes. Similarly, the commitment and motivation at the human interface level and an organisational network of support make the project objectives feasible and sustainable. Equally, organisational buy-in – particular from professionals and senior management – is crucial for success. Strong partnerships and associated financial backing, have proved to be essential for the success of the initiatives. Existing power dynamics – for example, those between computer-literate and non-literate – can not only reduce the positive impacts of Learning 2.0 for users but also increase social exclusion for the vulnerable.

Pedagogic models and approaches that are consistent with users' skill levels and interests and which support the technical strategies and tools adopted were key to the success of the projects studied. The development and implementation of new forms of collaborative learning roles significantly contributed to successfully engaging hard-to-reach groups in productive learning experiences. One of the key findings in this area was that positive outcomes are not necessarily linked to the richness of the Web 2.0 technologies on offer. Although media-rich environments show positive learning gains for participants, and promote their active educational, social and psychological re-engagement, low-tech environments show equally positive results. The key factors which promote positive learning outcomes appear to be how well the following fit together: the skills, needs and expectations of

users; the technological and pedagogic choices made and the availability of effective support roles like mentors and ‘learning companions’.

7.7.4. Overall Conclusions

There is strong evidence of positive outcomes, for both learning and inclusion, associated with the use of Learning 2.0, indicated by the improved accessibility and availability of learning opportunities for the hard to reach, a greater motivation and engagement when participating in learning, a general improvement of participants’ skills and competences, and positive effects on social integration. The key factor supporting these positive effects appear to be how well the needs of users fit together with the technological and pedagogic choices made, and the availability of effective support. Key mediating factors in realising successful learning and inclusion outcomes are existing levels of basic digital literacy, and the cultural and social mix of participating learners. Unfavourable power dynamics can offset positive impacts.

Learning 2.0 environments involving innovative pedagogic approaches, like open pedagogy, open up opportunities for the ‘hard to teach’ to engage in creative and self-paced learning. However, accrediting any achievement gained causes problems in a world of prevailing educational standards. There is a need for more effort to develop accreditation and standards procedures and protocols for Learning 2.0 that can help bridge gaps between it and the conventional education establishment.

Strong partnerships, combined with necessary levels of sustainable funding, are crucial in supporting the success of Learning 2.0 initiatives. There is a need for further research to gather evidence on the cost-effectiveness of Learning 2.0 to feed into both future business models and policy initiatives designed to promote its further development. This work also needs to consider how low cost solutions and open source technologies can contribute to developing Learning 2.0.

■ 8. Challenges for Learning 2.0

The examples reviewed in Chapters 4-7 have made the case that social computing provides a collection of tools that are changing teaching and learning practices at different levels. On the one hand, social computing is helping to increase the personalisation of learning paths. Learners can be active stakeholders who shape their own learning spaces and resources, actively creating content and defining their own learning pace. On the other hand, social computing technologies are key enablers of collaborative learning processes, where peers and more knowledgeable actors function as ‘scaffolding’ to the development of new abilities, and competences by the learners. Further, collaboration is not limited to the learners’ side: teachers and educational organisations can also reap the benefits of an unprecedented abundance of resources and a new way of collaborating with peers.

However, even though social computing is wide spread among internet users and young learners, making disruptive changes possible, its evolution in the educational context faces a number of challenges relating to both the pedagogical and organisational aspects of education, and the domain of technological requirements. In this chapter some of the main barriers, risks and challenges to the implementation of social computing in teaching and learning practice

will be presented and strategies for overcoming obstacles will be discussed. Access to the new Learning 2.0 landscape outlined above can be constrained by a lack of access to technological resources (computers or broadband connection) or by a lack of digital skills and competence (both on the learners’ and the educators’ side). Established practices in E&T institutions may also constitute a critical obstacle to adoption and appropriation of new educational practices based on social computing, thus inhibiting innovation. Furthermore, a lack of funding, staffing or competence building, together with the inability to fit new practices into the existing institutional framework, might hamper the take up of Learning 2.0.

Table 8-1 below provides an overview of the different types of barriers that have been identified throughout the project and indicates the parties affected by their inhibiting effect. This overview already indicates the pivotal role of teachers in facilitating change. Clearly, learners’ digital competences have to be developed and their needs adequately addressed, while E&T institutions need to supply a framework in which Learning 2.0 can thrive. However, it is the teachers who will have to implement change, advocating innovative learning practices and mediating between the different actors involved on the part of the learners and the institutional set up. They

■ *Table 8-1. Barriers and affected parties*

	Type of Barrier	Learners	Teachers	E&T institutions
1	ACCESS	x	x	x
2	BASIC DIGITAL SKILLS	x	x	
3	ADVANCED DIGITAL COMPETENCES	x	x	x
4	SPECIAL NEEDS	x	x	
5	Pedagogical skills		x	
6	UNCERTAINTY		x	
7	SAFETY CONCERNS		x	x
8	INSTITUTIONAL CHANGE		x	x

will not only have to improve and constantly update their own digital skills and those of their learners, but also, at the same time, they must ensure an accessible, safe, accommodating and functioning learning environment. Additionally, they will have to develop their pedagogical skills to implement more collaborative and learner-centred learning strategies. Learning 2.0 will only be successful if teachers are actively supported in assuming this critical role.

8.1. Access

There is evidence that the introduction of digital technologies in homes and schools can serve to reinforce and reproduce existing inequalities in the education system (Green *et al.*, 2005; Davies & Cranston, 2008). Accessibility constitutes a major obstacle to equal opportunities and remains a key problem for inclusion (Akbulut & Kiyici, 2007; Ray, 2006; Davies & Cranston, 2008). Therefore, to benefit from the advantages of Learning 2.0, equal access to these tools and the necessary skills for using these resources have to be ensured.

At present, differences in access to ICT are noticeable both on an individual and an institutional level in Europe. Individuals' internet access, one of the basic requirements for the use of online environments in learning, differs substantially between different age and social groups and among different regions in Europe (Ala-Mutka, 2008). For example, only 19% of females and 31% of males aged 55-74 used the internet regularly in the EU27 in 2007, as opposed to 77% of females and 79% of males aged 16-24.¹⁹⁵

Regional differences are reflected in schools' ICT equipment and internet connectivity levels. While the use of computers in European schools has reached almost the 100% saturation point in

all member states, there are large variations in the number of computers per 100 pupils, ranging from 27 (DK) to 6 (LV, LT, PL, PT, GR) computers per 100 pupils in 2006. Computer equipment levels also vary according to school type with an average of 9 computers per 100 pupils in primary schools (8 of which are internet connected) at the bottom end and 16 (14 internet) computers per 100 pupils in vocational schools at the top. Similarly, internet connectivity varies according to country and school type: While in the Nordic countries, the Netherlands, Estonia and Malta more than 90% of schools have broadband access, in Greece only 13% of schools were connected in 2006 (Korte & Hüsing, 2006).

In addition it should also be considered that one of the cornerstones of Learning 2.0 is represented by the possibilities enabled by social networks. However it is widely recognised that social computing networks build on pre-existing relations (Rudd *et al.*, 2006a; Owen *et al.*, 2006). The lack of social capital in segments of the population may also constitute a reason for exclusion from innovative modes of education that strongly rely on networking resources and capabilities.

8.2. Basic Digital Skills

Beyond the differences in the opportunity to access the media that enable Learning 2.0, differences in the acquaintance with ICT in general, and social computing in particular, among different learners and learner groups, may constitute another type of barrier leading to a possible "participation divide" (Hargittai & Walejko, 2008).

Eurostat data (2007)¹⁹⁶ indicates that, for example, only 24% of Europeans have posted messages to chatrooms, newsgroups, or participated in online discussions; again there

195 http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-QA-07-023/EN/KS-QA-07-023-EN.PDF.

196 http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-QA-07-023/EN/KS-QA-07-023-EN.PDF.

are large differences between countries, ranging from 43% in Estonia to 8% in Cyprus. Similar differences emerge with more basic digital skills, like using a search engine or sending e-mails with attachment (EU27 average: 57% and 50% respectively, ranging from 23% and 21% (RO) to 83% & 75% (NL)).¹⁹⁷ Thus, not all learners might be endowed with the basic digital skills that allow them to participate in Learning 2.0 activities.

Different digital skills levels will have to be considered and addressed when exploiting social computing applications in learning contexts. It is important to take into account that large digital divides occur, for example, between younger and older teachers. Taking basic ICT skills as an example, 80% of younger, but only 56% of older, European school teachers feel very competent in using text processors (Empirica, 2006). Before taking up new learning practices in education, teachers need to have the basic knowledge of the tools themselves, or they will not be able to plan or support their students' activities.

8.3. Advanced Digital Competence

An additional barrier to the deployment of social computing tools in the E&T context may relate to the poor mastering of advanced digital competences, which affects both learners and educators. Digital competence involves the *confident and critical use* of ICT for work, leisure and communication, and requires an informed and critical attitude towards interactive media and digital information – especially concerning its reliability.

On the educators' side, Childnet International (2008) observes that, in the UK, professional development programmes' advice and information for (primary and secondary school) teachers have not kept pace with the emergence of new technologies and practices, particularly those

that have become widespread and commonplace among learners. While educators may well be using social networking services themselves, they may not recognise the educational potential and opportunities for their learners, or understand the potential risks, for both themselves and their learners. Many educators do not use the Internet in the same way as many young people – as a ubiquitous, always-on extension of their physical space which, for young people, has always been around. In addition, the following areas raise a number of concerns that may contribute to a slow take up of social computing in formal education contexts:

- **Privacy and personal data disclosure:** Young (i.e. adolescent) internet users in particular tend to misunderstand the nature of social computing environments. They may believe they are writing for a closed group of friends, and unaware that the information they have posted may be publicly available, can be searched for and read by a much wider audience (Childnet International, 2008). They tend to disclose their most intimate feelings without considering the consequences of publishing these (Berson & Berson, 2006). Personal information is also shared through the media that individuals upload, in the comments attached to media and events, in the groups individuals join, and in the public messages sent through the wall feature of profiles (Davies & Cranston, 2008).
- **Advertising and spamming** might pose a threat to the use of social computing services with younger learners (Davies & Cranston, 2008; Buckleitner, 2008). A survey of online advertising for the National Consumer Council (UK) found that only 37% of advertisements on popular websites were labelled as such; hidden persuasion techniques are employed, and a quarter of the 70 advertisements examined were for products or services that are prohibited for children under 16 in the UK, including gambling and dating (Fielder *et al.* 2007;

¹⁹⁷ http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-QA-07-023/EN/KS-QA-07-023-EN.PDF.

Davies & Cranston, 2008). Educators have to be aware of these risks, take adequate measures to address them and raise awareness among young users. In the case of primary and secondary education, teachers might consider using products and services that are tailored for learning purposes and avoid inappropriate advertising activities.

- **Copyright.** Since social computing gives rise to content generation, re-purposing and consumption, many people will create and modify content, which may lead to questions as to who owns the content (cf. Franklin & van Harmelen, 2007). When anybody can use, create and publish content online, both conscious and accidental infringements of copyrights and moral rights (e.g. plagiarism), and personal misunderstandings can occur (Ala-Mutka, 2008). Although copyright protection is automatic upon the creation of a qualifying work, many users of social computing technologies and services are not aware of this and mistakenly believe that, because of the ability to create, share and adapt material, the Internet contains vast amounts of public domain material that can be freely accessed and used (Franklin & van Harmelen, 2008).

8.4. Special Needs

The use of social computing tools in E&T bears the risk that learners who are already at an advantage will be favoured, while those who are currently alienated from formal learning and could be excluded from benefiting from the knowledge society will find that learning opportunities become even less accessible.

Woodfine *et al.* (2008) emphasise that the use of online learning activities raises problems for higher education students with dyslexia far beyond accessibility and web design. They argue that social computing tools, while supporting different learning paces and cognitive styles

in some cases, are at the same time producing close to insurmountable barriers for students with cognitive disabilities in general, and dyslexia in particular. They present the results of a research project in which several groups of (UK) higher education students engaged in online authentic text-based synchronous learning activities. Their results indicate that text-based synchronous learning environments can marginalise, demotivate and disappoint students with dyslexia, who have difficulties in reading, spelling, word order and argumentation. Deficiencies in transposition, memory, organisation and time management, and a lack of confidence were revealed to be additional impediments. Woodfine *et al.* (2008) conclude that students with dyslexia require specialised support and adjustments (technological or tutor support), otherwise they will feel excluded, ignored or even withdraw from the learning activity.

In a similar vein, Bühler & Fisseler (2007) outline possible barriers for people with disabilities. They argue that current trends in the use of blogs, wikis and other social computing applications, towards e-assessment and e-portfolios, pose additional threats to accessibility for disabled people, as (1) the complex interrelation of different websites and services, mediated through RSS, makes it more difficult to ascertain accessibility and enforce standards; and (2) since users are content producers, they have to be supplied with, and act in accordance with, accessibility guidelines.

However, Bühler & Fisseler (2007) also point out that, over time, social computing applications might even serve to support and facilitate accessibility in three ways: (1) with the creation of a central interface tailored to each individual's needs including disabled students, providing the information accessed through different networks and services; (2) standards for accessibility could be integrated in the layout of social computing services, making it easy, even for the ignorant user, to create fully accessible content, supporting accessible authoring practices; and (3) the

presence of disabled people on the net and their interaction, communication and collaboration with non-disabled students, will raise awareness of their needs; the correction options integrated in blogs and wikis, for example, will make it easy for users to remove barriers to access.

This ambiguous result already indicates that while social computing tools pose new challenges to inclusion, their potential for supporting and facilitating inclusion – once certain obstacles are overcome – is substantial. However, policy support might be needed to ensure that inclusion and equity are facilitated and not undermined by the further development of dynamic web technologies.

8.5. New Pedagogical Skills

Embedding social computing tools in education is dramatically changing the role of teachers, transforming them into facilitators of processes of knowledge (co-)constructions in which learners are far more active than they have ever been. Under the Learning 2.0 paradigm, teachers can be conceived of as “scaffolding”, i.e. as guides, coaches, moderators, who provide a supportive environment in which learners can learn – with another and from one another – in the way that best fits their individual learning needs, preferences and strategies. While conceptually the learners move to the centre of the learning process as active creators of their own learning history, pragmatically, the role of the teacher becomes a critical and central concern. Teachers will have to allow for individuality, personalisation and self-creation, while, at the same time, providing the guidance and support necessary to enable students to increase and develop their capacities. These demands on the teacher represent an additional barrier to the mainstream deployment of Learning 2.0 approaches. Institutions need to help their teaching force to face this challenge.

Educators’ confidence in and experiences with social computing services is one of the main

barriers to exploiting these within education (Childnet International, 2008). At university level also, lecturers’ lack of appropriate competencies is seen as one of the reasons for delay in deployment of the opportunities offered by social computing (Blin & Munro, 2008). Although some studies in OECD countries show that teachers might be amongst the most skilled technology users, it appears that they are unable to take advantage of their competence and apply it to the way they teach (cf. OECD, 2008). According to the OECD (2008), three reasons emerge as the most salient for explaining this paradox: (1) the absence of appropriate incentives to use technology in the classroom and, more generally, to experiment with innovative approaches; (2) the dominant culture in the teaching profession, which does not rely very much on research-based evidence to identify good teaching methodologies and strategies; and (3) the observation that teachers lack the vision and the personal experience of what technology-enhanced teaching could look like. Teacher Training institutions and educational institutions as working environments should encourage teachers to nurture and adopt a new pedagogical culture through initial research-based training and continuous personal development.

Furthermore, as was pointed out in the validation workshop, today’s teachers are trained to become experts in *content* (especially at university level), rather than experts in facilitating knowledge construction. As a result, many educators are discouraged by the time and effort needed to implement Learning 2.0 approaches. Moreover, the institutional framework may limit the freedom teachers have in employing innovative approaches, social computing tools and collaborative assignments.

8.6. Uncertainties

This report highlights the ways in which Learning 2.0 is currently transforming learning and teaching. While its potential to promote innovation in E&T, as outlined above, is

substantial, there are a number of uncertainties that make it difficult for E&T systems to fully embrace the phenomenon and endorse its deployment in formal education.

In particular, the results of the study show that most initiatives are experimental in character. Little effort has been made to translate more recent learning theories, as described in Chapter 2, into practice or test their validity. Research is also scarce on the cognitive, pedagogical and psychological aspects related to ICT-enhanced learning processes. Therefore, practitioners cannot rely on solid *pedagogical models* or frameworks to guide them in deploying Learning 2.0 strategies.

Moreover, Learning 2.0 approaches underscore two potentially conflicting dimensions: On the one hand, *personalisation*, supports individualised and self-directed learning strategies; and on the other, *collaboration*, supports the co-construction of knowledge and the co-production of content. There is a lack of evidence and insight on how to reconcile these two tendencies and unite them in a comprehensive and coherent pedagogical approach. Additionally, the need to define blended strategies makes the definition and management of educational plans complex and demanding, in terms of both the definitions of educational formats and training activities, and the preparation of content building blocks. On top of this, good practices are difficult to transfer, increasing uncertainty.

Further uncertainties are related to the reliability of user-produced content, control of data and copyright regulations. As yet, there are no mechanisms in place to certify the reliability of content produced by non professional entities (e.g. Wikipedia). Results of the case studies show that, in general, there is a clear awareness of this among project organisers, teachers and students. In some projects, learners and teachers proactively deal with this problem by implementing quality control mechanisms. Similarly, not all knowledge that is freely available is *free*

knowledge, i.e. knowledge that users are free to consume, to copy, adapt and use for any purpose; and to share as a common good. Since it is difficult to discern the different categories and levels of ownership pertaining to content that is freely available, learners and teachers are faced with uncertainties concerning the legitimacy of their use of data.

Another set of risks is associated with the fact that, in most cases, Learning 2.0 initiatives will make use of an external service provider, which can lead to problems concerning the *control and preservation of data* (cf. Franklin & van Harmelen, 2007; Childnet International, 2008). Many Learning 2.0 environments do not enable or allow users to make back-up copies of the collaboratively generated learning content, so that there is a danger of content being lost to its producers. Some services retain the right of ownership of the content generated by users, making it impossible for learners and teachers to control the ways in which their creations are used (or misused). However, as Learning 2.0 strategies become more widely used, more and more services and platforms are emerging that directly target E&T and also address these challenges.

8.7. Safety and Privacy Concerns

Educational institutions and teachers may be reluctant to encourage the adoption of social computing because of safety concerns. Ray (2006) suggest implementing the “Kids’ Rules for Online Safety” as a possible way of addressing these concerns and raising awareness for the risks associated with social computing among young learners. Additionally, password-protected environments should be preferred, particularly for younger learners (Berson & Berson, 2006; Kolb, 2006), and privacy protections such as the use of pseudonyms, first names or initials as student identifiers should be implemented (Berson & Berson, 2006). Student safety can be further improved through constant guidance and supervision (Ray, 2006; Akbulut & Kiyici, 2007).

Being responsible for the safety of their pupils, E&T institutions may want to avoid exposure to incidents relating to the following risks:

- **Self-destructive behaviour:** Young people might engage in self-destructive behaviour, including sexual exploits, drug experimentation and criminal activity, and share these activities with their online social networks. In some US secondary schools, students are already facing disciplinary action for their blog posts, and police are monitoring blogs, sometimes uncovering confessions of crimes by teenagers (Berson & Berson, 2006). Inappropriately or unintentionally shared personal data may be used in bullying, be accessed by potential employers or educational establishments, lead to an inability to escape past actions and make a fresh start and be used in grooming and abuse (Davies & Cranston, 2008).
- **Cyberbullying** i.e. the deliberate use of ICT, particularly mobile phones and the Internet, to upset someone, is an increasingly common phenomenon (Childnet International, 2008). Some educational institutions have reacted to cases of cyberbullying of both students and teachers by restricting access to collaborative content sites (Ala-Mutka, 2008; Berson & Berson, 2006). The Euro Barometer Survey (2007) found that features on social network sites such as applications for rating friends could facilitate bullying activity and there is evidence that young people have created fake profiles or websites about peers and then used these to spread false or offensive content (Davies & Cranston, 2008). However, the 2006 National Bullying Survey in the UK found that whilst 69% of young people had been bullied, internet technologies and text messaging was a factor in only 7% of cases (Byron, 2008).
- **Online grooming** refers to a number of techniques that are used to engage the interest and trust of a child or young person for the sexual gratification of an

adult (Childnet International, 2008). Social networking services are especially susceptible to this kind of illegal online activity. The UK Centre for Exploitation and Online Protection has noted an increase in the number of reports to law enforcement agencies that relate to sexual abuse in social networking environments (Brennan, 2006). Whilst social networking sites have not increased the risk to young people of being victimised by online molesters, the Second Youth Internet Safety Survey of a representative sample of US teenagers in 2005 found that 13% of young people had received an unwanted sexual solicitation online, and 4% of these had experienced an 'aggressive sexual solicitation', i.e. one in which the solicitor made, or attempted to make, offline contact with the young person (Wolak *et al.*, 2006). Wolak *et al.* (2008) found that posting personal information online does not, by itself, appear to be a particularly risky, rather, it is voluntarily interacting with strangers online, particular engaging in conversations of a sexual nature that increases young people's risk of sexual solicitation and aggressive sexual solicitation. Fortunately, due to the general concern, most children are well aware of the dangers of talking to strangers online and understand basic internet security (Fielder *et al.*, 2007). In all of these cases it is vital that schools understand the issue, know how to prevent and respond to incidents and keep up to date on the legal issues surrounding the subject (Childnet International, 2008). Students need to know how to identify and report inappropriate behaviour on the sites they are using.

8.8. Institutional Change

Social computing underscores recent changes in the ways knowledge is accessed and disseminated, created and shared. This trend exerts pressure on formerly closed E&T

organisations, forcing them to acknowledge learning opportunities outside their walls, and inviting them to develop a new learning culture that is open to renovation and innovation. The need for a transformation of the education culture that has been brought about by the Learning 2.0 phenomenon is as yet poorly understood. However, experts consulted in the validation workshop strongly agreed that embracing the opportunities provided by social computing requires changes in the vision of E&T. It was argued, for example, that education institutions need to become reflective learning organisations that identify strengths, weaknesses, opportunities and threats; and plan, set and meet targets. Some of the transformations called for have been discussed above, such as the changing requirements for teachers, which need to be supported by institutions. Further challenges for include:

- **Re-thinking expected learning outcomes.** Learning 2.0 is based on new educational formats which support the generation of knowledge products that are radically different from traditional learning outputs. The resulting need to redefine the content and shape of learning outcomes represents a challenge for organisations and may constitute a barrier to the full endorsement of innovative pedagogical practices. Consequently, assessment and certification procedures have to be adapted as well.
- **Need for resource investment.** As outlined in 3.2 above, a recurrent theme in all the in-depth case studies is the paramount importance of a supportive institutional framework for the successful implementation of Learning 2.0, by financing, supplying equipment and technical competences, but

also by adapting organisational structures to the needs of the projects (e.g. time schedules). This need for active institutional engagement in the development of new practices may represent a reason for some E&T organisations to be reluctant to deploy Learning 2.0 approaches.

- **IPR-management, identity and privacy issues on individual and organisational level.** IPR-management, (digital) identity and privacy issues in social computing environments are a major concern for E&T organisations, due to the legal implications involved. These issues need to be addressed by each initiative separately, depending on the pre-conditions and demands and needs of respective target groups. Digital identity and ownership of knowledge and data need to be not only managed but also ensured and protected by deploying well-prepared terms of use, copyright and privacy regulations, and social computing guidelines.
- **Challenging existing organisational structures and hierarchies.** By supporting personalised and collaborative learning activities that are experimental in character, Learning 2.0 environments may be conflicting with established learning and teaching practice which relies on centralised, standardised and consolidated learning practices. For instance, the possibility of direct communication between different hierarchy levels, or the visibility of activities published on websites, may contest established communication procedures. The demand on the institutional framework to become open and flexible in structure may constitute an additional reason for E&T organisations to be resistant to implementing Learning 2.0 approaches.

■ 9. Implications for Policy and Research

The research evidence gathered as part of this study, indicates that the potential of Learning 2.0 for innovating learning practices and transforming educational institutions is substantial. However, since the Learning 2.0 phenomenon originated in informal learning processes, outside of E&T organisations, E&T systems are facing many challenges in deploying these new opportunities for learning and innovation. There is a clear need for more research on the nature and impact of Learning 2.0, and the ways in which it can be translated into organisational practice, indicating also how learners, teachers and E&T institutions can better be supported in embracing its opportunities.

9.1. Measures for Take-up

As outlined in the previous chapter, a number of factors are currently challenging the mainstream deployment of Learning 2.0. Improving awareness and encouraging take up are critical for promoting and enhancing innovation. As E&T systems differ widely across Europe, it is important to further support explorative and experimental grass-root initiatives; identify, monitor and foster good practice; exchange experiences at European level; and develop joint frameworks and common guidelines for the deployment of Learning 2.0 approaches in formal E&T.

Dissemination and awareness raising: There is a need to improve the sharing of successful practices as examples for practitioners and evidence for decision makers. Research should be encouraged to inquire about different strategies for embedding new learning approaches, identifying critical factors for successfully transforming educational culture and practice. Practitioners should be encouraged to assess, report and

exchange their experiences; institutions should be supported in their efforts to establish and maintain networks for knowledge exchange and collaboration. In general, examples of failed efforts and initiatives are of equal interest, and should be openly assessed and discussed to foster the critical assessment of Learning 2.0 practice.

Protecting minors: As a response to the risks associated with the use of social computing applications by minors, education institutions will have to raise awareness; improve digital competence to facilitate young people's critical and responsible participation in digital environments; and protect minors by implementing safeguarding measures (Ala-Mutka, 2008). The European i2010 Mid-term Review has already taken the initiative in this respect by setting a target for the European Commission to publish a guide that explains user rights and obligations in the digital environment,¹⁹⁸ including plans for the European Commission to launch a Safer Internet 2009-2013 programme for the protection of minors and the fight against illegal content.¹⁹⁹

Supporting inclusion and equity: As outlined above, Learning 2.0 strategies can be strategically employed to re-connect groups at risk of exclusion from the knowledge-based society and can thus promote social inclusion. However, since Learning 2.0 requires a certain level of initial digital competences, there is a risk of reinforcing and widening digital divides. Special attention needs to be paid to those affected by prevailing digital divides. Financial support, awareness raising campaigns and targeted initiatives are needed to equip disadvantaged learners with the

¹⁹⁸ http://ec.europa.eu/information_society/eeurope/i2010/i2010_actions_2008_2009/index_en.htm.

¹⁹⁹ http://ec.europa.eu/information_society/activities/sip/programme/index_en.htm; See also <http://teachtoday.eu> site developed to help teachers and pupils.

necessary knowledge and skills to become active internet users, interested in becoming engaged in online activities. For the hard to reach, user preferences and existing usage patterns – like mobile technologies and interactive TV – can be taken as a starting point for facilitating the transition to similarly structured social computing applications.

Joint vision for guiding developments: A major obstacle for the broader implementation and take up of Learning 2.0 approaches is the lack of communication and common understanding between the different levels of decision makers involved and affected in the process. A joint vision for the future of learning with scenarios concentrating on specific aspects, could illustrate common goals and help different actors to discuss adequate measures for supporting the transformation and modernisation of European E&T institutions and systems.

9.2. The Key Role of Teachers

As underlined before, teachers play a pivotal role in facilitating innovation in E&T. They are the ones who will have to drive change, advocating innovative learning practices and mediating between learners and institutions. Not only will they have to improve and constantly update their own digital skills and those of their learners, but, at the same time, they will have to ensure an accessible, safe, accommodating and functioning learning environment. They will also have to develop their pedagogical skills to implement more collaborative and learner-centred learning strategies. Learning 2.0 will only be successful if teachers are actively supported in assuming this critical role.

Advanced digital competences: Advanced digital competences, comprising the confident and critical use of ICT for work, leisure and communication, are becoming increasingly important (Ala-Mutka *et al.*, 2008). Teachers need to be equipped with these digital competences

and be enabled to ensure that their use of social computing tools is not only beneficial to their learners, but also respects their safety and privacy. At the same time they need to be supported in raising the advanced digital competence levels of their learners by encouraging a reflective and critical attitude towards the reliability and safety of online learning resources and environments. In the long run, the confident use of ICT will empower teachers to experiment with new tools, continuously extending their knowledge and experience with ICT, thus further promoting innovation.

Teacher training: E&T systems should pay special attention to the initial and in-service training of teachers in basic and advanced digital skills. As the success of Learning 2.0 approaches depends on the way they are embedded in learning and teaching, teachers need to be furthermore enabled to critically reflect and justify their methodological choices. In particular, teachers should learn to base their preference for a certain set of tool (whether ICT-based or not) on a reasoned decision, fitting it to the specific learning objectives, as well as their students' preferences, abilities and needs; they need to know which environments and tools to use to which effect and to be able to inform and engage students and parents of their methodological decisions.

Teacher networks and mobility: Teachers should be empowered and encouraged to participate in networks for peer support, where they can share and discuss their practices. The eTwinning network is an example of an effective support network for teachers, which promotes knowledge exchange and collaboration between teachers from different schools. Teacher mobility programmes are suited to acquainting teachers with different learning approaches, diversifying their repertoire of teaching practices and allowing them to develop dynamic and flexible strategies for addressing unforeseen situations, thus empowering them to develop their own innovative, future-oriented teaching approaches.

Incentives and support for innovative approaches: E&T systems and institutions need to provide a legal and organisational framework that is open, flexible and adaptable to changing learning practices and allows creativity and innovation to thrive. Curricula and syllabi, in particular, have to be flexible and reserve time for experimentation and exploration, allowing teachers and learners to explore new learning approaches. Assessment guidelines should be flexible and adaptable, reflecting the fact that collaborative and personalised learning approaches lead to individual learning pathways and deviant learning outcomes, which need to be assessed and acknowledged in different ways. Furthermore, the development of new pedagogical approaches and methods on the part of teachers and learners should be actively encouraged and rewarded.

9.3. Organisational Modernisation

Embracing the opportunities provided by Learning 2.0 requires E&T institutions to address and implement organisational change and to develop a new vision of the future of learning. On the one hand, E&T organisations face a number of internal challenges that they will need to address and overcome to implement Learning 2.0 strategies, like solving the legal issues connected to the ownership of learning processes and content; implementing safety and privacy assurance mechanisms; establishing a supportive framework for ICT deployment, including adequate computer equipment and access; and improving and encouraging teacher training. On the other, the proliferation of online information content and learning materials challenges the former monopoly of established E&T organisations. Schools, universities and training centres need to actively appropriate and support the diffusion of innovative learning approaches at all levels of the organisation. In order to benefit from the opportunities of Learning 2.0, there needs to be a transformation in which schools become reflective organisations and learning

organisations, analysing their strengths and weaknesses, opportunities and threats, and setting goals for their future development. Leadership for change and innovation becomes very important for change to take place at institutional level and not only by individual educational innovators.

Participative and open approaches within and between institutions: In addressing Learning 2.0, E&T organisations are confronted with the following dilemma: whilst the social computing phenomenon is characterised by extremely fast evolution, both in terms of applications and practices,²⁰⁰ adoption at the institutional level takes time, so that organisations naturally lag behind – when they should think ahead. To implement flexible mechanisms that act as scaffolding for institutional innovation, organisations need to develop dynamic, reflective and receptive networks where different actors (learners, teachers, administrators) can share relevant knowledge and jointly develop proposals for institutional innovation. Hence, institutions not only need to become more dynamic and reflective, but they also need to change their institutional culture by pro-actively encouraging the involvement and engagement of all actors.

Research on organisational change in education: Research is needed to understand how institutions transform when Learning 2.0 strategies are implemented. In particular, future research will need to investigate and assess how organisational change takes place; how leadership is managed and exerted; and how social computing tools can (and cannot) be deployed to encourage creativity and innovation.

Developing guidelines for change: As there are many factors affecting the success of deploying

200 It was noted by one of the workshop experts that the study (review of practices, database, and case-based analysis) should remain always beta, i.e. always open to update. Because of the speed of evolution of practices in this peculiar domain such a research cannot be considered as closed, because it will soon become an obsolete snapshot of 2008 state of the art.

Learning 2.0 approaches in different learning settings, which also transform these settings themselves, developing common guidelines can assist E&T organisations in addressing change. Pan-European stakeholder networks could be invoked to discuss and advance guidelines for change, based on research and practical experiences. These networks could also serve to disseminate best practices and action plans addressing the different actors involved in formal E&T. Furthermore, reference points for measuring progress could be set up jointly. The European Foundation for Quality in eLearning (EFQUEL) network might serve as a starting point for implementing this collaborative strategy for organisational modernisation.

9.4. Assessment, Certification and Accreditation

The present forms of assessment, certification and accreditation do not adequately capture the learning processes and outcomes that arise in social computing environments. The strength of Learning 2.0 approaches lies in supporting collaboration and personalisation. Traditional assessment strategies measure individual progress against established standards, applying the same measure to all learners of a group. These standards do not allow for deviant learning strategies and paces, and cannot reflect individual learning progress as it is expressed in a collaborative project. Thus flexible and adaptable assessment guidelines need to be developed that allow progress to be measured against individually defined goals and acknowledges individual achievements that are expressed in collaborative outputs. Furthermore, institutionalised certification and accreditation instruments are challenged by social recognition and peer assessment procedures emerging in online social networks.

European assessment framework development: Certification is important, if ICT-facilitated learning and personalised learning approaches are to be of strategic

value to learners, allowing them to provide proof of their competences. In order to ensure that social technology is used in a way that effectively supports learning, a certain degree of standardisation is needed. However, standards should be kept open and simple, and be based on realistic models. The European Qualifications Framework (EQF) could be used as a starting point to reform certification procedures, as it encourages E&T systems to put the notion of ‘competences’ at the centre of assessment procedures, thereby allowing for diverse learning pathways and strategies.

Reconsidering new means for assessment. Research should focus on developing new means of assessing and accrediting competences that are expressed in experiences made in collaborative Learning 2.0 environments, investigating, for example, how technology can be used to detect and recognise learning processes taking place, or how portfolios can be used to record productive and creative learning processes, display increases in competences, and improve learners’ awareness of their learning progress.

Research on needs for measurement of core competences: While community-based recognition mechanisms will become more and more important to certify competences attained in a lifelong learning continuum – through work experience or self-regulated learning activities – it is to be expected that, for initial training and, in particular, for certain basic competences and vital occupational skills, standardised certification schemes will continue to prevail. More research needs to be devoted to the question of whether and how community-based recognition could be used to complement and, in some cases, replace codified measurements.

9.5. Research on the Impact of Learning 2.0

Research is needed to determine how learning schemes and organisational processes

are modified and transformed by Learning 2.0 approaches, which in turn will change assessment and certification, recruitment and the accreditation of E&T institutions and courses. There is also a need for more scientifically guided experiments and controlled trials and a need for research to highlight policy implications.

Impacts of Learning 2.0. More research is needed on how innovation processes are changed as a result of Learning 2.0 strategies – inside and outside educational settings. Research efforts should also be directed at better understanding and analysing changed learning paradigms, in particular as regards the cognitive processes involved. Potential drawbacks need to be explored (from cyberbullying, to increased social and digital divides, to the effects of different adoption and appropriation rates across different institutions and nations), and ways of avoiding them, need to be outlined. Furthermore, more evidence is needed on how Learning 2.0 methods and environments can and should help educational systems to support lifelong learning.

Research for the changing role of actors and institutions: Research should address how teachers can be supported and empowered to become enablers of change. New models for learning and teaching, blending elements of informal and formal learning, have to be explored to enable E&T institutions to make informed decisions on how to face societal transformation and promote organisational innovation. In particular, further research would need to investigate the future of E&T organisations, develop visions on organisational transformation and address projected changes in the way leadership is managed and exerted.

Monitoring the evolution of practices and the rise of innovations. This study provides some evidence on current Learning 2.0 practice, outlining its potential for promoting innovation. The existence of numerous Learning 2.0 initiatives all over Europe and their diversity and variety constitute an indicator of the change that is taking place. However, it is necessary to continue to observe emerging practices and to gather empirical evidence on the use of Learning 2.0 by different actors and organisations.

■ 10. Conclusions

The increasing use of social computing for work, leisure and learning, especially by young internet users, puts pressure on E&T institutions to adapt their educational practices, forcing them to acknowledge alternative learning resources and training opportunities, and inviting them to develop a new learning culture that encourages creativity and active engagement and is open to innovation and evolution. While deployment of social computing in formal Education and Training (E&T) is at the moment lagging behind, there are already a vast number of experimental projects under way, which indicate the high potential of Learning 2.0 for supporting **technological, organisational and pedagogical innovation** in E&T and promoting **inclusion**.

10.1. Innovation

Social computing gives rise to **technological innovation** in E&T in a vast number of ways. Firstly, social computing provides new tools for producing, using, storing and managing digital content, giving rise to new formats for knowledge dissemination, acquisition and management. They increase the accessibility and availability of learning content by providing learners and teachers with a wide range of platforms which offer a broad variety of educational material.

Secondly, social computing tools allow for the production of digital learning resources of high quality, interoperability and accessibility. They also provide learning environments that are characterised by flexibility, modularity and adjustability, which are adaptable to a vast range of different contexts. They give rise to new strategies for studying a subject by making available a range of dynamic tools for transforming content and displaying information in different formats. Hence, social computing can contribute to

diversifying and enhancing teaching methods and practices by supplying educators with accessible and adaptable tools and resources, while learners can profit from flexible and dynamic applications that are better suited to their individual learning styles, preferences and needs.

Thirdly, social computing gives rise to more creative learning approaches, embedded in computer games, 3D simulations, virtual realities and other immersive environments. Multimedia applications, visual and audio tools, immersive environments and serious games, and mobile learning devices address different sensory channels, supply more engaging learning opportunities and support individualised learning opportunities by allowing learner preferences to be accounted for.

Finally, the networking potential of social computing together with its power in overcoming time and space barriers, supports the interaction and collaboration among and between teachers and learners and facilitates inter-institutional and inter-cultural cooperation. Online learning communities can effectively complement, supplement or substitute face-to-face communication and collaboration. Tools for collaborative content production enable learners to jointly produce digital content, and assume authorship and ownership for their product.

The innovative technological potential of social computing, also facilitates **organisational innovation** in E&T institutions by allowing organisations to create learning environments that are transparent and open to society, and accommodate all individuals involved in and affected by formal E&T. Furthermore, social computing allows educational institutions to intensify their collaboration with other organisations, across borders, language barriers,

and sectors. As a consequence, however, E&T institutions will have to become reflective organisations that critically evaluate and revise their corporate strategies to support innovative pedagogies. They will have to ensure an infrastructure in which social computing tools are accessible to all learners and teachers, create an atmosphere of support for Learning 2.0 and encourage teachers and learners to grasp the opportunities offered by social computing. They will have to allow for different assessment and grading procedures, foster and integrate new teaching and learning models and embrace the opportunities offered for transversal and peer learning among their staff.

Social computing promotes **pedagogical innovation** by supporting teaching and learning processes that promote collaboration and personalisation. Social computing tools allow learners to mix and match, creating personalised learning strategies, adapted to their particular preferences, interests and needs. Learning 2.0 approaches support different sensory channels for learning and more engaging learning environments; they also support the implementation of collaborative projects which enable learners to tap the tacit knowledge of their peers and develop their own ideas in a creative and supportive environment; and they allow learners to connect with societal players outside the boundaries of formal education, enriching learning experiences and better preparing learners for life in a globalised world.

As a consequence of the power of social computing in supporting collaboration and personalisation, learning becomes a process in which motivation, participation and reflection are fostered. Individual learners are empowered to develop self-directed learning skills, which help them to better develop and realise their personal potential. Networking and collaboration give rise to new interaction patterns between and among students and teachers, changing the roles of participants in the learning process. Teachers become designers, coordinators, moderators,

mediators and mentors, rather than instructors or lecturers, while students not only have to assume the role of (peer) teachers, supporting each other in their learning endeavours, but also jointly create both the learning content and context, developing their own rules and strategies for cooperation and content production. The openness and embeddedness of social computing in the wider societal context allows students to seize new learning opportunities, and transcend the boundaries of institutional education to connect learning back to its original societal and scientific context.

While the opportunities social computing offers in innovating learning and teaching practices are considerable, the deployment of Learning 2.0 faces a number of **challenges** relating to both the pedagogical and organisational aspects of education, and to the domain of technological requirements. Access to Learning 2.0 can be constrained by a lack of access to technological resources (computers or broadband connection) or by a lack of digital skills and competence, both on the learners' and the educators' side. Established practices in E&T institutions may also constitute a critical obstacle to adoption and appropriation of new educational practices, thus inhibiting innovation. Furthermore, a lack of funding, staffing or competence building, together with the inability to fit new practices into the existing institutional framework, might hamper the take up of Learning 2.0. Learners' digital competences must be developed and their skill needs adequately addressed. E&T institutions need to supply a framework in which Learning 2.0 can thrive.

Teachers play a critical and pivotal role in facilitating change by advocating innovative learning practices and mediating between the different actors involved in the learning process. They must improve and constantly update their own digital skills and those of their learners, and, at the same time, ensure an accessible, safe, accommodating and functioning learning environment. They will also have to develop their

pedagogical skills to implement more collaborative and learner-centred learning strategies. Learning 2.0 will only be successful if teachers are actively supported in upgrading their skills and experimenting with new tools and roles.

10.2. Inclusion

In addition to supporting innovation in formal E&T, social computing approaches display a huge potential for promoting **equity and inclusion** by (re-)engaging people at risk of exclusion from the knowledge-based society in learning opportunities that are meaningful to them. The evidence collected from the eight inclusion initiatives studied in-depth indicates that social computing strategies can improve access to learning and employment opportunities, promote the active educational and social engagement of participants, and increase participants' skills and competence levels. Accessibility and availability of learning opportunities for the hard to reach can be effectively increased, and motivation and engagement in learning can be significantly raised by using social computing approaches. There is strong evidence to suggest that Learning 2.0 tools have the capacity to foster the development of skills, in particular, basic and advanced digital competences as well as personal and social skills, which open up labour market opportunities. While more research is needed to endorse these findings, the potential of social computing for facilitating inclusion seems to be substantial. However, it should be born in mind that Learning 2.0 strategies may increase existing barriers to the use of ICT if no precautionary measures are employed.

10.3. Contribution to E&T Policies

These findings on social computing approaches to support innovation and inclusion in formal E&T entail specific opportunities and challenges for the four strategic objectives of European Education and Training policies in the years to 2020 (European Commission, 2008g):

Enhancing innovation and creativity:

Social computing opens up new opportunities for the construction, access, distribution and re-elaboration of knowledge, thus promoting innovation in E&T. Furthermore, it supports more engaging and playful approaches, provides new formats for creative expression, and encourages learners to experiment with different, innovative ways of articulating their thoughts and ideas. The Learning 2.0 landscape itself is also shaped by experimentation, collaboration and empowerment, allowing learners and teachers to discover new ways of actively and creatively developing their individual competences.

Improving the quality and efficiency of provision and outcomes:

Learning 2.0 approaches enable E&T organisations to offer more personalised learning opportunities that are tailored to their learners' individual needs and preferences, and thus improve quality and efficiency. The variety of tools available, together with their power in implementing novel learning strategies, addressing different channels and involving learners more actively in constructing their own learning process, allows more effective learning strategies to be implemented. Furthermore, there is evidence that Learning 2.0 strategies can raise individual performance and achievement and actively foster the development of transversal skills, nurturing abilities for flexibly developing skills in a lifelong learning continuum.

Making lifelong learning and learner mobility a reality:

Social computing can actively support lifelong learning by offering accessible, flexible and versatile learning environments that complement and supplement initial training. They allow learners to learn whatever, wherever, whenever and however they want; and provide them with attractive and engaging learning opportunities that can be fitted to their individual needs. The networking potential of social computing, together with its power in overcoming time and space barriers, also supports interaction and collaboration among and between learners

and teachers who are geographically dispersed and enables students to broaden their horizons, and collaborate across borders, language barriers, and institutional walls. Thus, Learning 2.0 promotes learner mobility by raising interest in other countries and cultures on the one hand, and on the other, responds to the learning needs of mobile citizens.

Promoting equity and active citizenship:

Digital divides, which affect all actors, learners, teachers and decision makers, still represent one of the major bottlenecks to reaping the benefits of Learning 2.0. However, as highlighted in Chapter 7, social computing approaches can also serve to mitigate existing inequalities and can be successfully employed in re-connecting individuals who are at risk of exclusion from the knowledge society with learning opportunities.

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European Commission

EUR 24103 EN — Joint Research Centre — Institute for Prospective Technological Studies

Title: Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe

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Luxembourg: Office for Official Publications of the European Communities
2009

EUR — Scientific and Technical Research series — ISSN 1018-5593

ISBN 978-92-79-14372-4

DOI 10.2791/33043

Abstract

Over the last few years, “Web 2.0” or “social computing” applications like blogs, wikis, photo- and video-sharing sites, and also online social networking sites and virtual worlds, have seen unprecedented take up. Research evidence suggests that these online tools have not only affected people’s private and professional lives, but are also starting to transform learning patterns and pathways. However, due to the novelty of social computing, take up in formal Education and Training is still in an experimental phase. As a consequence, data and scientific evidence on the current use and potential impact of Learning 2.0 strategies is scarce.

In order to investigate how social computing applications can be used in organised learning settings to enhance learning activities and promote innovation and inclusion in Education and Training, an exploratory study employing a triangulation of different research methodologies was conducted. The findings of this Learning 2.0 study are synthesised in this report. Drawing on a literature review, a collection of some 250 cases, 16 in-depth case studies and an expert workshop, the report outlines the main features of the current Learning 2.0 landscape. It examines the potential of Learning 2.0 strategies for promoting innovation and inclusion and points out challenges to mainstream deployment. The evidence gathered suggests that Learning 2.0 approaches can facilitate technological, pedagogical and organisational innovation in Education and Training and thus contribute to the modernisation of European Education and Training institutions deemed necessary to face the challenges of the 21st century.

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