JRC Technical Notes

Good Practices for Learning 2.0: Promoting Innovation

An In-depth Study of Eight Learning 2.0 Cases

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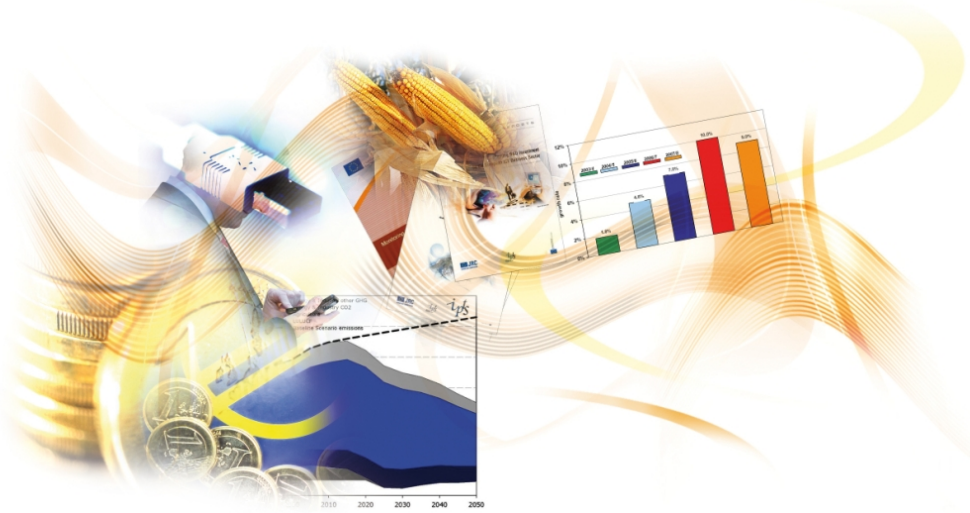

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JRC 53212

Technical Note

Luxembourg: Office for Official Publications of the European Communities

Acknowledgements

This report could not have been written without the help of a number of people involved in the 'Learning 2.0' initiatives chosen for the case studies described in the following pages. We are therefore grateful to these collaborators for their contributions.

Thanks are also due to members of staff at the 'Institute for Prospective Technological Studies' (IPTS) – in particular Christine Redecker, Kirsti Ala-Mutka, Margherita Bacigalupo and Yves Punie – for their helpful feedback, and to the experts who gave their time and valuable expertise at the validation workshop held in Seville in October 2008 at which the preliminary results of this study were presented.

However, as ever, the views and conclusions expressed in the report – together with any errors or omissions, are the responsibility the authors.

We would finally like to thank our colleagues Clare and Joe Cullen from Arcola Research who helped us to improve the language of this report.

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Preface

This report is part 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 Studies (IPTS)[2] 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, in order to understand the impact of this phenomenon on innovations in educational practice and its potential for a more inclusive European knowledge society. The project also sets out to identify challenges and bottlenecks so as to devise policy options for European decision makers.

The methodological framework for the Learning 2.0 project includes desk-based research using available studies, reports and statistics[3]; a stakeholder consultation[4] which served to set up a database comprising 250 Learning 2.0 projects[5]; the in-depth study of 8 exemplary cases to assess the potential of Learning 2.0 for promoting innovation; the in-depth study of 8 cases to assess its potential for promoting the inclusion of groups at risk of exclusion from the knowledge society; and a validation workshop[6] in which 20 external experts reviewed the research results.

This report presents the results of the in-depth study of 8 initiatives employing social computing tools in innovative ways in predominantly formal learning settings. The case assessment examines impacts and outcomes, factors for failure and success, as well as obstacles and barriers, in order to assess good practice and the impact of Learning 2.0 on innovation.

The results of this study have been presented at the validation workshop and will feed into the final report of the Learning 2.0 project. They also contribute to continuing previous work conducted in the IS Unit at IPTS,[7] in particular the recently concluded IPTS "Exploratory Research on Social Computing" (ERoSC) and the IPTS vision on future "Learning Spaces", models for future learning in the Knowledge Society, where technologies mediate new participative and flexible opportunities for learning.

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

5 [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 [6] For the workshop report see: 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.

7 For more information see: http://is.jrc.ec.europa.eu/pages/EAP/eLearning.html and http://is.jrc.ec.europa.eu/pages/EAP/eS.html.

Table of Contents

Executive Summary

Over the last few years, “Web 2.0” or “social computing” applications have seen an unprecedented take up, changing the way people access, manage and exchange knowledge, and the way they connect and interact. This trend is accompanied by the emergence of structurally different learning styles, especially among young people. From an educator’s point of view, social computing applications are extremely versatile and offer flexible and dynamic learning opportunities that are often more appealing and engaging than traditional learning arrangements. They have therefore a high potential for supporting and facilitating learning processes.

However, as social computing is a recent phenomenon, take up in formal education and training (E&T) is still in an experimental phase. This study's in-depth investigation of eight initiatives tries to provide 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.

The case assessment examines impacts and outcomes and factors for success. All the cases highlight the vast potential of social computing for promoting pedagogical and organisational innovation, while outlining existing obstacles and barriers.

Innovation

On the whole, the cases studied indicate that Web 2.0 tools have considerable potential for enhancing learning processes, promoting innovation in formal education and training (E&T) and enabling institutions and individuals to make lifelong learning a reality. In particular, the following innovation aspects have been identified:

New ways of collaborative creation and exchange of learning content and metadata: While in traditional environments, user activities are usually limited to the communication about the content, users of Web 2.0 enriched environments 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 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 personalized 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, allowing 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 learn-

ing plans and diaries, for showcasing work and documenting competences, and as a personal repository, containing all links and resources frequently consulted for learning and leisure.

New forms of blended learning scenarios (formal/informal; classroom/distance; intra-/extra-institutional; mixed learning scenarios & pedagogical approaches): By its very nature Web 2.0 is predestined for informal learning scenarios. The eight case studies in this report give examples for 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 by 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 encourages motivation. In all eight case studies motivational aspects have been stressed by the project organisers and most learners have reported high motivation. A moderating variable has been the digital literacy of the user. Low digital literacy is related to low motivation to use new ICT-based tools.

Trend towards embedded or integrated solutions vs. isolated tools: In most of the studied cases a trend 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 go 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 e.g. 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: Two cases studied already use virtual worlds: in the SecondReiff project SecondLife is used as the main learning environment, whereas 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 of other external Web 2.0 environments like del.icio.us, Flickr or YouTube. The latter tools are especially seen as rich resource databases for learning material that could be integrated in different teaching and learning scenarios.

Outcomes and Impacts

The assessment of the eight cases studied in depth reveals that Learning 2.0 initiatives impact the learning process itself by supporting and promoting certain *skills and competences*. At the same time, Learning 2.0 projects tend to trigger changes in the *institutional framework*, i.e. the organisational and pedagogical embedding of learning.

Learning Outcomes: Participation in Learning 2.0 activities can train *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. For some learning activities, a certain degree of background knowledge and initial skills are necessary. Further-

more, 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. *Meta-cognitive and quality management skills* are fostered, e.g. in user-based content production and feedback circles in collaborative activities, e.g. working on a wiki.

Moreover, a range of *transversal skills* are fostered by Learning 2.0 approaches. Social computing activities typically involve the collaboration of different actors on a joint project or task and thus support *general and special communication and collaboration skills*. The nature of the competences being fostered depends strongly on the approaches and tools used in a specific activity. *Multitasking and complexity-management skills* are needed and fostered in Learning 2.0 environments, as there are few integrated environments to date and tools usually possess a high level of specification. *Higher-order skills* like reflexive thinking, learning to learn and self-organisation are trained. 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.

Institutional Impacts: Innovative Learning 2.0 initiatives can lead to institutional impacts like changes in organisational culture and structures.

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 to become a virtual learning environment, accessible at all times and places. In other cases, the focus lies 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 E&T organisations towards society: In several of the cases it was outlined that Web 2.0 tools can be used effectively to open windows from the closed environment of formal E&T to the outside world, allowing learners to pursue new ways of accessing information and gaining knowledge, and linking 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 support 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.

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/or 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 implement, the special advantages and barriers of the tools 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 user needs, in terms of function and usability.

Well structured online environments: Web 2.0 environments by nature are more unstructured compared to traditional web environments. While enabling more freedom and creativity, there are dangers that the lack of formal structure jeopardizes 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, allowing learners to assume more responsibility for their own learning process while, at the same time, providing them with the guidance they need.

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 individual users as well as 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 graphic 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' contribution 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 continuous 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 usual 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 the case of KooL where learners set up a quality evaluation committee among themselves, while other initiatives have not used any such mechanism.

IPR-management, protecting identity and privacy, on individual and organisational level: 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 depending on the pre-conditions, demands and needs of the respective target groups. Recommendations on terms of use, and the use of copyright and privacy regulations, as well as social computing guidelines, exist, that can be adapted to the specificities of each case.

Case Overview

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 personalized 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				+				+

1. Introduction

1.1 Scope of this Report

This report presents the results of the first part of the study 'Good Practices for Learning 2.0'. The main objective of the study as a whole is to investigate the potential of Learning 2.0 to (1) support innovation and (2) promote the inclusion of groups at risk of exclusion from society. The study is comprised of two sets of case studies, the first of which involves an in-depth study of eight cases of the use of social computing for learning, identifying factors for failure and success with the aim of assessing good practice and the impact of Learning 2.0 on innovation. This report covers this first element – the 'innovation' aspect of the study.

1.2 Background of the Study

Context

The study 'Good Practices for Learning 2.0' supports the broader portfolio of projects currently being implemented by the Information Society Unit at the 'Institute of Prospective Technological Studies' (IPTS). The 'nucleus' of these projects focuses on work carried out under the 'Exploratory Research on the Socio-Economic Impacts of Social Computing' (EROSC). One of these projects is a broader study entitled 'The Impact of Web 2.0 Innovations on Education and Training' commissioned by DG Education and Culture (DG EAC) on the impact of Web 2.0 trends on the field of learning and education in Europe. The aim of this 'Learning 2.0' study is to give an overview of the current and potential use of social computing for learning and investigate its contribution to the European Union's policy goals by changing how people learn, think, live and interact. This report contributes to this study.

Policy Background

This work reflects increasing interest in exploring the opportunities offered by 'Web 2.0' for supporting innovative ways of learning. The work can be set within the context of a number of current EU and national policy agendas and initiatives, notably the renewed Lisbon agenda, the 2006 'Communication on Lifelong Learning', the Commission's '2008 Biennial Joint Report on Lifelong Learning', and in the draft 2008 'Joint Progress Report on the Implementation of the Education and Training 2010 Work Programme'.[8] Moreover, in its Communication on Media Literacy in the Digital Environment (2007b) the Commission 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)".

Web 2.0, Learning and Innovation

Against this policy background, a current prevailing view is that Web 2.0 has the capacity to engage people more fully in Lifelong Learning and social life. It is argued that 'laypeople',

[8] Draft 2008 joint progress report of the Council and the Commission on the implementation of the 'Education & Training 2010 work programme'", SEC(2007) 1484, COM(2007) 703 Final, Brussels

not just 'experts', are becoming knowledge creators, managers, owners and distributors of learning. Wim Veen for example postulates increasing non-linear or 'swapping' learning behaviours in the younger generation with mature technological knowledge and the motivation to use technology for their every day activities. He calls this generation 'Homo Zappiens'. The new cohort of users possess the necessary meta-cognitive and technological skills for ICT usage (e.g. web navigation through information, electronic communication, building virtual networks of people with similar interests), they operate on 'twitch speed', they are multi-tasking and mobile, are using non-linear approaches, games and simulations for knowledge acquisition, are able to process discontinued information, are connected, collaborative and active. Those new users who were growing up digital (the so called 'digital natives' or the 'n-generation') are able to swap between reality (as citizens) and virtual realities (as 'netizens') organising themselves in 'Distributed Electronic Virtual Knowledge Centres' (or 'Learning Malls') and in 'Self-managed Virtual Communities' around themes of shared interest and value.[9]

The genre of Web 2.0 or social computing tools that constitute the main focus of the study refers to the range of digital applications that enables interaction, collaboration and sharing between users and which supports or fosters group interaction (Owen et al., 2006).[10] Current state of the art suggests that the expansion of Web 2.0, coupled with convergence in platforms and devices, has significantly increased the capacity for people to engage in opinion formation, knowledge creation and decision making. It is suggested that the emergence of Web 3.0 will continue these trends, taking Lifelong Learning from its traditional 'transmissive' mode, where learners are to a large extent passive consumers of knowledge, to a 'transformative' mode where knowledge is actively co-constructed as part of everyday life.[11]

This shift from transmissive to transformative modes of Lifelong Learning is associated with the increasing convergence of different ICT applications. Following Jenkins (2006), the 'Good Practices for Learning 2.0' study placed particular emphasis on exploring the use of Learning 2.0 not simply in terms of technical functionalities, but in terms of how Web 2.0 reflects cultural practices. These are driven, on the one hand, by top-down technological and media production and also bottom-up user and consumer activities and creativity.[12] The effects of these emergent 'convergence dynamics' on social relations and on learning are not well understood, and the study paid particular attention to assessing how these complex dynamics provide both opportunities and barriers to learning.

In turn, the study is also interested in how Learning 2.0 might have an impact on the broader issues around e-Inclusion and e-Participation. Recent studies show that, despite significant investment by the EU and member states, around 42% of EU citizens are still classified as 'non participants' in the knowledge society.

[9] Veen, W. & Vrakking, B. (2006). Homo Zappiens. Growing up in a Digital Age. London

[10] Owen, Martin, Lyndsay Grant, Steve Sayers and Keri Facer (2006). Social software and learning. Futurelab Opening Education Reports, 2006

[11] Nova Spivak: What is the Semantic Web, Actually?; URL: http://www.deitel.com

[12] Jenkins, H (2006). Convergence Culture: Where Old and New Media Collide. New York: New York University Press

In line with the above, the recently concluded in-depth 'Review of Learning 2.0 Practices'[13] of the broader IPTS study on Learning 2.0 clustered a large number of Learning 2.0 cases in the so called "iLANDS" model encompassing the following innovative Learning 2.0 strategies:

Learning & Achieving: Social computing to improve learning processes and outcomes;

Networking: Social computing to improve communication between stakeholders as well as the exchange of knowledge;

Embracing Diversity: Social computing to improve social connectivity and to provide new sources of knowledge;

Embracing Society: Social computing to improve the access to the leaning experience for all possible actors.

It is concluded that "these four approaches to Learning 2.0 give rise to new areas for innovation in learning, to innovative lands for Learning, or: iLANDS". The elements of the model are illustrated in the Figure below.

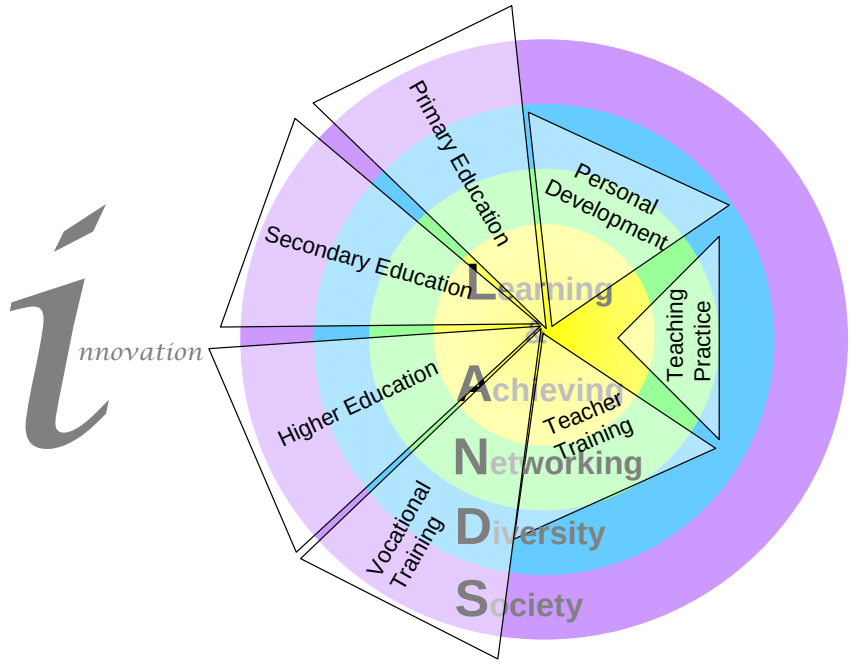

Figure 1: iLANDS for Innovation in Learning (IPTS)

Accordingly the relationship between social computing and innovation of the learning experience (or pedagogical innovation) is located in the potential of Web 2.0: i) to facilitate the supply of and access to learning materials; ii) to contribute to personal knowledge management and to build resource networks; iii) to improve personal achievements and thus contributing to individual development; and finally to iv) to help acquiring subject specific, higher order skills as well as meta-competences.

[13] Redecker, C (2009). Review of Learning 2.0 Practices: Study on the Impact of Web 2.0 Innovations on Education and Training in Europe, IPTS publications EUR 23664 EN, ftp://ftp.jrc.es/pub/EURdoc/JRC49108.pdf.

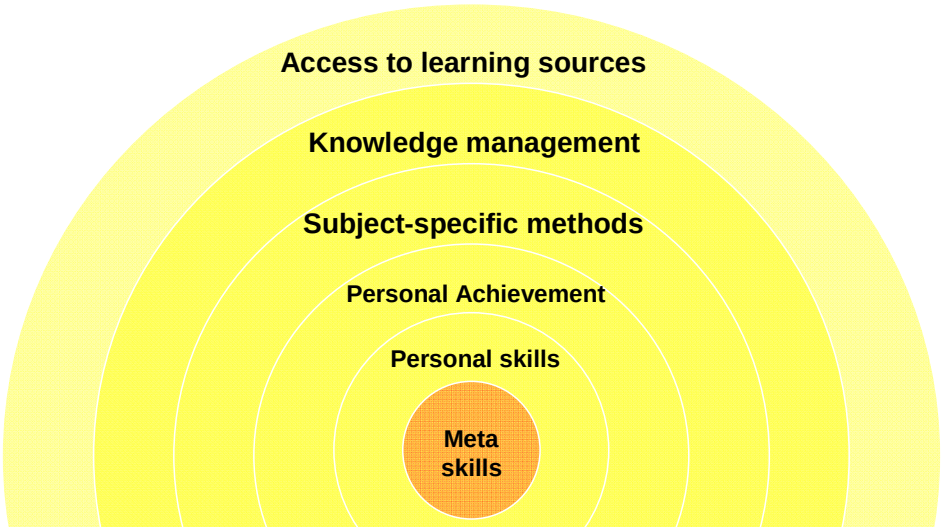

Figure 2: Learning and Achieving with Social Computing Tools (IPTS)

As indicated above the study defines Web 2.0 as a set of practices rather than any particular list of tools: the use of two or more modes of computer-mediated communication that result in community formation' (Vuorikari, 2007;[14] Owen et al., 2006). In principle, this embraces a wide range of platforms, software and tools, including: communication tools to handle capture, storage and presentation of information; text, audio and video, wikis and blogs; and interactive tools allowing users to communicate in real time (for example phoene, NetPhone, videochat; instant messaging).

Social networking models are at the core of learners' interaction with social computing tools. These can be interpreted as particular configurations of organisational, institutional, cultural and behavioural modes, which serve to realise particular sets of user interactions and, ultimately, communication outcomes. For example, social network services allow people to come together online around shared interests, hobbies, or causes – like dating. Other services – e.g. LinkedIn – enable business networking. Social network search engines use social networks to filter search results, for example Friends Reunited, as well as commercial social networks form communities around particular consumer or producer interests. The Web 2.0 tools, systems and applications investigated in the study therefore encompass the following types:

Social networking services – Internet- or mobile-device-based social spaces designed to facilitate communication, collaboration and content sharing across networks of contacts. They enable users to connect to friends and colleagues, to send mails and instant messages, to blog, to meet new people and to post personal information profiles, which may comprise blogs, photos, videos, images, audio content. Examples include Facebook and MySpace (for social networking/socialising), LinkedIn (for professional networking), Second Life (virtual world) and Elgg (for knowledge accretion and learning). Social networking systems allow users to describe themselves and their interests, implement notions of friends, ranking, and communities.

Weblogs or blogs – online public writing environments, which enable a single author or a group of authors to write and publicly display articles, including visual, audio and video con-

[14] Vuorikari, Riina (2005). "Can personal digital knowledge artefacts' management and social networks enhance learning?" Insight Innovation Brief, Sept., 2005, http://www.eun.org/.../social_networks_learning_vuorikari_9_2005_insight.pdf

tent, as well as features such as links to other blogs, information about the author, and comments from readers.

Wikis – a website that allows users to collaboratively add, remove and otherwise edit and change content, usually text. Unlike blogs, wikis generally have a history function, which allows previous versions to be examined, and a rollback function, which restores previous versions. The best-known example is Wikipedia a collaboratively created online encyclopaedia.

Tagging, Social Bookmarking and Folksonomies – these allow recording (bookmarks) of web pages, and tagging with significant words (tags) that describe the pages being recorded. Examples include del.icio.us, furl and Bibsonomy. This process of organising information through user-generated tags has become known as 'folksonomy'. Folksonomic metadata consists of words that users generate and attach to content.

Media-sharing devices – these store user-contributed media, and allow users to search for and display content. Examples include YouTube (movies), iTunes (podcasts and vodcasts), Flickr (photos), Slideshare (presentations), DeviantArt (art work) and Scribd (documents).

Podcasts and Vodcasts – podcasting is a way in which a listener may conveniently keep up-to-date with recent audio or video content; vodcasts are video versions of podcasts.

Virtual and immersive environments – examples of these are Second life, or similar online 3D virtual worlds, such as Active Worlds, Entropia Universe, and Dotsoul Cyberpark, which provide users with a online game-like 3D digital environment to which users subscribe.

Online office and discussion applications – these are software packages that replicate desktop applications like Microsoft Office or Open Office and include collaborative editing tools that allow learners in different locations to collaboratively edit the same document at the same time. They typically include interactive discussion forums to enable users to share comments.

Web 2.0 tools for learning – some online collaboration applications are especially tailored for educational purposes. For example Moodle is a free software e-Learning platform designed to help educators create online courses.

Syndication and notification technologies – a means of directly sending content updates, typically using a feed reader (or aggregator), relying on protocols called RSS (Really Simple Syndication) and Atom to list changes.

1.3 Structure and Contents of the Report

The Report is set out as follows: Following this introduction, chapter 2 sets out the overall approach and methodology used in the study; chapter 3 outlines the selection criteria used to select the cases covered by the study; chapter 4 briefly summarises the features of the selected innovation cases; chapter 5 in turn holds the detailed description of the selected innovation cases providing in-depth information on: i) the case itself; ii) learner profiles and learning processes; iii) technical aspects; iv) outcomes, motivational aspects and impacts, v) barriers and success factors; vi) lessons learned; chapter 6 finally presents the key conclusions and implications derived from the analysis of the innovation cases including a results summary for each individual case and followed by a results synthesis across the innovation aspects for the areas of: i) innovation; ii) success factors; iii) barriers; iv) skills and competences; and finally v) institutional impacts.

2. Approach and Methodology

2.1 Overall Approach

The case study on good practices for Learning 2.0 focused on assessing the potential of social computing tools to support innovation in learning, which will enable learners to participate and actively shape the knowledge-based society. The cases were analysed with a particular focus on identifying the factors for success, investigating which obstacles had to be overcome, what outcomes were achieved, specifying factors determining these outcomes, and analysing how innovation was supported. The study had a particular emphasis on organised learning settings such as Primary and Secondary Education, Vocational Education and Training (VET), Higher Education, Teacher Training as well as on workplace learning and Continuous Professional Development (CPD), although it did cover more broad-based 'informal' settings such as community-based initiatives. The cases were analysed in terms of how success and failure factors reflect the following key dimensions:

Innovation – examining how far innovative learning approaches and pedagogies are facilitated and supported by particular Learning 2.0 initiatives;

Key Competences & Labour Market Skills – exploring whether and in what ways Learning 2.0 initiatives and innovations foster new kinds of e-skills beyond the level of basic computing skills; whether and in what ways such initiatives support soft skills, for example cultural awareness, entrepreneurship, citizenship, and whether and in what ways they support new and flexible ways of learning that are particularly suitable for gaining specialized additional knowledge to improve one's professional skills and adapt to labour-market needs;

Maturity & Institutional Change – assessing and reflecting in how far the institutional framework of teaching and learning affects and is affected by Learning 2.0, and, in particular, which changes in the organisational framework of education and training are needed to support Learning 2.0 and which changes are brought about by the use of Learning 2.0.

2.2 Research Questions

The key research questions to be addressed through the study focused on identifying and assessing innovation; outcomes and potential impacts on learning and inclusion, and unforeseen, negative and multiplier effects i.e.:

What kinds of Learning 2.0 applications are currently being developed and implemented to support lifelong learning and social inclusion?

What are their characteristics, in terms of technical configurations; learning scenarios; pedagogic methods; institutional arrangements?

What kinds of innovative learning approaches and pedagogies are facilitated and supported by particular Learning 2.0 initiatives?

What kinds of new digital skills are emerging as a result of the use of Learning 2.0 applications?

What other, non-digital key competences for lifelong learning, are being supported by Learning 2.0 applications?

In what ways are Learning 2.0 applications equipping users with skills that will increase their labour market opportunities?

What specific learning outcomes are associated with the use of Learning 2.0 applications and initiatives?

What institutional and organisational changes – for example on organisational cultures; on the educational enterprise – are associated with the use of Web 2.0 applications in lifelong learning and social inclusion?

What unforeseen, negative, additionality and displacement effects are associated with the use of Learning 2.0 applications and initiatives?

What barriers on institutional, organisational and technical level occurred when implementing the initiative and how was dealt with these barriers?

What key motivational aspects played a role for project managers, teachers/tutors and users when organising and carrying out the activity?

What examples of good practice can be identified and how can these be used to support future policy and practices in the field?

2.3 Methodology

As stated above, the aim of the case studies is to deepen the understanding of how social computing is being used to support new forms of learning and new ways of supporting inclusion by carrying out in-depth analysis of a set of 'exemplars' of Learning 2.0 initiatives. These exemplars reflect particular configurations of technological choices and attributes; learning scenarios, pedagogic models and tools and institutional arrangements. The overall methodological approach adopted follows accepted models and practices used in case studies (Yin, 2002)[15], but incorporates additional models and methods chosen to suit the particular focus of this study – particularly the research questions outlined above - and the environment in which Learning 2.0 initiatives operate. Six of these additional models and methods were applied:

Behavioural Additionality Analysis[16] – a method used to measure both individual and aggregate changes in learning and social interaction behaviours, using self-reported measurements;

Theory of Change Analysis[17] – an approach used to identify both the explicit and implicit paradigm of change that lies at the heart of an innovation – in other words the transformative model that is embedded within it;

Cultural Logic Analysis[18] – a 'discursive' approach used to supplement 'theory of change' analysis and aimed at de-constructing the conceptual and theoretical paradigms underlying initiatives, their 'vision' of Lifelong Learning, Learning 2.0 and e-Inclusion and their intended outcomes;

[15] See Robert K. Yin (2002)
[16] See Georghiou, L., Clarysse B (2006); Georghiou, L., Keenan, M. (2005)
[17] See Chen H T (1990); Rossi, P H, Freeman, H E and Lipsey M W (1999)
[18] See Habermas, J (1981); Strydom, P. (1990)

Pedagogic Audit[19] – a tool for assessing learning outcomes;

Digital Skills Audit – a method focusing on capturing the extent to which Learning 2.0 applications are developing and supporting e-skills over and beyond the basic ICT skills typically aimed at in conventional digital literacy programmes;

Social Capacity Audit[20] – an instrument aimed at assessing the effects of participation in Learning 2.0 initiatives aimed at promoting social inclusion on promoting individual capacity and social participation.

2.4 Methodology Design and Research Activities

The case study methodology design is based on five inter-connected stages: Logistics; positioning and profiling; data collection; analysis; synthesis. Table 1 summarises the objectives of each phase together with the methods and tools used to implement it.

Phase	Objectives	Methods & Tools
Logistics	Establish protocols for implementing case studies	Case study procedures
	Identify key informants and data sources. Contact key 'gatekeepers'. Arrange site visit	Logistics audit
Positioning and profiling	Desk research to collect preliminary data on the case	Case profile template
	Situate the case in its cultural and organisational lifeworld	Environmental audit
Data collection	Collect preliminary data on key research questions with main informant	Key informant interview schedule
	Collect data generated through utilisation of platform and tools	Guideline for automated data collection
	Collect data on user experiences	Self administered user questionnaire
	Collect in depth data on user experiences	User interview schedule
	Collect group data on user experiences	Focus group guideline
	Observe how the initiative operates on the ground	Observation guideline
	Analyse content produced by the initiative	Content analysis guideline
Analysis	Assess key outcomes and impacts for individual users	Behavioural additionality analysis template
	Compare intended outcomes with actual outcomes	Theory of change analysis template
	Evaluate the 'vision' of the initiative	Cultural logic analysis
	Assess learning outcomes	Pedagogic audit
	Assess innovative e-skills outcomes	Digital skills audit
Synthesis	Integrate the results of the data collection and analysis to answer key research questions	Case summary template

Table 1: Case Study Design

[19] See as an example the learning skills audit developed by the Australian Flexible Learning Community; URL: http://community.flexiblelearning.net.au/ProfessionalDevelopment/content/article_5531.htm

[20] See Freire, P. (1970); Horten, M. Freire, P (Eds) (1990); Putnam, R. (2000); Blaxter, M., Poland, F. & Curran, M. (2001); Woolcock, M. (2001);

2.5 Case Study Selection Strategy and Criteria

The selection of cases reflected the following priorities:

Different Learning Settings – the cases proposed include formal and non-formal learning settings; different target groups, in particular 'at risk' and 'hard to reach' groups; diverse training situations (i.e. workplace, at home; distance or face-to-face), training needs (i.e. general, vocational, leisure; re-skilling, up-skilling) and interactions (i.e. learner-teacher, learner-learner, teacher-teacher), as well as a variety of institutional settings (i.e. in schools, universities, training centres);

Different Social Computing Applications – the cases proposed include a variety of uses of social computing applications in learning contexts, involving wikis, blogs, podcasts, social bookmarking, editing and networking tools, virtual realities/immersive technologies, as well as networking, sharing, reviewing, commenting, collaborative knowledge creation, editing or publishing;

Maturity and Potential of the Initiative – the cases include initiatives that provide examples of sustainable development;

Geographical Distribution – the cases proposed reflect a range of different geographical locations and cultural environments.

The procedure adopted for case study selection was as follows: A list of eight 'preferred cases' was compiled by the contractors, incorporating the feedback received from the Institute for Prospective Technological Studies (IPTS). An additional list of four 'substitute' cases for was compiled by the contractors. An appraisal of the 'preferred list' was undertaken. The appraisal covered: i) verification of the 'Web 2.0' technologies used; ii) verification that the case example is still 'live' or that research data can be captured; iii) verification that each case reflects a genuine 'community of collaborators/learners'; iv) an appraisal of the richness i.e. quality and quantity of data potentially available to the research team, including an assessment of the accessibility of the case – particularly the extent to which the views of users could be captured; v) an assessment, and initial classification, of the type of learning outcomes provided by the case; vi) an assessment of the degree and nature of potential difficulty involved in implementing the case study.

3. Summary of the Innovation Case Studies

The following Table provides a brief summary of the main features of the eight innovation cases that were studied in detail.

No	Name	Description
1	**Welker's Wikonomics**	Secondary School i.e. Zurich International School, Switzerland; International extensions; Grass roots activity; Collaborative learning; Supporting classroom teaching by offering online cooperation, communication and information environments like a blog, wikis and discussion forums.
2	**SecondReiff - WISE**	Higher Education i.e. RWTH Aachen, Germany; Pilot project; WISE is a Second Life project space of the RWTH Aachen School of Architecture; SecondReiff is the first pilot project in a series of planned projects using the space for combining and using real and virtual world learning in studies of architecture.
3	**Protovoulia**	'Umbrella' site of innovative online services for teachers and pupils in Greek primary and secondary schools (and beyond); Started as a grass roots activity of eight Greek foundations and developed into an institutional programme; Collaborative content production and learning trough LMS combined with blogs, wikis, forums etc; Supporting school innovation and the opening up of schools towards society.
4	**IBM Internal Knowledge Management**	Corporate Learning i.e. IBM Software Group, Germany & Worldwide; Internal use of commercial products and methods ('use what you sell'); Development of implementation strategies and tools for Web 2.0 in organisations and companies for internal information exchange, collaboration, informal learning and knowledge sharing; Tools: 'bluepages' (expert search), personal blogs, wikis, discussion forums, social bookmarking; communities; virtual meeting software.
5	**KooL – English for Glass Professionals & Glass Compendium Wiki**	Vocational Training i.e. Staatliches Berufskolleg Glas Keramik Gestaltung des Landes NRW, Rheinbach, Germany; Federal state funded pilot project, extended on national level; Integrated, collaborative online environment for English language learning by study subject-related media produced by students applying a blog, wikis, podcasts and videos.
6	**ETZ Stuttgart – ELKOnet**	Vocational Training & Further Education i.e. Elektro Technologie Zentrum (ETZ) Stuttgart, Germany; Federal state funded pilot project, extended on national level; Online community for knowledge extension and exchange among students with discussion forums, a wiki, a blog and social bookmarks; Step-by-step extension of the environment with Web 2.0 tools towards an integrated platform.
7	**LeMill – Calibrate**	Teacher Training i.e. Calibrate project consortium; LeMill development at University of Art and Design, Helsinki, Finland; EU-funded project, establishment as national learning material platform in several European countries; Web-service for creation ad exchange of learning materials and resources for teachers using repositories from several different European countries; community, collaborative resource development and sharing, blogs, wikis.
8	**Nettilukio – Internet Upper Secondary School**	Teacher Training i.e. Adult Learning & Secondary Education i.e. Otava Folk High School, Finland; ESF-funded pilot project, now running as an officially recognized secondary school; Complete online study programme of Finnish upper secondary school level using a learning platform, virtual classroom technology, wikis and blogs.

Table 2: Characteristics for the Innovation Cases

As the previous and the following tables illustrate, the selected innovative Learning 20 cases reflect a wide spectrum of learning settings, technical platforms, learning activities, all encompassing grass root activities as well as institutional or public programmes.

Learning Settings	**Welker's**	**SecondReiff**	**Protovoulia**	**IBM**	**KooL**	**ELKOnet**	**LeMill**	**Nettilukio**
Primary School			✓					
Secondary School	✓		✓					✓
Vocational Education and Training					✓	✓		
Higher Education		✓						
Teacher Training			✓				✓	
Workplace Learning				✓				
Lifelong / Adult Learning								✓

Table 3: Learning Settings of the Innovation Cases

The above table shows that the selected Learning 2.0 innovation cases reflect a wide spectrum of institutional learning settings, from primary school through higher education, workplace learning, adult and professional training. Three cases are located in secondary schools; two cases in Vocational Education and Training (VET), Teacher Training (TT); one innovation case each involves a primary school, one a Higher Education (HE) institution, one focuses on learning at the workplace and one on Lifelong/Adult Learning.

The next table in turn summarises the technical platforms and Web 2.0 tools represented by the selected innovative Learning 2.0 practices. The Table shows that all social computing tools commonly identified in the literature are used, ranging from social community tools, through wikis, blogs and podcasts, virtual environments (MUVE), learning platforms and Personal Learning Environments (PLE) to e-Portfolios. The three groups of tools most frequently used are social community/networking tools, wikis and blogs. All cases involve furthermore different combinations and configurations of different Web 2.0 applications.

Technical Platforms and Web 2.0 Tools	Welker's	SecondReiff	Protovoulia	IBM	KooL	ELKOnet	LeMill	Nettilukio
Wiki	✓	✓	✓	✓	✓	✓	✓	✓
Blog	✓	✓	✓	✓	✓	✓	✓	✓
Learning Platform			✓		✓	✓	✓	✓
MUVE			✓					
Social Community	✓	✓	✓	✓		✓	✓	
Podcasts					✓			
Virtual Meeting		✓		✓				✓
Social Bookmarking				✓		✓		
Personal Learning Environment								✓
E-Portfolios					✓			✓

Table 4: Technical Platforms and Web 2.0 Tools of the Innovation Cases

The following table finally illustrates the learning activities. As the table shows, all selected innovative Learning 2.0 case studies focus on collaboration and communication and the vast majority of cases also centre on peer production and review of content. Two cases address the more defined area of Knowledge Management (KM) and one innovative case utilises virtual realities and simulations. All cases incorporate multiple learning activities.

Learning Activities	Welker's	SecondReiff	Protovoulia	IBM	KooL	ELKOnet	LeMill	Nettilukio
Peer Production / Review	✓	✓	✓	✓	✓		✓	✓
Collaboration	✓	✓	✓	✓	✓	✓	✓	✓
Communication	✓	✓	✓	✓	✓	✓	✓	✓
Knowledge Management			✓			✓		
Simulation		✓						

Table 5: Learning Activities of the Innovation Cases

4. Detailed Description of the Innovation Case Studies

4.1 Welker's Wikinomics – A Grass Roots Initiative in Secondary School

Figure 4.1: Screenshot from http://welkerswikinomics.wetpaint.com

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	Jason Welker (Secondary school teacher, project manager of Welker's Wikinomics)
Self Administered Questionnaires (SAQ)	21	Secondary school students
Observation	Online environment and activities	

Table 6: Data Collection Summary Welker's Wikinomics

4.1.1 Introduction

Welker's Wikinomics is a collaborative online learning environment supporting classroom teaching at a secondary school in Zurich, Switzerland. The initiative was developed by Jason Welker whilst he was working as an economics teacher at the Shanghai American School in China and was then transferred to Zurich International School. The case is an example of a grass roots project initiated and developed by a single teacher.

The online environment offers cooperation, communication and information spaces for students such as a blog and a wiki. Through using a blog, the teacher can provide real-life examples related to lessons learned in the classroom and the students are able to comment. The wiki enables students to collaboratively develop a subject-related information environment that supplements – and in the future: replace – textbooks. Additionally, discussion forums are used as tools for communication between students

The online tools are not used during classroom sessions but are a working platform for homework. Use of the online tools is obligatory for students. Students record their contributions to the blog, wiki and forums during the school year in "Blog- and wiki-logs". Their contributions can be assessed and form part of the students' grades. Welker's Wikinomics has won prizes as Edublog's 2007 Best Educational Wiki and Wetpaint's 2008 Golden Paint Can Award for Education 2.0 Wiki.

4.1.2 Case description

The initiative was started about three years ago and soon became one of the biggest educational wikis. During a professional development workshop on educational technology at Shanghai American School, speakers from the USA presented examples of how to use wikis and blogs in educational settings to the teaching staff. This workshop inspired the teaching staff to start their own wiki.

The initial aim of the project was to teach economics by replacing traditional textbooks and source materials (for instance printed newspaper articles) with new internet technologies, in order to motivate students and connect them to the modern world in a more relevant and engaging way. The project began as a blog which aimed to make newspaper articles more easily available to students and to help them consolidate the work learned in class.

The demand for an online repository for student-generated information led to the next phase of the project, the formation of the wiki. The wiki has been in use for three years with a new group of student users each year. Its intended function is to help students to prepare for exams. The wiki now serves as a model for other teachers in education.

There have been some changes within the initiative since was established. Chat rooms had been available at first, however they were mainly used for off-topic chat by students and thus deemed too much of a distraction. Now, only the homepage of the wiki has a chat function available and this is used for test review live sessions with the teacher. The biggest changes have been improvements to the organisation of the page structure. Discussion forums have been added, offering a space for discussions and comments on each wiki page. It is now an obligatory task for students to respond on discussion threads in every unit. The wiki is intended to replace the use of textbooks in the classroom as of next year.

4.1.3 Learner profiles and learning processes

Both schools provided two different economics classes, AP (American System) and IP (European System). In Shanghai only the AP students used the wiki whilst the IP students worked exclusively with the blog. In Shanghai the students were mostly Asian or Asian-American but there were also around 25% of students from a European background. Therefore, there is a very high diversity of nationalities in the classes. The level is upper secondary school (17 or 18 years old) and after finishing the course many students progress to university.

The students participating in the project are in general very knowledgeable about ICT and have an intuitive approach towards the use of new technologies. In particular, they are very familiar with online communities, instant messaging and editing wikis. There is no evidence of a digital divide; all students grew up with computers and high speed internet.

The school in Shanghai was very supportive of the programme, to the extent that other teachers started to use wikis in their classes.

In Zurich now all students (4 IP and 1 IP classes) are involved in the wiki. Among the 75 students this year there are 30 or 40 different nationalities, mostly from across Europe, but also from North America and Australia. The Zurich International School is both supportive and progressive towards its use of modern technologies (e.g. Tablet PCs, Smartboards in every classroom).

The online environment supports and supplements classroom teaching. It consists of a blog with regular input by the teacher (real-world examples of study subjects) and comments by the students, a multi-page wiki about economics created by the students in a collaborative way and related discussion threads opened by the teacher or students for debates and analysis of contents. The online environment is not used during classes. In the end of the class the usual task for the students is to continue working within the online environment as homework. It is a good active way for the students to read, write and think about economics at home. Compared to using textbooks, there is more interaction between students. The opportunity to influence peers and generate content collaboratively is appealing and much more engaging to students.

The blog acts as an intersection, where teachers can reinforce connections between the learning content and what is going on in the world by providing real-life examples of how the learning topics can be applied. Students reply to the teacher on the blog by adding their own comments. In the discussion forums students are asked to respond to each other, and they can also start their own threads and debate with one another. The wiki is reserved for content and information and is a substitute for a textbook, not a tool for communication. Students take their notes from the class and work together to combine their notes in one place. The wiki serves as a source of information (e.g. theories, graphs), and this content can then be analysed on the blog and in the discussion forums.

4.1.4 Technological aspects

The blog is now a self-hosted WordPress blog, after Blogger was temporarily blocked by the Chinese firewall. Wetpaint is used for the wiki, which is an ad-free wiki service for teachers. The advantages are that it is free, has no distracting advertising and discussion forums are included.

4.1.5 Outcomes, motivational aspects, impacts and barriers

Feedback from students confirms that they use the wiki to prepare for tests and also that they enjoy working with the wiki and collaborating with each other. Similarly positive feedback from teachers indicates that they also find the wiki beneficial.

Many wikis used for teaching are abandoned after a short while because of a teachers' lack of enthusiasm and engagement. The key for the success of the wiki in this case is the teacher's motivation, excitement and commitment. The teacher was able to "sell" the technology to the students so that they are inspired about the project and therefore motivated. It proved important that the students believe that using the tools will help them understand the subject better and that it is also a fun and interesting way to learn. Motivating factors for students are noted as communication with other students, the production of own content and the relation of topics just learned to real-world developments or events. An important issue is also that the online content is updated regularly so that there is always new material available to read. An-

other big motivational factor is that the students want to get a good grade, which can only be obtained by participating in the online platforms.

The wiki and the blog are open to anybody in the world, which has proven to be an important motivational factor for the students. Currently, privacy issues are not a cause for concern amongst the students. The pages displayed in the wiki are a result of collective work and the students' use of pseudonyms ensures that no private information is displayed. Individual students are required to compile and maintain a document summarizing which pages they contributed to, which blog-entries they commented on and in which discussion forums they participated in ("blog and wiki-log").

The biggest obstacle within the project was the Chinese firewall. Eventually, Webpaint was blocked and students had to use a Virtual Private Network or a Proxy-Server to access the wiki. One of the demands on the teacher is to stay ahead of the students; it is a challenge to maintain and organise the wiki in a logical way as it grows. This problem was solved by structuring the wiki in sections and sub-sections, each representing the teaching units in economics, with a top level page providing an overview and the contents structured on several levels. The key is to organise the wiki in a way which makes navigation intuitive and information easy to find, whilst ensuring that it is not overwhelming to the first time user.

Additionally, at first, the students can have problems distinguishing between the wiki and the blog, failing to realise that they are on two different websites. The first lesson in class has to be spent on showing and explaining the environment to the students. Potential for improvement and further development can be seen in podcasting the lectures, so that students can relisten to classes anytime they want.

Other teachers at Zurich International School are keen to learn the methods introduced by the project and there is a demand for workshops on the topic. Generally, it is easy to use the technologies, for instance no programming skills are necessary. Teachers need only initial training, in the form of examples or models. This personal dissemination is happening in all educational sectors at the moment.

From the perspective of the international community of Web 2.0 teachers the wiki and blogs are extremely useful for teaching resources. Outside of this community, however, many teachers are not aware of how to use the tools in their own classrooms. This is why it is extremely important to find teachers who can actively transfer Web 2.0 models to other schools and help support their implementation.

4.1.6 Results of the survey among students

The 21 students that responded to our survey overall evaluated the project as very positive and valuable.

The Web 2.0 tools used are rated as highly useful. The blog is rated with 4.2 in average on a 1-5 rating scale (n=15), the wiki got the highest appreciation with 4.8/5 (n=15). The online platform in general is regarded as very useful (4.4/5, n=15). Compared to the Web 2.0 tools the more traditional elements have been rated lower, but still as useful (Discussion forums: 3.8/5, n=15; Chat: 3.0/5, n=15; E-Mail: 3.2/5, n=15).

Students see clear benefits of the Web 2.0 use. Most students strongly agree with the following statements concerning the initiative: "Improved my general knowledge" (4.64/5, n=14), "Improved my knowledge about particular subjects" (4.71/5, n=14), "Improved my qualifica-

tions" (4.00/5, n=14). The impact on computer and soft skills was rated lower than the impact on knowledge, but is clearly seen as a factor of improvement: "Improved my basic computer skills" (3.79/5, n=14), "Helped me to use computers to do more complex things" (3.43/5, n=14), "Improved my self-confidence" (3.79/5, n=14).

Some selected qualitative statements can illustrate the students view on the initiative:

> *"I think the best aspect of the wiki was the fact that it was collaboration. Everyone participated, so it was the knowledge of all of us, and not one particular student. This allowed for the bouncing of ideas back and forth, you could share your opinions on the blog and people would respond and vice versa."*
>
> *"At first, my motivation was more of a completion grade type motivation. Eventually though, I began to enjoy reading and analyzing articles in the news related to economics. It's interesting to see what the theory we're learning in class is like in real life. How it's different, how it's better or worse, etc."*
>
> *"It allowed me to learn economics in a way that I enjoyed. I'm not very much a book person. More of a read online articles person and that really helped me."*
>
> *"Now I can actually read the finance and economics section of The Economist and Times and understand what it's saying."*
>
> *"The communication I must say was mainly in class. Even though some conversations occurred on the wiki, it was rare for us to continuously return to the comments of the same blog post to actually continue the conversation. The comments on blogs don't exactly provide the conversational atmosphere that a forum or a classroom provides, and thus most of the communication occurred in person though some occurred online."*

4.1.7 Success factors

Support and technical equipment of school

Support by the management level of the school is seen as a key factor for success. The two schools where this activity took place are generally very supportive towards use of modern technologies, are technologically progressive and have a very high affinity with the use of modern technology. Therefore the successes experienced by this initiative are attributed to such an environment and may not be within the means of every secondary school in Europe.

An inspired and motivated teacher

Jason Welker had been inspired by a workshop on educational technology at his school, from which he gained the technical knowledge necessary to install and further develop the initiative independently. The methods have further been influenced by Personal Learning Communities of the teacher in a world-wide personal network of people using Web 2.0 technologies for learning. Communication amongst practitioners takes place via a network of personal blogs, which can be recognised as a Personal Learning Network.

Students with good technical equipment at home and adequate basic ICT skills

The user group of this initiative is somewhat a privileged one. There is no digital gap, all of the students grew up with computers and all live in households with good technological equipment and high speed internet and many already use web 2.0 applications for non-

academic purposes. The students have a high level of computer literacy (for example they learn quickly and in an intuitive way how to edit wiki pages) due to their previous knowledge and this may differentiate Zurich International School from many other European secondary schools.

Reasonable use of the Web 2.0 tools

Web 2.0 tools are implemented in a strategic way that makes the most of their specific characteristics and emphasises their benefits to learning. For example, the wiki is used as an effective tool to encourage the collaborative creation of learning content; currently to supplement traditional textbooks but later to replace them entirely. The blog has links and embedded videos which provide a real-life context for case studies as well as enabling the students to comment directly. The topic-related discussion forums are linked with the related wiki pages and are used as a platform to expand communication in a more discursive manner around specific subjects.

Well-structured online environment and meaningful connection to classroom teaching

The online environment has been developed further since the beginning of the project and has become increasingly well-structured. A major challenge within the project was the need to frequently restructure the wiki as it becomes bigger and more complex, by the effective use of sections and sub-sections. Intuitive navigation and easy information detection are key. The online environment was not used in classroom sessions, but at the end of the sessions students were asked to continue learning at home with wiki, blog and discussion forums. Consequently, the online environment is used as a collaborative distance learning process, supplementing the classroom sessions where traditional learning and teaching techniques are used.

4.1.8 Lessons learned

Learning 2.0 can be successfully implemented as a compulsory part of classes in secondary school

The nature of Web 2.0 tools supports their usability in informal education settings. However, the Welker's Wikinomics project is an example of how Web 2.0 tools can also be successfully implemented in a formal school setting by creating a blended learning scenario where the online tools supplement traditional teaching methods, particularly for homework. The use of the tools by the students is an obligatory part of classes and quantity and quality of participation directly contributes to students' grades. This structured methodology is an important part of the project’s success.

Initial knowledge and ongoing motivation of the teacher are crucial

The implementation of Web 2.0 in education demands a degree of technical knowledge and commitment on the part of the teacher. In the case of Welker's Wikinomics these initial prerequisites were provided by enthusiasts from outside. Once one or more members of an organisation have the initial competences and impetus to start their own projects they can act as multipliers to transfer the key starting competences to other members of the institution. Interest, success and continuous motivation are strongly related variables which can reinforce each other and drive the development of Web 2.0 projects

Initial introduction of the tools and their value to the students is important

Motivation is as important for the students as it is for the project organiser. Students need to see added value from the Web 2.0 use. An introduction to the tools, their technical attributes and wider value should be provided. The scope and detail of the introductory lesson(s) depend on the size of the virtual gap existing in the respective group of students. Although for many students the use of Web 2.0 tools is already commonplace, there may be a digitally disadvantaged groups of students. It will be necessary to ensure that these students are able to use the Web 2.0 tools effectively and that their implementation in class presents an opportunity for progress, rather than an obstacle.

Intuitive navigation, easy relocation of information, manageable structure and regular updates of the online environment are key

Web 2.0 by nature is less structured than conventional web environments or learning management systems. This provides more freedom to the user and, in turn, can lead to a higher level of student engagement and the development of more collaborative activities. However, it is necessary to address potential problems related to the unstructured nature of Web 2.0 environments. The risks of being overwhelmed by information and of getting lost in navigation, especially as a newcomer, need to be catered for. A simple and clear homepage – by now almost a trademark of Web 2.0 sites – and use of structuring elements like categories or a history are helpful. Regular updates are a key factor for every website to stay interesting but are especially important for web environments which depend on active user participation. A critical mass of regular participants is therefore a prerequisite.

4.2 SecondReiff (WISE) – Connecting Virtual Worlds with Learning 2.0

Figure 4.2: Screenshots from http://www.w-i-s-e.net

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	Marc Frohn & Sascha Glasl, (Project Managers)
Self Administered Questionnaires (SAQ)	1	Higher Education Student
Other	Meeting and guided tour in the SecondLife project environment	Marc Frohn, Sascha Glasl (Project Managers); Melanie Rubenbauer, Simon Heid (ILI)

Table 7: Data Collection Summary SecondReiff (WISE)

4.2.1 Introduction

SecondReiff is a Web 2.0 initiative of the RWTH Aachen University in Germany. It is the first pilot project in a planned series of projects using WISE, a 3D space in the virtual world SecondLife for combining real and virtual learning for the study of architecture at higher education level. The project has focused on architecture as its pilot area of study because SecondLife is especially beneficial for supporting spatial thinking and understanding. The environment contains user-generated 3D models of architectural design drafts, 3D-structuring of elements similar to a Web 2.0 tag cloud, user-user rating, 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 its use of the advantages of virtual world learning. The methods of the project are inspired by Web 2.0 environments and

transferred to a 3D learning environment. A key focus of the initiative is examining how representations of learning activities in a 3D virtual world interact with real world learning processes. The project also explores what the special motivational, organisational and technical challenges of virtual worlds are, which additional collaboration and communication facilities these environments offer and how these can be used effectively to support learning activities.

4.2.2 Case description

The initiative started in 2007 to respond to some difficulties faced by the Faculty of Architecture at the University of Aachen. Student workspaces were distributed over the whole campus and there was no collective common room. The initial goal of the initiative was to improve this and to create a space where students could learn together. The aim was also to develop tools to connect the real world learning spaces with a common virtual environment as well as explore the potential of SecondLife as a teaching and learning space.

The experimental platform WISE was developed, aiming to capitalise on the potential of SecondLife to enhance the architectural programmes at the university, allowing students to explore spatial understanding and build 3D representations. Using a virtual world opens up numerous possibilities for studying architecture as students are not constrained to using the space in a traditional manner. The project organisers were able to build up a learning space that did not need to resemble reality, or the other spaces found in typical SecondLife educational projects.

Three main areas have been created. Firstly, the organisers developed the virtual common room that had been lacking in the university campus and made the atmosphere as comfortable as possible in order to encourage communication. Secondly, they developed a library through using a media-tool that makes all student-created knowledge visible. In contrast to a classical library only user-generated content is provided and is structured by a Web 2.0-like clicking mechanism according to popularity. Thirdly, a workbench provides an experimentation space for architectural creations by the students.

The starting point of the project implementation in higher university teaching settings are usually one-day introductory events where teachers and students can try out the environment and ask questions. Then, seminars are offered which use the project space in a practical way as well as being able to address the more theoretical aspects of the project. Seminar teachers and student tutors are trained for two weeks after the introductory event by the project organisers. Additionally, weekly consultancy by the developers is offered directly within the SecondLife space.

4.2.3 Learner profiles, learning spaces and learning processes

Learners are students of architecture at the University of Aachen. The students in general have good initial knowledge of working with 3D tools and Web 2.0. The SecondLife space is partly structured according to the seminars that take place. Three central areas are allocated to seminars of the Faculty of Architecture. Two other spaces are for events taking place outside the faculty but are also related to architecture. Additionally, students have their own spaces.

On the edge of the island there is also a space for architectural practices and companies, which offers students the opportunity to make professional contacts. This is an important aspect of higher education which is normally overlooked by traditional academic teaching.

Learning processes take place in the three different areas: 1. Communication and meeting spaces, 2. Media-tool and 3. Workbench. The communication area consists of a general meeting and seminar space plus several smaller meeting spaces for seminar-related small-group meetings. The general seminar space contains a projection tool for presentation slides. The smaller areas are cubes, where the work of students or presentation slides can be projected on the walls. The media tool is a three-dimensional cube consisting of small cubes representing the students' works. Visitors can fly through the media repository. By clicking on single works, the respective element gets a higher rating and becomes more visible. Works of less public interest become more transparent after a certain time. The workbench is a sandbox for the creation of three-dimensional objects for experimentation and building. Students can create or recreate architectural designs and later exhibit them in the media-tool. The general communication facilities of SecondLife (e.g. Voice Chat, Instant Messenger, Notecards) support cooperation and feedback processes.

The use of SecondLife as a platform has also created a new teaching approach. In the beginning of the project the focus was on developing applications. Now, more and more, questions that emerge from building up the space in SecondLife are addressed directly and inspire theoretical and practical considerations concerning spaces in architecture.

4.2.4 Technological aspects

Challenges during the project implementation have been slow server downtimes of SecondLife, software crashes, problems with connection speed or software installation problems. SecondLife has rather high hardware requirements and a modern computer with an integrated 3D graphic processor is necessary. Although SecondLife went open source this year, the system is not easily adaptable to the specialised needs of the architectural programme. It is also difficult to integrate third-party applications, such as other 3D construction software.

Aside from SecondLife, the initiative has also employed the use of two-dimensional websites, private homepages and student blogs, and these tools have been connected to the 3D space by web links. In the future, other Web 2.0 applications will be connected directly.

The use of VoiceChat in SecondLife has become extremely popular, and is used alongside normal text chat and private instant messaging for communication between project organisers, teachers and students. The different types of chat SecondLife offers create different levels of private and public communication. Additionally, two spatial components are present when using VoiceChat: Firstly, it is visually apparent who speaks at a certain moment and secondly, the more distance there is between speaker and receptor, the more muted the voice is. The visualization of voice and persons in the space is very helpful in conference talks.

4.2.5 Outcomes, motivational aspects and impacts

Only a small group of teachers participated in the project because of initial barriers, time constraints, limited interest and lack of information. Initial motivation of participants is good and many find that the collaborative working methods, which SecondLife encourages, are highly motivating. Usually teachers and students work more or less separate from each other and students have more autonomy. Building things in SecondLife helps to create team spirit and new forms of communication emerge.

However, SecondLife as a teaching and learning platform is new, complex and can be difficult for participants at the start. It is therefore important for both teachers and students to maintain a good level of motivation throughout the project. A key conclusion of the project implementation in this respect is that participants need to be selective about how they use the platform and concentrate on 'bounded' and small-scale pilot applications rather than ambitious applications.

Another problem for some students is the motivation to use SecondLife as a platform. Unlike social applications on the net, such as Facebook, Skype or FlickR, SecondLife is not yet embedded in the daily student lifestyle, and is relatively complex for beginners. To see an added value in SecondLife, users first have to get immersed in it and collect some initial competences and experiences. The added value is not clear at first for many users and some may lose interest. Once there are more direct educational applications for the classroom, these barriers of interest and motivation could decrease.

4.2.6 Success factors and barriers

Use of the potential of virtual worlds

One of the successes of SecondReiff is to use functionalities like the three-dimensional organisation of elements, additional communication facilities and spatial as well as non-verbal extensions of web-based communication and collaboration, to add value to established, but nonetheless effective, ways of supporting architectural skills acquisition. In this way it has avoided the over-ambitiousness of many comparable educational initiatives that use Massive Multi-User 3D Virtual Environments (MUVEs) like SecondLife. These have encountered problems in trying to realize 1:1 representations of reality (e.g., to recreate a virtual campus or to transfer traditional web representations of organisations to the 3D space).

Hybrid spaces using Web 2.0 are combined with features of virtual world learning

SecondReiff represents a 'hybrid' approach that combines the strengths of open information sharing and collaborative working in 'Learning 2.0' social networking methodologies with the strengths of the 'user-user interaction' exemplified in virtual worlds. The strong presence of an avatar provides a cloak of anonymity that can help users to feel more confident. The social networking aspect provides an element of group identity and collaborative support.

Motivation of participants by creating a comfortable, attractive and usable learning environment

The project creates a positive and supportive atmosphere by applying novel ways of using space – in keeping with its architectural focus. In contrast to more conventional attempts to rebuild real campuses, seminar rooms or learning spaces, this project uses space in ways that encourage participants to think more creatively about their own subject matter – architecture – at the same time as maintaining a focus on usability. The communication area is designed as a comfortable place located in a natural setting, whereas the media-tool is located in a fantasy setting, created as a 'fly-through cube'. The workbench area is reminiscent of an empty desert, which encourages users to use it as a blank canvas and be creative with their ideas.

Complexity, accessibility and system stability of SecondLife

Throughout the duration of the project, a major challenge has been that MUVEs like SecondLife are still cutting-edge applications which demand a high standard of technical equipment (e.g. a computer with a modern 3D-accelerated graphics card) and it is extremely time-consuming to install and to learn the necessary skills to take part. There are frequent problems encountered in accessing the platform due to system or region downtimes, simulation speed can be unsteady and network or server lag is also a common complaint. It is particularly detrimental to the project when these problems occur during scheduled course or meeting times. Until the system is reliably stable and hardware requirements are fulfilled by standard computers at home and in organisations, mainstreaming and massive implementation in formal educational organisations is not possible.

4.2.7 Lessons learned

MUVEs support learning of spatial understanding and enable advanced virtual communication

Educational projects using Massive Multi-User 3D Virtual Environments (MUVEs) like SecondLife as a learning platform are potentially beneficial for many educational sectors and areas of study as 3D virtual worlds support the representation of small and large-scale learning scenarios in vivid, flexible and memorable ways. Furthermore, they enable collaborative content creation and offer advanced communication facilities that could be transferable in domains like language learning.

Learning in virtual worlds can be connected with Web 2.0 approaches and tools

Being complex and rather new for many developers and users, the realization of learning scenarios in virtual worlds can seem a little too complex for many students. Activities like displaying presentations or reading of longer texts are more difficult compared to performing the same tasks in traditional web environments, although they are possible. Therefore, the case study suggests that the most effective learning scenario is created when the use of virtual worlds and traditional web spaces, including Web 2.0 tools, are combined.

Taking full advantage of the potential of MUVEs for learning requires a high level of effort

Using MUVEs for learning is a very time-consuming process and requires a high level of input from all those involved in order to create a well-designed project space. Additionally, users have to invest initial time in installing the software and learning the basic skills to move, communicate and eventually create and share objects in the virtual world. It is therefore recommended that similar initiatives start with small-scale pilot projects and pay attention to usability and attractiveness of the environment, as well as the real added value of tools and methods used.

In general, educators have a low level of knowledge and interest in using virtual worlds for learning

Current projects are developed and maintained mainly by forward-thinking teachers who are already familiar with and have much previous experience in using the platform, and who can therefore clearly see added values for teaching. For many other actors in education, virtual

worlds may be more daunting and at first sight; the doubts, barriers and disadvantages can outweigh the desire to explore educational opportunities. Additionally, there are as yet no standard applications for the seminar- or classroom that offer obvious added-value. Hence, acceptance among educators is low in general and successful pilot projects are necessary to serve as ‘product champions’ and help to lower initial knowledge barriers and concerns.

Technical obstacles when using SecondLife in education are present

The main barrier to using SecondLife in educational establishments at present is the absence of the high-specification technical equipment required to run the platform at schools and universities, as well as in the homes of teachers and students. Additionally, broadband and stable internet connections are required. Firewalls, which are in use in many organisations or at home, frequently block SecondLife applications or stop them from working properly. System stability in general is still low compared to regular server or region downtimes and changing simulation speeds.

4.3 Protovoulia – School Innovation and Teacher Training through Web 2.0

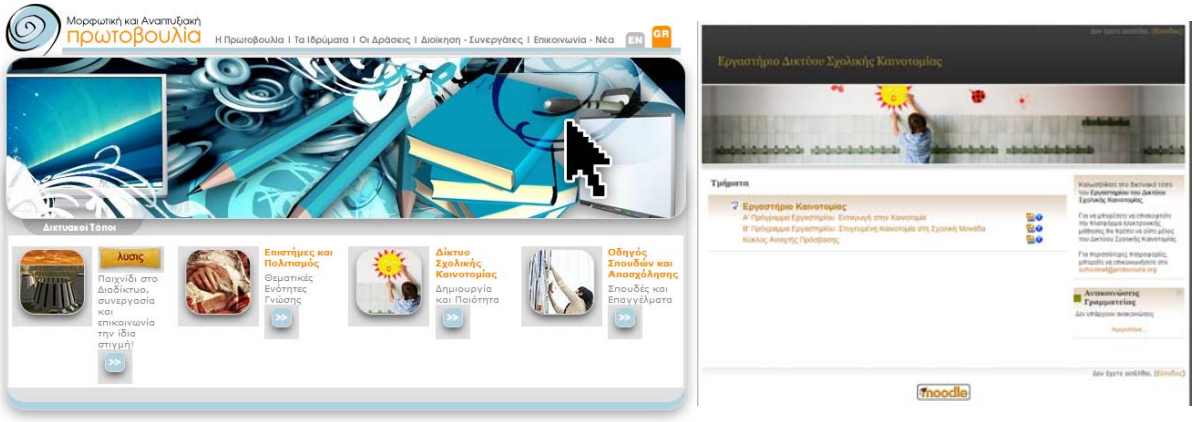

Figure 4.3: Screenshots from http://www.protovoulia.org/en/prwtovoulia.htm

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	4 (3 through a focus group and one interview, plus online contacts for requests)	Nikitas Kastis (Project Coordinator) Manolis Polychronides (Responsible for Thematic Presentations) Nikos Zygouritsas (IT Manager) Vivi Anthopoulou (Responsible for Teacher Training and the Network of Innovating Schools)
Focus Groups	1	Three programme managers i.e. Kastis, Zygouritsas and Polychronides
Self Administered Questionnaires (SAQ)	6	Teacher Trainer from Primary and Early Secondary Schools (approx. 50% male and female; between 25 and 50 years old; all with completed tertiary education)
Observation	Online environment and activities (in Greek; translation by key informants)	Activities of all actors on the Protovoulia site e.g. teachers, teacher trainers, pupils, case managers, pupils, members of participating foundations
Content Analysis	Data from internal evaluation report (in Greek; translation by key informants)	

Table 8: Data Collection Summary Protovoulia

4.3.1 Introduction

Protovoulia has been launched as an 'umbrella' web site to provide access to a range of materials for learning, as well as to raise school education value for school teachers, education experts and students. The web site has been set up as the main communication channel for the 'Education and Development Initiative', the so-called Protovoulia – from the Greek word for Initiative -, which has been undertaken as a grass roots, joint activity by eight of the most established Greek Foundations.[21] It was set up to raise awareness amongst the political establishment, as well as the public, about the social significance of school education. To this end,

[21] Namely the J. F. Kostopoulos Foundation, the Bodossakis Foundation, the Evgenides Foundation, the Leventis Foundation, the A. S. Onassis Foundation, the Lambrakis Foundation, the National Bank of Greece Foundation and the St. Niarchos Foundation.

a central aim was to offer prototypical and scalable solutions for the development of the curriculum, learning materials and innovative pedagogies, as well as the organisation processes and 'culture' of the school system. Thus, Protovoulia has been constituted of a number of complementary actions addressing (a) the development of educational content, (b) school innovation and corresponding Teacher Training (TT) for change and, finally, by directly addressing pupils and families at home with (c) serious games for learning (for ages 11 to 15) and (d) 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 have been adopted and are currently being piloted.

4.3.2 Case description

The Protovoulia initiative was launched during June 2006 as a set of four Actions corresponding to:

1. The development of an integrated action to facilitate the introduction and validation of innovations in the Greek school system, by (a) setting up a pedagogical background relating to process innovation, curricula and learning materials and didactics; (b) building and operating an online on-the-job (school-based) training platform, with a blended training scheme encompassing introductory seminars of groups of teachers, as an online Teacher Training Lab and (c) enhancing the school management and accountability culture, by strongly and sometimes exclusively adopting collaborative learning methods, at both the ('real') school and at the 'platform' level, thereby facilitating a gradual change of the school 'culture'.

   This action has been a gradually expanding to a 'Network of School Innovation', where schools around Greece have been invited to join, after a selection procedure, with their teachers participating in the online Training Laboratory and collaborating at the school and inter-school level, in 'horizontal' education activities of a rather broad range, from lesson planning and validation to better use of the daily school time schedule and the collaboration with local community and local stakeholders. The training program is providing support to both the school and the teachers to enhance their education planning, implementation and assessment capacity and, thus, their capacity to handle change, innovate and sustain a continuous drive towards better quality and more effective education. A number of Web 2.0 tools, namely blogs, wikis and in-house content sharing and collaboration solutions, have been adopted, both inside the Moodle-based training environment and at the portal of Protovoulia (http://schoolnet.protovoulia.org).

2. The design and development of authoring, sharing, re-purposing and re-using solutions for learning content, which are offered in the form of 'Thematic Presentations' of knowledge domains that relate to the curriculum of primary and secondary education, while addressing both interdisciplinary concepts and learning strategies and are easily contextualised in competence-building learning experiences. Themes of knowledge are being introduced by groups of subject experts, referenced and hyperlinked to other online sources of information, while coupled with Web 2.0 tools, like weblogs and wikis – the Wiki*Gnossi* (i.e. 'Gnossi' being the Greek word for Knowledge). School teachers and pupils are being invited to join a knowledge sharing experience, testing new forms of knowledge building and validation. This action therefore aims at (a) providing interesting and continuously validated learning materials to schools, while (b) addressing the important question of bringing knowledge, research and academic think-

ing closer to school education and, thus, (c) investigating new forms of publishing and validating knowledge to address learning at school ages. The aforementioned online 'knowledge environment' at http://themes.protovoulia.org is currently expanding to include solutions which will support the interoperability of cultural and scientific information repositories of Greek content, which will provide contextualised search and cataloguing solutions aimed at supporting school learning. This interoperability initiative will be coupled with the Learning 2.0 tools, while bringing together highly valued learning materials being documented by a cohort of prestigious libraries, archives, museums and science and technology centres.

3. The structuring and operation of a web portal offering guidance to tertiary education possibilities as well as to related job profiles and professional qualifications. This has been designed as an online consultation environment for studies and professions at http://studies.protovoulia.org. Information being provided has been additionally enriched by a two-year study about the employability of graduates of tertiary education, in terms of quality parameters (i.e. whether the university graduates currently carry the right skills and competences required by the industry) and quantitative analysis (i.e. based on the labour survey results of the last 20 years), responding to questions about the relative unemployment and individual returns, between education levels as well as between scientific areas (following the ISCED 5-6 typology).

4. The development of a Multiplayer Online Role-Playing Game (MORPG) for 11 to 14 year-old children, of the serious games category, with an energy/resources handling concept where the gamers are invited to play individually and in teams, while getting familiar with scientific concepts and developing collaborative working skills and sharing competences. The game has recently been launched and is beginning a validation phase.

The Protovoulia initiative has already entered its third annual period with expanding the 'Network of School Innovation', the 'Thematic Presentations' for learning, knowledge building and open interoperability action and its Tertiary Education online Observatory. It has also entered into an institutional collaboration framework with the Greek Ministry of Education and Religious Affairs, with special emphasis on providing long-term sustainability to the 'Network of School Innovation'. It is hoped that it may develop into a Non-Governmental Organisation (NGO) on Education Innovation, which will offer synergies to the state as well as other benefactors, in order to increase both effectiveness and efficiency to the Greek school education in its European context.

The main focus of the current study lies on the 'Network of School Innovation' established under Action 1 and the 'Thematic Presentations' conducted under Action 2.

4.3.3 Aims and objectives of the initiative

The 'Network of School Innovation' is aimed at all Greek schools. It supports the development of initiatives by teachers themselves. Through the collaboration of schools it promotes educational innovation in schools and it aims to bring about fundamental change in the format and content of education so that creative forms of working and learning in schools will result. Both schools and individual teachers may participate in the 'Network of School Innovation'. The primary aims of the network are:

- The development and implementation of integrated educational schemes, in order to bring about the effective shift from educational and learning practices based on memorization and rote learning to learner centred educational activities that systematically promote and foster the development of students' creative abilities, with the active participation of teachers and pupils;
- The development of authoritative, reliable, and user-friendly forms of educational innovation;
- The production of teaching material to enrich learning materials already available in Greek schools;
- The utilization of other Protovoulia actions;
- The systematic support of teachers in designing, developing and implementing schemes of educational activities;
- The cooperation between its members in order to highlight and promote 'good practices of innovation' in education;
- To cultivate community spirit between members in order to foster a positive learning environment and develop pupils' abilities;
- To promote innovation and to support dialogue in education.

The participation of the schools enables them to become points of reference, so that modern educational methods may be gradually and constantly evaluated and introduced. The teachers are invited to study and to experiment with proposed schemes of activities, as well as to compile reports on the educational practices used. They are also invited to make proposals that cultivate pupils' abilities and demonstrate an interdisciplinary approach to knowledge, critical thought, and assessment, which meet the quality criteria of Protovoulia.

4.3.4 Learner profiles, learning environments and learning processes

In the context of the 'Network of School Innovation' of the Protovoulia project, 163 teachers from 62 schools, of which 27 were primary and 35 secondary schools, participated in the pilot 'Innovation Workshop'. First, a group of 16 teachers and education researchers were recruited which acted as 'facilitators' for the centrally organised project-based Teacher Training program that included 58 public and private schools. The program was based on a blended course, which included face-to-face seminars as well as an online training program. The first group of teachers who took the role of facilitators consisted mainly of active teachers or teachers working as researchers at university.

The course started in the end of January 2008 and lasted until the end of June 2008. The group of facilitators had six face-to-face seminars, while the large group of participants had two face-to-face seminars conducted on different dates and in different places around Greece. The major part of the course took place online through the e-Learning platform Moodle, which includes discussion forums, blogs and wikis. Each of the 16 tutors was responsible for between two to five groups of teachers.

The topics of the activities undertaken during the 'Innovation Workshop' cover a wide range of school-life issues, from focused approaches to the didactics of a certain subject to broader pedagogical issues, administrative issues, psychosocial support for pupils and teachers, tech-

nological infrastructure, connecting the school with the local community, with scientific bodies, social partners, but also with schools or institutions abroad.

Teachers who participated in the workshop indicate that the activity met the needs of their students and could be developed and integrated as a practice or organic approach to school. Most of them consider that they themselves benefited from their participation in the workshop mainly on the following points:

- They have worked systematically on their self-chosen activity (e.g. in planning, in implementation, in assessment);
- They received respect as professionals, as they have chosen for themselves the object of their training and thus they were not forced to take the role of the student like in other specific training programs;
- They were able to familiarise themselves with a modern e-Learning platform and embedded Web 2.0 applications;
- They were able to familiarise themselves with practices and perceptions of 'open' knowledge;
- They were in contact with colleagues from different disciplines and levels of education from various parts of Greece, with whom they share common interests.

The participants were members of three virtual groups. The school group, which constituted the main group, the tutor group (depending on the number of schools participants were responsible for), and the larger group, which constituted the whole training course.

Within the context of the 'Thematic Presentations' educational material was collected, documented and provided to teachers and students in individual Scientific Areas, in principle, those concerning the development of scientific thought and the European Culture. The 'Thematic Presentations' are also designed to cultivate the interdisciplinary approach to knowledge and the development of critical thinking, creativity and collaboration.

4.3.5 Technological aspects

Different forms of state-of-the-art Web 2.0 tools are used in the various actions of the Protovoulia Initiative. The 'Innovation Workshop' of the 'Network of School Innovation" is supported by a Moodle e-Learning platform that was customised to the needs of the selected educational design. In this platform (http://epimorfosi.protovoulia.org) different forms of Web 2.0 social computing tools are used (i.e. forums, blogs, metadata/tagging). Furthermore, the platform was customised in order to use a specially built Content Management System (CMS) that supports the educational material produced by the actions of the Protovoulia initiative. The teachers who participated in the 'Network of School Innovation' were automatically registered users of the 'official' blog that was customised using a WordPress solution.

In the context of the 'Thematic Presentations' action, the same specially built Content Management System (CMS) that supports the educational material produced by the actions of the Protovoulia initiative is used. This CMS is designed to take into consideration the latest developments in educational metadata and tagging. The wiki (i.e. the Wiki*Gnossi*) is using a MediaWiki solution, while all content is put in 'productive comment and use' with a fully customised blog again using a WordPress solution.

4.3.6 Outcomes, motivational aspects and impacts

The outcome of the collaboration of teachers in the 'Network of School Innovation', as well as the input by other teachers (registered on the Network web area), may be commented on using the website, thus giving the extended community of educators the opportunity to showcase 'good practice'. The aim of this is to enhance the quality of education through the provision of educational solutions, which will be tested and hopefully adopted widely, thus gradually increasing the proficiency levels of the Greek school community, and in this way contributing to social cohesion. The web area of the School Innovation Network serves:

- Teachers who are interested and who sign up to the Network, giving them suggestions and schemes of educational activities, the opportunity to compile entries for school use in the 'Thematic Presentations', as well as to generally comment primarily online on the activities proposed by the Network;
- Teachers (i.e. registered users) at Network schools, who will also be given the opportunity to compile schemes of educational activities and 'educational practices' as well as to evaluate them, and the right to compose encyclopaedic entries in the Thematic Presentations;
- The professional support of the teachers at the Network schools in adopting modern educational methods and in evaluating their effectiveness in Greek schools.

The evaluation results – based on an internal evaluation of Protovoulia and a small number of external Self Administered Queationnaires (SAQs) – showed that the Network and the related Teacher Training programme corresponded to needs of teachers, which 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 nevertheless rather low (approx. 8%). The teacher trainers of Protovoulia also indicate an increase in basic and complex e-Skills among themselves and the participants. The Teacher Training fostered inter-and intra-institutional as well as cross-professional exchange (for collaboration and interaction as well as for creating and sharing knowledge) in order to achieve the self-defined goals of their Teacher Training projects (e.g. on environmental and multi-cultural aspects; to encourage pupils to read).

The informal collaborative peer production and learning space, i.e. the 'Thematic Presentations' around selected educational themes (i.e. history of science; European civilisation), are aimed to improve the learning material that the Protovoulia initiative makes available to schools, as well as to invite the scholarly community to contribute to this venture (thereby enriching the scientific and educational material to which pupils have access). At the same time, it aims to offer suitable Web 2.0 tools to pupils so that they may develop and share educational material such as encyclopaedic information suitable for school use, as well as interactive presentations of subjects of scientific interest.

As the work on the 'Thematic Presentations' has only just started, its progress cannot yet be evaluated. Envisaged outcomes comprise: the enrichment and extension of the 'Thematic Presentations' and the secure and fast access of members of the educational community to sources, reference works and collections on the internet.

This activity is to be complemented by a Content Management System (CMS), which will allow the users (i.e. scholars/experts, teachers and pupils) to work together and to produce in turn additional educational material with the aim of:

- Gradually enriching the scientific and cultural learning material made available to teachers and pupils by the scholarly and/or scientific community;
- Enabling teachers and pupils to gain experience by producing educational material together (in communities);
- Increasing the availability of encyclopaedic knowledge on the internet, with entries suitable for use in schools, in various areas of knowledge.

In the above context, http://themes.protovoulia.org functions as a suitable internet environment for making educational material available for use in schools. At the same time, the web-address hosts innovative and user-friendly presentations (mainly for the ages 10 to 15) of specific areas of knowledge by specialists and scholars, as well as the results of the creative endeavours of the educational community. The number of participants who compose and edit the Thematic Reference Works will gradually increase, the starting point of which will be the 'Thematic Presentations'. The action will be realised in a way that it supports the participation of teachers and schools in the 'Network of School Innovation'.

4.3.7 Success factors

The success of the initiative is expressed in the provision of high quality learning materials with embedded Web 2.0 functionalities, the soundness of the pedagogical model, the enhancement of the curriculum, the facilitation of organisational processes at participating schools, as well as the support offered to schools and teachers, in terms of reliability and quality. The following success factors emerged:

Critical mass of participants

It was crucial to ensure that an increasing number of schools and teachers were joining the online Teacher Support/Training environment and undertaking school innovation activities to manage change and drive schools towards better quality. Learning effectiveness was a key factor. It was equally important to involve an increasing number of education experts in the venture and the pilot, who were able to offer their understanding and consultation to teachers and school authorities, whilst experimenting with innovation to address mainstream education and pedagogical questions.

Comprehensive introduction to the training program

In order to overcome possible inertia and resistance amongst schools and teachers, a comprehensive and thorough introduction to the pedagogical methods and technological applications of Protovoulia i.e. LMS, CMS and Web 2.0 tools appeared to be fundamental to ensure the commitment and the continuous compliance of all actors.

Adequate digital competences

Adequate digital competences (of basic to higher level) amongst teachers in Greece cannot be taken for granted. Hence, the programme needs to be complemented with digital literacy training. Adequate pedagogical and technical knowledge about Web 2.0 tools increases the confidence of educators to use them in their own learning, during their own Teacher Training programs and later on in their own teaching.

Reasonable use and meaningful integration of Web 2.0

As for web-based learning environments and Web 2.0 tools in general, it is essential that they are used for learning purposes or to support learning processes in a reasonable way. When the Web 2.0 tools for Protovoulia were selected, the special advantages and barriers of the tools were taken into account (e.g. the choice of wikis for the 'Thematic Presentations' and blogs for the 'Network of School Innovation' embedded in Moodle). By these means, Protovoulia achieved a successful content development and an adapted integration of Web 2.0 technologies in the learning and teaching processes.

Support on all levels

From the very beginning of Protovoulia it became apparent that continuous support mechanisms for teachers need to be provided by both the Protovoulia initiative itself and by the school management where the teachers are based. The school administration and management needs to provide the necessary framework for financial, organisational and personnel related aspects, while Protovoulia ensures the pedagogical support along with the necessary digital skills training and continuous technical tutorial support. Addressing changes in school education furthermore needs relevant capacity, investment and strong alliances between the private and the public sector.

4.3.8 Lessons learned

In two consecutive annual evaluation cycles, corresponding to the two phases of the Initiative, until August 2008, a number of interesting conclusions have been reached:

Openness to innovation

The openness of all actors involved in Protovoulia towards innovative solutions fostered the participation in and the endorsement of Web 2.0 solutions. This was also facilitated by the easy access to and exchange of knowledge among the members of the school communities (i.e. teachers and other education staff) and between experts and educators. This in turn contributed to the increase of validated school-related knowledge online, the gradual broadening of the learning content and to the enrichment of Web 2.0 communities, populated by both school teachers and subject experts and educators, thus enhancing and validating Learning 2.0 solutions for school education.

Access is not sufficient!

Protovoulia has shown that the successful implementation of Web 2.0 in Teacher Training relies primarily on: i) access (equity); ii) competences and; iii) motivation of teachers. This triad of requirements is further mediated through: iv) individual needs of teachers; v) the applied course structure; and vi) adequate (external) support structures.

Technological choices & integration

Technology enhanced, project based Teacher Training and the peer production of content are adequately supported by purpose-fit social computing tools e.g. blogs and wikis as they contribute the perception of ownership of the learning process and results and thus to the motivation of learners to engage in the learning experience. Social computing tools can also support and complement existing ICT infrastructures and e-Learning solutions i.e. e-mail,

discussion forums, Content Management Systems (CMS) as well as Learning Management Systems (LMS).

Processes of change take time!

Changes in the Greek school system need time, consistency and resources as well as policy perspective, and they have to be related to contextualised innovation and to broader as well as to more focussed learning objectives, at the knowledge/subject, competence and school development level. In addition school development goes hand-in-hand with the professional development of teachers and their qualifications, i.e. technologically and pedagogically competent and qualified teachers can serve as incubators and multipliers of innovation in- and outside of schools (e.g. teachers becoming teacher trainers).

Integrated solutions

School openness needs to be coupled with state-of-the-art pedagogies and competence-building oriented curricula, while contextually endorsing the web 2.0 solutions, activating knowledge sharing, collaborative working and validating emerging knowledge building paradigms. Financial capacity, together with expertise and political leverage are necessary ingredients for an effective recipe for change and quality upgrade in school education, to address both growth and social mobility (equity), in the European context.

4.4 IBM – Web 2.0 for Knowledge Management and Learning at the Workplace

Figure 4.4: Screenshot from www.ibm.com/software/de/web20/

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	René Werth (Sales Leader, IBM Deutschland)
Content Analysis	Online Publications and conference presentations	Peter Schütt (Leader Knowledge Management & Social Networking Germany Workplace, Portal and Collaboration, IBM Deutschland GmbH)

Table 9: Data Collection Summary IBM

4.4.1 Introduction

The IBM Software Group develops strategies for the implementation of Web 2.0 tools in organisations and companies and tests what tools can be implemented in a meaningful way in the corporate sector. 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 aim to improve internal information exchange, collaboration among employees and between employees and externals and informal learning and 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. Especially interesting in this case, besides the special benefits, obstacles and challenges of Web 2.0 implementation in the corporate sector, are changes of learning at the workplace that go along with Web 2.0 implementation, related changes and more generally the role of associated changes in organisational culture, interesting also for

organisations from other educational sectors, as well as the relation between Web 2.0 knowledge management strategies and intra- and inter-organisational learning processes. Additionally, implementation strategies and relevant success factors and obstacles in small and medium enterprises can be detected and some information about research and development concerning future trends in the sector like virtual worlds and software mash-ups can be collected.

4.4.2 Case description

Web 2.0 tools are used in an extensive way at IBM Germany and worldwide. There are 580.000 profiles in 'bluepages', a tool for documentation of internal employee and external partner data, contact information and personal know-how for expert searches with about 4 million queries per month. The bluepages have been in use for more than 5 years and are requested frequently by external customers. The bluepages can represent dynamic networks in addition to the normal reporting and communication pathways. 1.400 Subject-related social communities have been in use for more than 3 years and offer a central area, member administration with direct communication facilities, the embedding of discussion forums, bookmark sharing, feed-reader and links to other systems like wikis. There are public areas with full access, areas which can be viewed by all employees, areas which require registration for access, those which require access provision by an administrator, as well as non-public/private communities with access only after invitation. The communities offer possibilities for cross-departmental communication of employees with similar interests and transfer of knowledge and experiences.

There are 150.000 threads in discussion forums with about 400.000 entries. 60.000 employees have been actively contributing to 13.000 blogs within the last 12 months and there are about 120.000 blog entries and comments. 2.000 blogs are rated as especially active with at least 2 new entries per week. The blogs are linked to the 'bluepages' networking tool and can be accessed directly from user profiles and take over a verification role during expert search processes. There are 12.000 wikis organised in a central wiki platform with about 190.000 pages and 65.000 daily users. Two thirds of all employees work actively with the wikis. Additionally, 550.000 links have been collected collaboratively in the bookmark sharing system by 20.000 employees. The social bookmarking tool is implemented as a browser plug-in and seems to be more effective than a normal search on intra- or internet as information is input by colleagues working on similar subjects, additional metadata is provided (e.g. website descriptions) and in most cases links are up-to date and relevant.

The use of all tools is voluntary for employees, there are no requirements to use them but users have to follow internal social computing guidelines. Besides 'official' tools, regularly new tools or updates are tested internally (e.g. people tagging, social tagging of user profiles with key words) and – if well received – are integrated into official products. Additionally, sometimes completely new platforms are tested, which, even if they are up-to date, still may have less relevance or potential benefits for customers. In parallel, surveys among customers provide feedback about product success. Current products are Lotus Connections (a suite of social software tools) and a product for virtual teams. The use of virtual worlds is being tested, but is still in the research and development phase.

The end goal is the sale of products and the commercial transfer of implementation strategies to small and medium enterprises and public bodies. According to current research there is a demand and high interest for wikis in small enterprises and public administrations (e.g. a wiki

of a city), although implementation of other Web 2.0 tools might be more reasonable in some cases.

In most cases after a short initial testing phase of tools customers express that they would like to continue using the tools. The key is seen as added value for the employee that directly translates to added value for the whole organisation (e.g. use of hidden/tacit knowledge). This simple relationship is not recognized in many organisations yet. Implementation of Web 2.0 in organisations is related to a change of organisational culture also. Small organisations here are more flexible and faster, according to experience. The reason lies in the stronger dependence of smaller enterprises on being innovative. Here, a cultural change is visible in moving from concentrating only on innovation in research and development departments, towards the use of innovative ideas and the potential of all employees (as illustrated by the example of an employee's daughter using an MP3 player of a competitor with an innovative additional feature). By the use of Web 2.0 tools the communication of innovative ideas is supported.

4.4.3 User profiles and knowledge transfer

User groups at IBM do not essentially differ from small and medium enterprises. Regarding the implementation of modern communication and collaboration tools 3 different user groups can be distinguished: the first group are young professionals just entering the job market or still in academic education. They are mostly digital natives and are used to chat, communicate in blogs or work with wikis. This group has generally no problems in using new technologies for cooperative work. The second group of professionals in the age of 25 - 45 is the biggest group. They have used communication tools like E-mail for years and are usually able to see the added value of new work tools, adapt their workflow, and use the tools effectively after a short while. The third and more problematic group is that of senior experts who trust in the individual knowledge they have collected over time and have stronger doubts towards new tools. This third group will become smaller over the next few years. The challenge is to bring together these three user groups which initially approach the new tools in a different way. For instance, it could be difficult to persuade a professor at the end of his professional career to summarize his experiences in a personal blog. A better approach could be to carry out an interview with him and put the results collaboratively in a wiki.

The usage rates of the various tools at IBM are different regarding the user groups. The bluepages are used equally by all employees. The communities are used more intensively by departments related to product development compared to administration. Administrative departments make greater use of the wikis, e.g. for project documentation. Wikis are more useful for departments where content becomes outdated less quickly or where employees have to work collaboratively on documents (e.g. reports).

As described above in detail, knowledge transfer takes place on several levels supporting internal documentation of personal knowledge, person- and content-related information detection, cross-hierarchical and cross-departmental communication and collaboration, project-related distant collaboration, knowledge transfer between distant locations, creation of new ideas and innovation and personal informal further education, competence development and public documentation of competence portfolios.

4.4.4 Technological aspects

It is seen as important that a system or a tool can be integrated easily into existing systems that are already in use. For instance, it should be possible to publish a blog entry directly from an office application or from the web browser. Tools should be easy to use for the employees. Hence, software should be flexible and accessible from other applications. Web applications should accord to standards and offer interfaces like RSS-feeds, http, java or java script. Technical obstacles can be active browser scripts that are not allowed in many organisations, other (data) security regulations and compatibility problems of software and web browsers. There are no significant hardware requirements for user computers. Also, the requirements are low and limitations eventually exist only by file sizes of file-sharing tools.

4.4.5 Outcomes, motivational aspects and impacts

The huge number of users, provided in detail above, demonstrates the internally successful implementation process of the Web 2.0 initiative at IBM. Personal added value is seen as the key factor for success, mediated by motivational factors.

Participation in the Web 2.0 based collaborative activities helps individuals to develop an internal reputation. Mainly within technical, product related career paths employees can establish themselves and sharpen their position and profile within the organisation. Additionally, individual knowledge and competences are documented internally which can be an individual career advantage. Other personal advantages are of course the more effective search for work-related information and easier communication processes. These personal advantages for the individual employee result in a more intensive use of the tools. Concerning initial motivation depending on the respective group of users the added value of the Web 2.0 tools has to be explained or is obvious for them.

Social competences and network building are related aspects of Web 2.0 implementation. Within organisations networking is important and is being supported by Web 2.0 tools. Especially in organisations with employees at distributed physical locations, communication and collaboration can take place virtually. By the use of Web 2.0 tools, distant cooperation becomes more personal, for example, giving employees a clearer picture of the person behind an E-Mail address.

Web 2.0 tools are also relevant for personal further education at the workplace. By taking part in communities of interest, getting to know the personal interests of colleagues or to identify a new trend by looking at a tag cloud, personal further education is supported. Competences can be improved through individuals selecting and displaying personally interesting information. These can be competences which will be necessary at a later point in time, which increases the employability of individual employees and improves the internal development opportunities for the employees.

Change of organisational culture is closely related to Web 2.0 implementation processes. A certain level of openness for new ways of communication has to be present within an organisation. A usual effect is that the different levels of the hierarchy gradually become more closely connected in communication. Furthermore, communication between different physical locations becomes easier. Organisations which are strongly hierarchical or limit the use of certain tools by group regulations or the limited visibility of contents will probably profit less by the implementation of Web 2.0 tools. From the beginning, at IBM a very open strategy was followed with, in most cases, fully accessible content for all user groups. Overall IBM

has had a relatively open organisational culture already before Web 2.0 implementation. Through extensive use of Web 2.0 this openness has increased further.

4.4.6 Success factors and barriers

Open organisational culture

Change of organisational culture is closely related to institutional implementation of Web 2.0. The more unstructured, bottom-up, cross-hierarchical and cross-departmental character of communication supported by Web 2.0 tools has to meet organisational structures that allow and support this kind of interaction to make the full potential of the communication and collaboration processes obtainable. Limitations like traditionally hierarchical organisational and inflexible structures or strong data security regulations can be hindering factors. An open organisational structure is a requirement for and can at the same time be an effect of Web 2.0 implementation.

Added value for employees = added value for the organisation

When implementing Web 2.0 in a top-down institutional approach added value for the individual member of the organisation has to be visible to create and maintain motivation to use new tools and methods. Added value can express itself for instance in easier, more effective work flows, easier communication and collaboration in projects and higher chances for personal skills and career development. A visible added value for the majority of individuals will automatically result in an added value for the whole organisation. It is recommended to give such added-value considerations priority over classical cost-ratio calculations when planning to implement new technologies.

Easy integration of new tools into existing systems

On the technical level it is highly advantageous if new tools can be integrated in existing software systems which are already in use by employees, for instance, if blog entries can be published directly from office software or a wiki can be embedded in a project website. This rule can also be transferred to other educational sectors where embedding of Web 2.0 in existing Learning Management Systems could improve acceptance and maintain familiar access processes and environments. Hence, software should accord to standards and respective interfaces.

Voluntary participation and social computing guidelines

To avoid reluctance and to respect the prerequisites and attitudes of different user-groups in an organisation it can be recommended to follow a voluntary participation strategy when implementing Web 2.0 tools for work and learning. Individual members of the organisation will use the tools automatically once an added value is visible for them. As is known from web-based communication in general, Web 2.0 supported communication processes also tend to be more open, individual and diverse. The use of social computing guidelines is recommended to help individuals to learn related web-based communication skills, to prevent unprofessional internal communication behaviour and ensure positive external presentation.

4.4.7 Lessons learned

There are various potential benefits of Web 2.0 implementation in the corporate sector

Internal documentation and exchange of individual knowledge, information and experiences, easier, more efficient and more open ways of communication, a higher extent of collaborative working processes, increased creativity and collective creation of innovative ideas and rich potential for personal further education of employees can make work flows more efficient, increase productivity and enlarge competences and employability of individual members.

The corresponding organisational cultural change is a challenge

Important factors to consider when implementing new work and learning tools are the integration of different user-groups within an organisation, the traditional organisational structures and the integration into existing technical environments. An already existing open organisational culture, smaller organisational size, flexible structures and adaptable technical environment seem to be supporting factors. The implementation of Web 2.0 tools, methods and approaches can itself result in more open, flexible and innovative organisational structures and processes.

Added value of tools for individual organisation members is a key factor

The implementation of new tools, working methods and communication structures is always an investment and demands initial adaptation and learning efforts of users. Especially in high-paced modern working environments, groups of employees with lower digital literacy can be reluctant, and show concerns and difficulties in adapting their normal workflow. Hence, it is important to make the added value of new tools and methods clearly visible and give participants the necessary time to experience personal advantages.

Mash-up technologies and virtual worlds could be important near-future trends

Mash-ups are applications combining functionalities of various other software applications in a flexible way, making it possible to use features of a different application in an individual way. IBM is currently developing in this area and has already published a first major product. Another trend might be virtual worlds offering a completely new communication, collaboration and learning platform in a 3D virtual environment. Mainstreaming of virtual worlds in educational and corporate environments is envisaged to happen in the next 2-3 years.

There are various relations between knowledge management and learning

Modern Web 2.0 based knowledge management systems allow members of an organisation to select individually interesting information from a collective knowledge database for informal personal further education and career development purposes. Communities of interest and practice, collective bookmark sharing or using tag clouds to identify new trends are only some examples of possible interaction modes for knowledge management and learning. Additionally, the use of Web 2.0 knowledge management tools in formal continuous education settings is possible.

Web 2.0 tools can result in more enjoyable, interesting and easier learning processes

There are clear relations between interest, joy and effectiveness of learning processes. Voluntary, self-driven, interest-based and self-motivated learning processes are usually easier and more sustainable than top-down controlled approaches. Web 2.0 tools can offer an adequate environment for such learning processes by letting individuals compose personal selections of topics, contents and methods. Additionally they provide the possibility for user-contributions to the learning database and allow users to take over different flexible roles in a collective, alternate teacher-learner information provision and communication process.

4.5 KooL (English for Glass Professionals and Glass Compendium Wiki) - Language Learning with Web 2.0 in Vocational Training

Figure 4.5: Screenshot from http://www.rheinfit.de/GlassProfessionals.htm

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	Stephanie Merkenich (Teacher, Project Manager)
Self Administered Questionnaires (SAQ)	8	Students in vocational training taking part in English for Glass Professionals and/or the Glass Compendium Wiki
Observation	Online environment and activities	
Content Analysis	Third party evaluation results	http://wiwi.uni-paderborn.de/www/fb5/wiwi-web.nsf/id/Dep5_Wirtschaftspaedagogische_Beitraege_Paderborn/$file/wpb_h14.pdf

Table 10: Data Collection Summary KooL

4.5.1 Introduction

KooL is a project in the framework of the German initiative SKOLA („Self-regulated and cooperative learning in vocational training“), an initiative for innovative web-based pilot projects in the field of initial vocational education and training. Kool was developed at a vocational school for glass professionals in Rheinbach (Nordrhein-Westfalen) and offers an integrated, collaborative online environment for English language learning by providing subject-related media produced by students using a blog, wikis, podcasts and self-produced videos. The pilot project started in 2005, a time when Web 2.0 was in the early stages of its evolution. The project planned from the beginning to use Web 2.0 technologies, which could finally be realized thanks to the funding from the SKOLA programme. The project was supported by scientific experts from pedagogy and media didactics from University of Paderborn. Currently, the initiative has been extended on a national level to other schools and study programmes by transfer projects.

4.5.2 Case description

In this case study two parts from the KooL learning programme have been studied in detail: (1) “English for Glass Professionals (EFGP)”, an online environment for the teaching and learning of English as a foreign language, and (2) the “Glass Compendium Wiki”, an online learning resources collection developed in cooperation between students and teachers. EFGP tries, in contrast to other similar activities, to integrate different Web 2.0 and other online tools in one coherent virtual learning environment and to use it for English language training. Of particular interest is the group blog, which contains podcasts and videos produced by students of English, or by using external native speaker audio and video sources. All materials are related to the content of glass design or production. The Glass Compendium Wiki is an attempt to supplement learning from textbooks by a thematic online resource developed cooperatively by the students. Especially interesting here is a quality control mechanism that was proposed, organised and realized by the students themselves. An evaluation committee of students, with changing members, checks potential new entries according to correctness and relevance for test preparation, provides feedback to the authors and finally gives the right to publish the articles.

The project aims to integrate Web 2.0 systematically into classes and is already integrated into various schools, and study programmes. The directory board of the school has offered important support structures and measures to ensure project success. Besides investments in technical equipment like notebooks and a wireless network, new team structures have also been put into place. Study programmes and curricula have been adapted and lessons have been restructured. Hence, classes could be organised with more freedom regarding timing, methods and contents. For instance, the school implemented one free day a week of self-organised learning for the students. Overall, the school management has strongly supported the initiative, which has been a key factor in the success of the project.

4.5.3 Learner profiles and organisation of learning processes

Project participants are students in vocational training from different secondary and professional training classes and study programmes like glass technique, glass design, glass production or glass mechanics. Students are studying degrees at different educational levels. For some study programmes, English training is obligatory and relevant for final exams. Hence, it was necessary to develop a complex learning environment which enabled differentiation in the levels of English learning resources.

The pedagogical approach follows constructivist learning theories. In EFGP one module was produced according to the anchored instruction approach, where students produce their own narrative movies which represent and explain tasks to be carried out by other students. In the Glass Compendium Wiki, all materials are produced by the students themselves. EFGP contains thematic English language videos and audio which support students in listening to the pronunciation of native speakers and a group blog where students upload own texts and self-produced podcasts.

The platform is used regularly during classes in cooperative learning settings with group working phases enabling active language learning. The online environment is also used by the students at home, especially the wiki, which is generally less suitable for working in parallel.

In general, the project is the collaborative work of teachers, students and scientific experts. Scientific experts accompanied the project, provided initial introductory support and

evaluated the project. The teachers and project manager, Stephanie Merkenich, assumed the role of a multiplier within the school and offered internal workshops for further training of staff.

Regarding the training of teachers, technical equipment and organisational structures, the vocational training sector seems to be disadvantaged in comparison to other educational sectors. One main drawback is that teacher training and further education courses offer little or no training on new media integration in classes. Teacher training still follows rather conservative approaches and is not focused on innovative methods and competences. A special challenge in vocational education is the dual system of vocational training in Germany with two different alternate learning locations. Potentially, Web 2.0 tools would be an excellent opportunity to bridge this gap between the two locations at school at the workplace. Mainly from the perspective of training companies and organisations, however, obstacles like organisational barriers, missing technical equipment and lack of knowledge and motivation prevail. Especially in smaller enterprises these aspects are problematic when trying to implement innovative ICT-based learning approaches.

4.5.4 Technological aspects

The learning platform has been designed as a process-oriented concept. The integrated tools support learning processes in the best way possible, but it was less important to create a perfectly designed product. Due to limited resources, professional programming was not possible in every case.

Regarding hardware resources a server was necessary, a wireless network environment was built up in the school and notebooks were purchased. The software learning platform Team-Learn was used in addition to the Web 2.0 tools. The Glass Compendium uses MediaWiki software, is only accessible for students and is password protected. EFGP is fully accessible for everybody. The Web 2.0 tools include a blog, the wiki, podcasts, video-podcasts and RSS-feeds. Additionally, an e-portfolio tool was offered but has not been used by the students up to now. It is planned to implement e-portfolios in a dedicated technically affine notebook class in the future.

The tools have been selected according to the criteria of interactivity, autonomy for learners, communication between learners, enabling of distance learning, creative, active and process-oriented learning (in case of EFGP learning of English as a foreign language). Altogether the tools are regarded as instruments that support the learning process and not as self-serving products. For instance in the case of the Glass Compendium, the initial plan was to use word documents. The wiki was only implemented after a proposal from students to organise the documents online as part of the learning platform.

4.5.5 Outcomes, motivational aspects and impacts

Overall, students' motivation and activation has increased through the initiative. Additionally, the tools have been disseminated to other schools and three other schools have successfully implemented the whole programme.

The main obstacle to the initiative was the variation in teacher ability to deal with and use new technologies. This was especially the case among the group of older teachers, who displayed significant reservations using new technologies. This had some effects on motivation.

The project organisers are intrinsically motivated. The teachers are, in general, interested and curious but also have fears and doubts about the new technologies. There are groups of teachers who manage to bridge this initial gap and start to make use of the new technologies, but there are other groups who refuse to use them altogether. Consequently, the school adopted a strategy of voluntary participation, which was successfully implemented by the schools' management team and helped to establish a project team of motivated teachers. Motivation of students differs according to initial digital literacy. Less digitally literate and interested groups of students needed greater input from staff to help boost motivation, and more enjoyable, game-based approaches were employed. Digitally literate groups like apprentices in graphic design or media communication showed much stronger self-motivation and were able to make use of prior knowledge.

There have been no measures and comparisons of learning success (pre-post measures) up to now. In case of the Glass Compendium Wiki a high degree of participation and commitment is visible. For EFGP, a project evaluation (containing student interviews) was carried out and resulted in a very positive appraisal of students, with the technical stability of the environment identified as the crucial success factor.

For the group of students who were initially less digitally literate, there has been a significant improvement of computer skills through taking part in the initiative. Overall the digital divide was reduced and students who had never used a computer before managed to acquire basic technical and media competences. Additionally, the possibilities of Web 2.0 for social interaction have been made obvious to the students.

One challenge was that participating teachers needed to contribute a substantial amount of time to the project. Although the amount of time involved in the project was estimated by the school management, the real amount of time invested by teachers was significantly higher. For long-term initiatives it is recommended that teachers' time schedules are re-structured in order to reduce the overall workload and to take into consideration what teachers can realistically fulfil in a working day at school.

As mentioned before, a crucial point is the presence of a stable technical environment. Regarding hardware equipment and internet connections, schools are in general disadvantaged compared to other educational sectors (e.g. higher education). There was a budget for technical equipment in the pilot project, but it became clear from the beginning that lack of equipment and slow internet connections can be a barrier to success. Regarding the use of Web 2.0 tools, it became apparent that working on the wiki in parallel during classes is difficult and is not recommended. In general the added value of the wiki was not initially clear for the students and had to be explained. However, students clearly recognised the added value of podcasting and were particularly interested in audio-visual media production. Producing written materials for the wiki proved to be less attractive to students.

On the regional level the initiative received high attention and has now been systematically integrated into the further education programme of the regional government. There are regular workshops for teachers from the region. This was not intended at the beginning of the project.

Finally, the project demonstrates the potential of Web 2.0 for language learning. Using the tools encourages an active use of the foreign language and the production of audio-visual media content helps to overcome barriers and increase motivation. It was also evident that students who had been more introverted during traditional classroom teaching began to participate much more. Additionally, it was fairly easy to integrate a pool of learning

resources including videos and native speaker samples. There are plans to initiate an e-twinning project for cooperation with a school from another European country and to use additional communication media like Skype.

4.5.6 Results of the survey among students

8 students responded to the questionnaire and results overall seem to reflect the digital divide among students at this vocational school.

The usefulness of the Web 2.0 tools is rated differently. The wiki is regarded as highly useful and got an average score of 4.25/5 (n=8). Podcasts (2.38/5, n=8) and the online classroom in the learning platform (1.63/5, n=8) are evaluated as moderately useful with a high variance of responses among the 8 survey participants. Additional qualitative statements in the questionnaire (some given below) show highly related varying general attitudes towards the initiative and can be interpreted as representations of the gap in digital literacy and interest among students.

Questions concerning the personal benefits of participation in the initiative are also ambivalent and most questions received medium ratings on average. Still, benefits are seen in different categories: "Improved my general knowledge" (3.38/5, n=8); "Improved my knowledge about particular subjects" (4.00/5, n=8); "My general computer skills have improved" (3.63/5, n=8). An interesting result is that there was no clear positive estimation concerning improvement of foreign language skills, which is one of the main goal of the project (2.63/5, n=8).

Some selective qualitative statements from the questionnaire could help interpreting the indifferent results of quantitative rating:

> *"It was good that students could work on topics in a self-organised way and share their work in the wiki as a source of information and learning."*
>
> *"Medium communication processes as team work was not successful due to different personalities“*
>
> *"My motivation has neither improved nor decreased by the wiki."*
>
> *"There have been technical problems, mainly when producing the podcasts."*
>
> *"The team work and communication has improved."*
>
> *"Nothing was positive about this initiative."*
>
> *"I have better knowledge than before about the topics I worked on in the initiative"*

4.5.7 Success factors and barriers

Presence of a stable technical environment

Hardware equipment like a server, laptops and a fast internet connection are seen as crucial in this vocational school project. This became especially evident when comparing the initial project phase with later stages, after the acquisition and installation of a stable technical infrastructure had been made possible by external funding. Lack of an appropriate technical infrastructure has also been cited as one inhibiting factor when trying to transfer the project to other schools or the training companies and organisations within the dual system of vocational education.

Self-organised quality management by students

This is one of the special features of this initiative and can be regarded as a rare case of teachers allowing students to self-organise and contribute to the quality of shared learning content. The project drew on the motivation of students to build up high quality materials for test preparation. On their own initiative, students set up a committee to check wiki articles prepared by other students, give feedback and permit uploading and publishing of the materials.

Integrated, complex and process-oriented online learning environment

The initiative successfully follows an approach to integrate the different tools used in one coherent online environment, aims to provide materials complex enough to allow effective language training in different levels of difficulty and for different groups and classes of students and focuses on a process-oriented (vs. product-oriented) use of the tools enabling interactive, cooperative distance learning for foreign language training purposes.

Scientific accompaniment and monitoring

Cooperation with expert scientists from media pedagogy and didactics was seen as an important success factor for this project, especially due to the limited internal resources and an initial lack of technical and methodological knowledge. The external experts provided initial introductory support to help implement the tools and methods and carry out project monitoring and evaluation.

Support by the school

The schools' management board actively and broadly supported the project and provided a framework to enable the projects' success by several organisational measures like adapting curricula, shifting time structures and enabling more open organisation schedules in general. A related success factor was the strategy to allow teachers to participate in the project with their classes on a voluntary basis.

Digital divide among students and teachers

Less digitally literate and interested groups of students had to be motivated extrinsically. Game-based approaches can be recommended for these groups. Digitally literate groups like apprentices in graphic design or media communication had a much stronger self-motivation. Throughout the initiative, there has been a significant improvement of computer skills, particularly for the group of students who initially had a lower level of digital skill. Overall the digital divide was reduced. Teachers have in general been interested and curious, but also have fears and doubts about the new technologies. A cause for the digital gap among teachers is seen in insufficient teacher training.

4.5.8 Lessons learned

There is a need for external project funding at schools

From the case study it becomes clear that initiatives that are not supported by external financial support are much more difficult to realize. Support by the school management, change of class schedules, time credits for teachers and technical equipment have been important success factors and this project could not have been carried out on this scale

without the external funds. It seems that vocational schools, at least in Germany, have more difficult start-up conditions and less available resources for innovative initiatives compared to other educational sectors, e.g. universities.

Web 2.0 can potentially bridge the gap between different learning locations

Beside the classical advantage of online learning to enable distant and blended learning solutions, a related opportunity becomes clear when looking at the dual vocational education system in German with its two alternate learning and teaching locations, the vocational school and the applied training organisation (company). Web 2.0 could help to close the gap between these two learning locations, for instance by using learning diaries in personal students' blogs. Unfortunately, at present, organisational reasons and lack of equipment are barriers for implementing these new learning tools and methods, particularly in smaller training organisations.

Web 2.0 provides an excellent opportunity for new methods in foreign language training

Blogs, wikis and podcasts allow active and cooperative language learning methods by the inclusion of native speaker materials as learning resources or self-production of foreign language texts, audios and videos by the students. The project shows that the use of these tools enables a more active, participative and inclusive language training and is especially useful to integrate students who are reluctant to speak actively in the foreign language.

The use of Web 2.0 tools can improve activation, motivation and computer skills of students

Participative methods, collaborative content production, communication and resource sharing can result in higher general activation and motivation of students. The results of this case study show that the initial digital literacy of the individual student significantly mediates the effect. Initially digitally disadvantaged groups of students are less motivated to use the Web 2.0 tools but could benefit more than the digital literate groups, as shown by a higher increase in general computer literacy, communication and team working skills.

4.6 ETZ Stuttgart (ELKONet) – A Learning Community in Vocational Training

Figure 4.6: Screenshot from http://community.etz-stuttgart.de

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	Dr. Jürgen Jarosch (Project Manager)
Observation	Online environment and activities	

Table 11: Data Collection Summary ETZ Stuttgart (ELKONet)

4.6.1 Introduction

The online community of the Elektro-Technologie-Zentrum (ETZ) Stuttgart developed from an online learning platform that was set up in 1999 and has been continually enhanced with additional tools and features. 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 extend and share their knowledge in collaboration with each other.

The project was initially funded by the national institute for vocational education and now is integrated in a network of 6 educational centres on a national level (ELKONet). All of these centres specialize in electronic and information technologies and related areas. The goal is to use a common online platform which is constantly kept running and to use synergies in initial and further education. For instance web-based training developed in one centre should be open to use for all other centres. Generally the new Web 2.0 tools, such as the community and the wiki, are already open for the other partners; however they are currently only being used by the ETZ Stuttgart. A transfer project to encourage the other centres to use the Web 2.0 environments is planned.

4.6.2 Case description

The case is an example of a platform that has gradually been extended by new features and Web 2.0 tools and is now developing, from a collection of isolated tool towards an integrated solution. The Web 2.0 tools implemented are: a social community with course-related discussion forums, a wiki for sharing of learning content, a blog and a social bookmarking site for sharing of links and bookmarks.

The community is structured in different areas, which run partly autonomously and are partly moderated by teachers and trainers. The related training contents concern a variety of study subjects like electro-technology, information technologies and energy technology. Each study course has its own forum within the community. Initially, the forums were moderated by tutors or teachers and the activity of learners observed. The status of the forum is adjusted according to the development of self-organised communication activities; the forum is either kept open, is closed or additional tutorial support is organised.

The online community is accessible to all participants, even after the course has been completed. This is to support long-term learning processes and keep participants in touch with the content and the organisation.

The study has raised a number of further questions: How can the process of extending an existing environment can be achieved effectively? What factors have to be considered when implementing new learning tools? What advantages of a Web 2.0 learning community in vocational training and further education exist and what are the related obstacles and barriers?

4.6.3 Learner profiles and learning environments

The community is used by several vocational training courses, with students and apprentices of electro-technology, information technology, and other study programmes. Additionally it is used for courses and study programmes in further vocational training and further education.

The target group in general has a low internet-affinity and intensive efforts are necessary to mobilize course participants to contribute actively. Participants are usually beginners in computer and internet use and need introductory support. There is not widespread active use of the tools among the participants, which is essential for Web 2.0. Only in special areas like information technologies are learners familiar with Web 2.0 tools and approaches, in most other areas participants are unable to use the tools independently. Hence, barriers still exist for the extended collaborative use of the wiki. For this reason, although learners are already able to contribute to the wiki, the project has decided not to promote the wiki until they have developed an integrated technical solution, in which the wiki is embedded in a general learning platform.

The discussion forums are actively used by the learners and interesting dynamics can be observed. For instance, in the period preceding exams, the community is used for the exchange of experiences and collaborative test preparation.

Altogether, it is obvious that for this group of participants the active, self-organised use of internet technologies is something they are not familiar with. Most participants do not spend much time using the internet (compared to learners from other educational sectors). For instance, most learners at ETZ Stuttgart do not consider using the internet as their first source for finding information for learning purposes. By using the online platform within a formal course system, participants learn to deal with internet technologies during the initial stage of vocational training.

4.6.4 Technological aspects

Concerning hardware and internet connection speed, standards are used and there are no related problems. However, there have been some initial difficulties with software. For instance, it became clear that an isolated solution for the wiki is not satisfactory and as a consequence an integrated solution within the Learning Management System has been developed. Because of some missing features, additional programming was required. In general it was observed that integrated Web 2.0 solutions are not a standard for Learning Management Systems yet.

4.6.5 Outcomes, motivational aspects and impacts

Overall 8.000 learners from 30 institutions on a national level participate in the learning platform; around 600 are active in the Web 2.0 applications. In the further education area around 5.000 learning hours are held in online tutorials and the number for self-learning units are even higher.

The use of the discussion forums is satisfactory and proves popular among learners. Implementation and acceptance of the Web 2.0 tools, especially their use in a collaborative way, demand further development, as well as introductory and continuous support.

The community is partly self-organised, partly requires moderation by tutors and is especially intensively used during times of exams and for test preparation. A future added value is seen in the wiki application. The blog requires regular updates, a critical mass of participants and up-to date information for its success. In general it is more difficult to detect meaningful ways of applying the blog in learning processes compared to the other tools.

A divide in two different groups of students regarding digital literacy and motivation can be observed in this vocational training case. Digital literate users are usually better motivated to use the tools in an active way, whereas less digital literate participants need more support to overcome initial lack of knowledge and motivation.

There is an ongoing internal discussion among developers and project organisers concerning the integration of the tools into one environment; as well as addressing functionality and usability issues. Integrated solutions are evaluated as less user-friendly compared to (open-source) isolated tools. In the beginning of the initiative, isolated tools have been used each with their own software. Experiences with the singular tools have been good, but disadvantages existed regarding data and software administration, which has led to the development of an integrated solution with the ongoing embedding of all online tools into a Learning Management System. This more comfortable environment is supposed to lead to higher usage rates and more active participation. The use of isolated tools has the disadvantage that generated content cannot be easily transferred to other tools. In an integrated environment it would, for instance, be possible to transfer content from the LMS to the wiki and vice versa and hence facilitate user-generated content production.

The strategic goal of the project development is to further improve the tools, to keep content up-to-date and to increase the extent of collaborative content production by learners, supported by teachers and tutors. Increased integration of the learners in the content production process is seen as an efficient way to keep content up-to-date, for instance in the case of new content-related data. However, also in the future, in the initial production of most learning material will be carried out by teachers and experts.

The communities serve another purpose, they act as an instrument to keep participants in continuous learning processes after finishing a certain course or study programme and also to keep them updated about follow-up courses or further study options of the organisation and the institutional network.

Overall, establishing Web 2.0 applications requires a high level of input and respective projects are seen as an investment for the future. Concrete positive effects or benefits can be observed in the mid or long-term.

4.6.6 Success factors and barriers

Introduction of the tools and regular support of participants

Initial introduction and continuous support by teachers and tutors is essential to help learners acquire the necessary knowledge for initial progress and to develop and maintain the motivation to use the tools for learning processes. This is particularly applicable in educational sectors with a significant digital divide, or with groups of participants that are not used to working and learning with internet technologies and Web 2.0 applications.

Integrated software solutions vs. isolated tools

Integrated solutions, for instance a Learning Management System with an embedded wiki can enhance data transfer, foster collaborative content production and offer a more comfortable and easy learning environment. An important related aspect is usability, which may not be the best with regards to some of the integrated solutions. Additionally, integrated solutions are more difficult to adapt and might need more initial development.

Digital divide among participants

In this case, from the vocational education sector, a clear digital divide consisting of active use of Web 2.0 tools and the use of the internet for learning purposes can be observed. Motivation, degree of activity and collaboration and demand for initial and ongoing support are related factors when dealing with the two different groups. The early use of online platforms and Web 2.0 tools in education and training can improve the skills of the digitally disadvantaged participants and help to prepare them for the use of the internet actively for learning purposes.

Negative cost-benefit ratio for some groups of participants/courses/forums

In this project, a strategy is applied to keep only those forums and parts of the community open which have a perceivable use for the learners and have certain degrees of participation rates. Some forums show negative cost-benefit ratios as they make higher moderation and support efforts necessary whereas only few positive outcomes and benefits for the learners are visible. If an intermediate phase of intensified support and tutoring is unsuccessful, these forums are eventually closed.

4.6.7 Lessons learned

Integrated solutions could offer advantages compared to the use of isolated tools

Over the course of the studied initiative, there has been a visible shift away from the use of stand-alone solutions towards an integrated learning environment, consisting of the different Web 2.0 tools embedded in a Learning Management System. Integrated solutions can offer a more comfortable environment for the user, make data transfer between different applications easier and facilitate collaborative content production.

Users can actively contribute to keep learning content up-to date

Whereas the initial production of online learning material will still be carried out by teachers and experts, through the use of Web 2.0 tools learners can play an active role in keeping online learning materials up-to-date; for instance, by adapting data, updating links or

providing additional resources. According to this approach, learners do not create structures nor do they maintain the organisation of the content or deliver the main content-related materials, but are competent to adapt, add and make changes to the existing content, within the existing structure.

Digital divide among students in vocational training

The digital divide among learners in the vocational education sector needs to be addressed. In-depth introductory training phases on ICT and internet skills in general and (collaborative) use of Web 2.0 tools and approaches, particularly in the early stages of vocational training, can help students prepare for digital classroom learning, reducing the digital divide among students in this educational sector.

Online communities can be an instrument to keep students in continuous learning processes

In this initiative forums are kept open after the end of a course and participants have the right to access all materials and communities after finishing a course. Hence, continuous learning processes are supported and students receive regular information about follow-up courses or further study options. For the organisation, this strategy is also a method of customer retention.

4.7 LeMill (Calibrate) – A Web 2.0-enhanced Community for Teachers

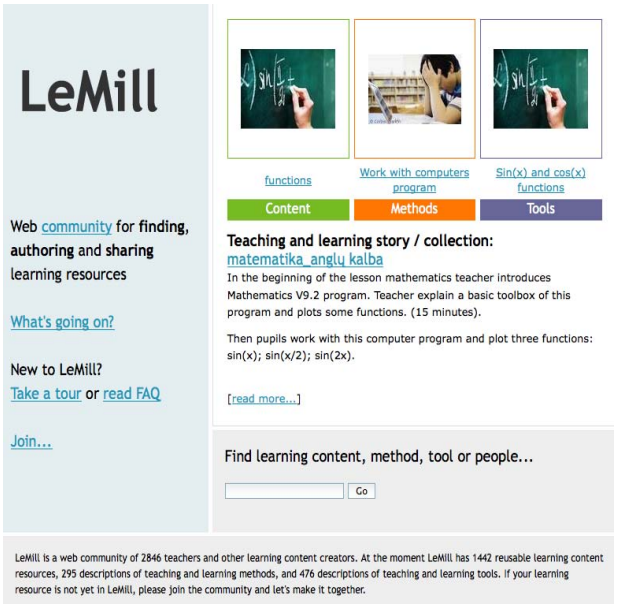

Figure 4.7: Screenshot from http://lemill.net

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	Tarmo Toikainnen (Project Manager)
Self Administered Questionnaires (SAQ)	12	Teachers from different European countries
Observation	Online environment and activities	

Table 12: Data Collection Summary: LeMill

4.7.1 Introduction

Calibrate began in 2005 as a 3 year, EU-funded project. LeMill was one of the work packages within Calibrate (developing an open-source toolbox for teachers) and a collaborative work of the Calibrate project partnership (more than 20 partners). The University of Art and Design in Helsinki performed as the coordinator of the respective work package.

The Calibrate project promotes the idea of free and open learning resources and international transfer of online learning material. LeMill develops a web-service for exchanging national learning repositories/materials within the Calibrate project. The follow-up project MELT is connecting further learning repositories to the exchange platform.

LeMill follows an open grass roots approach whereby teachers can create learning material that they can use and share with each other. Collaborative development of learning material is possible. In an experimental approach, work with “non-approved” learning material is tested.

4.7.2 Case description

In the beginning of the project interviews with teachers from different European countries about how open learning repositories could be integrated to everyday teaching were carried out. The results showed that teachers would need not only text materials, but are looking especially for multimedia and interactive materials. There is a demand for the exchange of successful techniques and activities to use in teaching (e.g. how to keep students motivated in the last two lessons on Friday afternoon). Subsequently a separation of materials in content/methods/tools was done and an online community was installed that works on these three categories of resources.

The basic idea underlying the separation into three categories (content/methods/tools) has not changed. Teachers have been requesting some new features (e.g. math teachers asked for math formulas, which have then been realized with latex, or demanded exercise templates). Most of the changes of the platform in the later project phases concerned the user interface so that also teachers with limited ICT-skills can understand it and work with it easily. User interface simplicity is regarded as one of the success factors. Finding correct names for functions (e.g. “activities” was renamed to “methods”, “learning patterns” to “teaching a learning story”) is seen as essential. Understandable, non-technical terms are preferred. Choosing a certain term for a function will lead to a certain type of activity by the teacher (another term could result in different activities).

With a growing amount of content in the platform, functionalities for filtering the content became more and more important, for example the development of search/browsing tools; user interfaces, etc. These functionalities have to be adapted to the size (amount of content/users) of a platform and hence have to be developed step by step accordingly.

In the communities members can create and join groups. Each group has a blog. Most of the teachers were not familiar with using blogs, which led to some changes of interface and terminology, for instance the blogs are called “forums” with normal blog functionalities. All resources are enriched by a certain amount of metadata (open keywords, tags). The international user-group led to multilingual tag clouds, but no language separation was implemented. There is a “language tag” but the language of material and the language of tags used can differ. Additionally there is an official LeMill project blog, which is multilingual.

4.7.3 User profiles and organisation of the community

The primary focus is on the group of teachers in 7 European countries. Additionally there are learning material authors and some students involved. Members come from all different sectors in education, though the primary target group are primary and secondary level teachers, of which around 100 participate actively. There were 2.500 members in LeMill at the end of the Calibrate project.

To achieve a critical mass of materials/community members in each language it is important to make the project more attractive. The community has become functional and self-sustaining in some countries, national validators arranged teacher training workshops and community building was carried out on a national level. Now, there is continued teacher training in collaboration with the national administration of these countries.

The basic principle of content sharing and development processes is that materials should be ready to be displayed in a web-browser with a flash plug in (no e.g. word/powerpoint-

documents). Existing materials are uploaded by copy-paste to a webpage template which will also be editable by others.

4.7.4 Technological aspects

The LeMill.net service is a free and open web-service with open-source software that can be used by anyone and is customizable. Software such as plone and zope have been used.

4.7.5 Outcomes, motivational aspects and impacts

Teachers need not only text-based learning materials, but additionally multimedia and interactive materials. There is a demand for an exchange of innovative learning techniques and learning activities. Therefore, materials in the platform were separated by content, methods and tools and an online community was established that works on these three categories of resources.

The functionalities of the platform, usability criteria and user interface have been adapted and developed step by step during the project according to user needs. The platform reaches now teachers, authors of learning material, students and target groups from other educational sectors from 7 European countries. There were 2.500 members in the LeMill community at the end of the Calibrate project.

The community has become functional and self-sustaining in some countries, national validators arranged teacher training workshops, and community building was carried out on a national level. Now there is continued teacher training in collaboration with the national administration of these countries. The LeMill software is used by an initiative in Georgia. In Estonia LeMill is used as the official learning resource repository.

Further improvement of the platform is planned. Currently a function for direct upload of files (e.g. word/powerpoint) which will then be viewable as web-resources, is being integrated. The integration of other Web 2.0 resources (e.g. FlickR) is foreseen. There is a clear roadmap for further development containing the integration of other resources (e.g. FlickR), exercises, printable collections of resources as books (pdf), export of resources and import to LMSs.

4.7.6 Results of the survey among participants

12 full responses of participants to the questionnaire were collected. Teachers overall see clear benefits from taking part in the community and appreciate the services and applications offered. The Web 2.0 tools as well as the platform in general are rated as useful: The blogs are evaluated as most useful (4.58/5, n=12), followed by the platform in general (4.17/5, n=12), wikis (3.67/5, n=12) and E-Mail (3.75/5, n=12).

Teachers see clear benefits in taking part in the community with highest ratings for the categories “Helped to use the computer for more complex things” (4.36/5, n=11) and “Improved my self-confidence” (4.36/5, n=11). Additionally benefits are seen in other categories: “Improved my general knowledge” (4.18/5, n=11), “Improved my qualifications” (4.18/5, n=11), “Improved my knowledge about particular subjects” (3.91/5, n=11) and “Helped to develop networks that provide opportunities” (4.00/5, n=11).

Some selected qualitative statements illustrate the participants' attitudes towards the initiative and provide some additional impressions:

> *"You can find different materials and upload your own materials."*
>
> *"Excellent communication between users."*
>
> *"Using the possibilities of ICT in lessons has always been a great help for teachers and LeMill provides a very useful environment for improving the study-process, besides it's easy to use."*
>
> *"I know there are a lot of opportunities there, I hope I'll use them once."*
>
> *"I've seen LeMill's popularity in Georgia. It's very useful tool to get a lot in short time"*
>
> *"I am happy that I can use innovative methods"*

4.7.7 Success factors and barriers

Exchange of learning activities and methods important for teachers

In addition to exchange of learning materials, teachers have expressed a demand for collaboration on learning activities and teaching methods. Consequently, the LeMill platform was structured in three main categories of materials, activities and methods, with the community embracing these three resource sharing sections.

Adaptation of structure and functions of the platform according to demand

The separation of materials into content, methods and tools was done in response to the user needs analysis. The functions of the platform, usability criteria and user interface have been adapted to the size of a platform and have been developed step by step during the project accordingly.

Simplicity and clarity of the user interface

Non-technical terms that can be understood by teachers with limited ICT-skills have been chosen. For instance, blogs are called "forums" but have normal blog functionalities, "activities" were renamed as "methods", "learning patterns" were called "teaching a learning story". This factor is important as certain terms will lead to a certain type of activity and another term could result in different actions.

Filtering functions and self-organised user-based tagging of resources

Adequate filtering functions have to be employed and adapted regularly according to the actual size of the platform and the actual amount of content. All resources are enriched by metadata (open keywords, tags). The international user-group led to multilingual tag clouds, but no language separation was implemented.

Critical mass of materials and community members

As for every online platform a critical mass of users and content is necessary in order for it to become attractive to more users. In an international project like LeMill this critical mass of users and content has to be reached for every target language. The community has become functional and self-sustaining in some countries by an approach installing national validators

and multipliers who arranged teacher training workshops. Community building was carried out mainly in a national approach.

4.7.8 Lessons learned

Multimedia and interactive content requested by teachers

An interesting result of the study is this part of Calibrate's user need analysis results. Teachers not only suggest sharing text-based materials, but also have a strong demand for additional multi-media based and interactive content. Apparently, teachers already have the basic structures for their lessons and can easily find or get access to text-based learning materials. Obviously, not many teachers have the resources to develop high-quality multi-media and interactive materials and there is a demand for exchange and re-usage of these kinds of materials.

Group functions of social communities can support learning resource exchange

Social communities can provide group functions like blogs, wikis and discussion forums which have the potential to support collaboration and exchange of learning materials. Additional user tagging mechanisms enable a user-driven allocation of metadata to content and resources.

Services should respect the demands of the target group addressed

User needs analysis can help to initially identify special demands of the target group on a platform, such as special functions, preferences of certain tools, usability aspects and terminology used. According to the successful model of LeMill, for international, multilingual projects national validation and project monitoring approaches are recommended.

Multilingual content and metadata is a challenge for international projects

Similar to other web-services and platforms for an international exchange of materials, multilingual content and multilingual users who provide multilingual metadata can be problematic. In LeMill a multilingual tag-cloud (similar to for instance to del.icio.us) has been chosen. No language separation existed, which allowed for tagging in different languages, but resulted in a less clear tag cloud.

Design of the user-interface should be a high priority

User-interface design is a key success factor according to user feedback in LeMill. A simple and clear interface and a set of carefully chosen terms are important and should be adapted to the knowledge of the representative target user. Additionally, it is essential to ensure adequate filtering and search mechanisms adapted to the size of the platform.

4.8 Nettilukio (Internet Upper Secondary School) - A Comprehensive Online Study Programme for Secondary Education in Adult Training

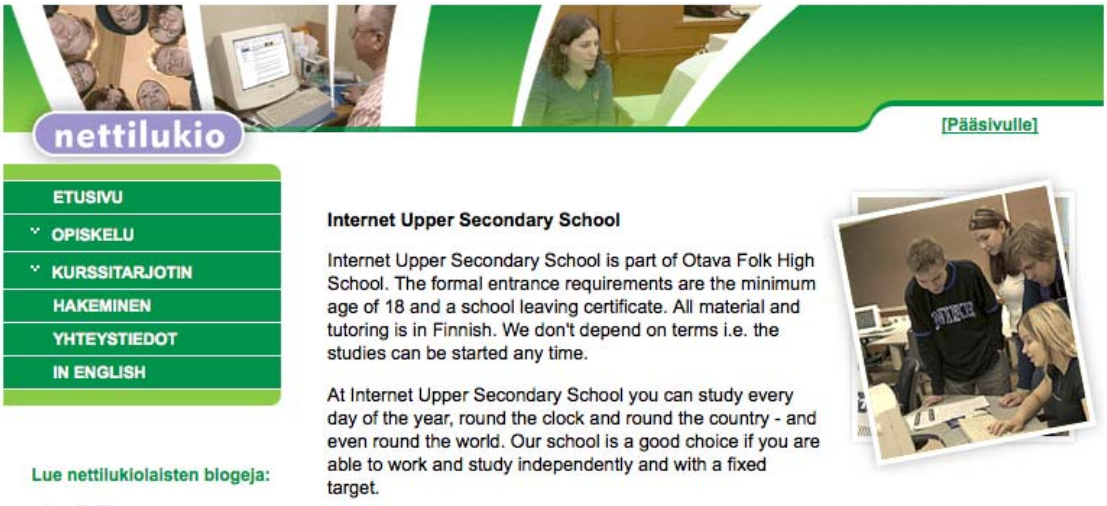

Figure 4.8: Screenshot from http://www.nettilukio.fi/fi/sisalto/nettilukio/06_in_english?n:selres=765612

Data Collection Activity	**Specification** (e.g. type of data collected; numbers involved)	**Profile of respondents/users** (e.g. age group; gender; learner type)
Key Informant Interviews	1	Taru Kekkonen (Teacher, Project Manager)
Self Administered Questionnaires (SAQ)	70	Students (mainly adults taking part in the upper secondary school programme)

Table 13: Data Collection Summary Nettilukio

4.8.1 Introduction

Nettilukio offers a comprehensive Finnish upper secondary school study programme online, using a learning platform, virtual classroom technology, wikis and blogs, which is aimed at adults aged 17-75. In exceptional circumstances, younger students are also accepted, for example Finnish students living abroad.

The initiative started out as an ESF-project, which lasted from 1996 - 1999 and was then additionally supported by national funding. The first priority was the development of web-based learning material, with particular emphasis on upper secondary school content. In 1997, the online study option was established in order to bring educational possibilities to students in remote parts of Finland who were unable to travel long distances. The initiative is now fully and officially integrated in the normal national school programme and financed by the national support for schools, which means that students have free access to the school.

4.8.2 Case description

The initiative is based on a concept of pure online learning with no obligatory traditional classroom teaching sessions, although it is possible for students to attend classroom sessions in Otava. There are no periods or semesters and the courses are always open. Students can pick courses freely to suit their schedule and can start at any time in a non-stop course subscription system. This means that students have more autonomy and can determine their own

learning paths, rather than being governed by school rules and structures. For some courses, however, there is a fixed schedule and communication between students is facilitated by greater teacher involvement.

Contents and courses for all subjects are available, with about 100 courses altogether. Students must take a minimum of 44 courses in order to pass the programme. Throughout the duration of the programme there are no tests, which shifts the focus away from performance and accreditation based learning, to individualised learning. The idea is to trust the students instead of controlling learning through test structures and adding additional pressure. Students build up a portfolio of coursework through completing courses and supplement this by writing learning diaries/journals. Usually it takes about 3 years to study the programme and at the end of their studies, students have to take the normal national test for upper secondary school level.

The initiative opens up classroom teaching to the web and enables online communication between students, providing them with the opportunity to create collaborative content through wikis and blogs. An example for the use of blogs is a project that allowed the students to document the presidential elections (http://mahtavin.blogspot.com/), in which students took turns to follow the current developments and make contributions to the blog. Through working collaboratively, the students were able to build up a picture of and thereby understand the development of an important political and historical phenomenon. Wikis are used to similar effect in history, mathematics and biology. A virtual classroom was also established at the end of last year.

4.8.3 Learning profiles, learning environment and learning processes

At the moment around 450 students take part in the programme. Within individual courses, group sizes vary. Most of the student groups are very mixed and the participants have different reasons for studying at Nettilukio: some are living abroad, some have shift-working jobs (e.g. in hospitals), some are parents of small children and some may travel a lot, such as business people and athletes. There are also people with physical and mental disabilities, including students who have difficulties interacting face-to-face with others, but who may be very sociable on the internet when physical barriers are removed. Users may also include people with negative experiences from earlier schools. For all these groups of people the school offers more flexibility than a traditional school. As most of the participants are working full-time or part-time, a lot of them study during evenings and weekends, some even during night-shifts.

All the course materials and social communication tools (e.g. discussions forums) can be found in the learning platform for self-learning and students follow personal learning plans. Web 2.0 technology has opened a window to the outside and has enabled communication between the school and other organisations. The students have access to the wikis and the blogs from the learning environment, but these tools are also available to non-school members.

Every student belongs to a group of 20 students with a mentor/tutor who is responsible for that group. The mentor does not teach the subjects, but helps the students to develop personal learning plans, and will also contacts students who have been “invisible” for some time to ask if help is needed.

Whenever students face a problem they can ask the teacher via email, although during the daytime it is also possible to call. If the teacher is online, students can ask questions directly

by chat. Some students use also Skype. The role of the teacher becomes more important at the end of the course when they assess the portfolio of the student and provide feedback.

4.8.4 Technological aspects

The online platform was designed within the Folk High School by technical experts among the staff. Teachers and students planned the learning environment together in order to make sure that the needs of the students are met. Overall, the platform is a standard LMS (Learning Management System) with some minor differences, including the use of virtual classroom technology, wikis and blogs.

Recently, the project has introduced a virtual conference room where students have the option to attend classroom teaching through the web in a synchronized online learning approach. This can be accessed simply by entering a web address. There are web cameras in the classrooms, which enable students to listen, watch, share documents (students see the same display as in the classroom) and talk via headset or online chat, as if they were in a normal classroom. There have been some technical issues with the virtual classroom, such as the time it takes to upload material and some problems with voice chat, but overall the system is running successfully.

4.8.5 Outcomes, motivational aspects and impacts

The motives of students participating in the project are varied. Some students want to maintain their learning skills, broaden their education or simply enjoy learning, others are attracted by gaining formal accreditation and obtaining a diploma. Motivating students throughout the 3-4 year process is a challenge for both staff and the students themselves. Some students find it difficult to commit themselves to distance online studies as they have to manage their own time and “no one sets the clock”.

The initiative is running successfully with high participant rates and it has been fully integrated in the national school system. Special skills are acquired by the learners through participation. ICT skills overall improve and students learn to be self-organised and to take responsibility for their own learning.

One of the main challenges encountered by the initiative is communication between students because of the high level of self-organisation and time scheduling the system offers. As a solution for this problem, the school encourages communication and participation at a wider school level rather than simply on an individual course level. By introducing the virtual conference room, efforts are made to remove the communication barrier between students present in the classroom in Otava and the online students, in order to create the feeling for the students that they all study together.

4.8.6 Results of the case study survey among students

70 responses of students to our questionnaire have been collected. Overall, students see high benefits in taking part in the initiative. A significant result of the survey was that the learning platform and conventional communication tools are conceived to be equally useful as the Web 2.0 tools.

The learning platform in general (3.95/5, n=37) and E-Mail (4.63/5, n=35) have been rated as important tools. E-Mail apparently is regarded as the most important tool for communication

within the programme. The wiki is seen as a useful tool for learning (4.00/5, n=37), whereas blogs are regarded as less useful (2.81/5, n=36) in comparison.

Participants overall see very strong personal benefits from taking part in the initiative. The highest ratings received were “Improved my general knowledge” (4.64/5, n=33), “Improved my knowledge about particular subjects” (4.42/5, n=33) and “Improved my writing, reading or foreign language skills” (4.64/5, n=33). Additionally, the improvement of computer skills and soft skills has been seen as a benefit.

The additional qualitative feedback demonstrates that students reported increased motivation. This is strongly associated with the benefits of using E-Mail communication:

> *“E-Mail was the best, ‘cause everything has to be asked by e-mail and every time I got the answer back very soon.”*
>
> *“The best thing for me is that I can find all the materials regarding my studies from internet and that I can adjust my studies to my schedule.”*
>
> *“I am very motivated and motivation has been growing more during the activity.”*
>
> *“I was especially motivated in the end. In the beginning I did not have so much motivation.”*
>
> *“I was extremely motivated ‘cause I have found a way to educate myself without leaving my job. Motivation still keeps in place.”*

4.8.7 Success factors and barriers

Full integration to national school system

The programme is officially recognized as a way to study in upper secondary school in Finland and participants can obtain a degree just like at a normal secondary school. This certification aspect ensures the motivation of the participants and leads to higher number of participants in the programme. This popularity makes it more likely that the single courses reach a critical mass of active members, which is a precondition for successful online communication and collaboration.

Mix of an open course subscription system and scheduled courses

In general, there are no semester periods or fixed starting points for single courses. Students can subscribe to a course at any time they want and compose an individual course and time schedule. However, for some courses which require greater input from tutors, there are fixed start dates. This makes it easier for teachers and tutors to provide support, especially in the initial stages of a course.

Personal learning plans, learning portfolios (e-portfolios) and learning diaries

Student survey reports show clearly that the individual freedom the programme offers to the students is the most important factor in its success. This teaching and learning style is especially effective for target groups with special needs. The individual scheduling of studies is supported by individually generated online learning portfolios and personal learning diaries and journals. There are no tests at the end of single courses. At the end of the programme students take part in the national test for graduation.

Teachers take over teaching and tutoring roles and are supported by mentors

Teachers fulfil both, teaching and support roles, responding to problems raised by their students through email and providing regular feedback, as well as assessing portfolios at the end of the course. Mentors help students to create learning plans as well as keeping students focussed.

Open information vs. privacy issues

The learning material and all the social communication such as discussions forums in the learning platform are open only to students and teachers and are password protected for privacy reasons. Now Web 2.0 technology has opened a window to the outside world from the learning environment and students also have access to the wikis and blogs from outside of the learning platform. This means that non-students can also participate in the wikis and blogs, and contribute to the collaborative knowledge base.

Communication processes among students vs. self-organised learning schedules

The school recognises the importance of balancing student autonomy and self-organisation with the need to encourage and maintain communication between students in order for successful collaborative learning to take place. As students are following paths of self-directed learning, it is important that communication between students does not suffer. To achieve this, the school supports communication between students on a wider school level, instead of just focussing on communication between students within course groups.

Self-motivation of students has to be kept on a high level for the duration of the course

For some students it is difficult to commit themselves to distance online studies as it is a challenge to stay motivated throughout the 3-4 year course period. Mentors can support the learning process by taking responsibility for groups of students, encouraging and supporting them to continue their learning. Personal learning plans further help to keep students on track.

4.8.8 Lessons learned

Wikis and blogs open the window from the learning environment to the real world

The Web 2.0 tools open a window to the outside world from the learning environment by offering the possibility of communication between the school and external organisations, as well as frequently providing real-life examples to assist learning and improve learning resources. The students have access to the wikis and the blogs from the learning environment, but the tools themselves are located externally, with open access for anybody to contribute and participate.

Virtual classroom technology can successfully bridge the gap between different locations

Virtual classroom software is used to connect learners in classroom sessions in Otava with online learners. Distance students can optionally attend the classroom teaching through the web in a synchronized online learning approach. Listening, watching, document sharing, communication between students and chat are possible. The virtual classroom helps to remove the communication barriers between students present in the classroom in Otava and the students present online.

Structures for inter-course communication for students could be important

In online learning environments with individual learning schedules, structures and processes that allow communication and support across courses can contribute to more effective learning. These structures can be created by wikis and blogs, virtual classroom technologies and course-related as well as school-related discussion forums.

Long-term motivation of students can be supported by teachers assuming different roles

The case study demonstrates that it is possible for teachers to fulfil the role of the teacher and tutor at the same time. Due to the freedom afforded by virtual learning platforms, staff are more easily able to balance their roles as a teacher (e.g. to give content related feedback) and as a tutor (e.g. to help with questions). In case of Nettilukio Internet Upper Secondary School there is additional support by other participants taking over a mentoring role (e.g. contact students who have not taken part in learning activities for a while).

5. Good Practices for Learning 2.0 – Key Conclusions

5.1 Results of the Individual Innovation Case Studies

The key findings emerging from the study for each individual innovation case are displayed in the following table in relation to three main criteria:

1. The key outcomes of the initiative;
2. The success factors leading to these outcomes;
3. The main lessons learned for future policy and practice in the field.

	Outcomes	Success Factors	Lessons Learned
Welker's Wikonomics	*Achievements:* • Grass root activity in an International School; • Collaborative learning and supporting teaching in classroom by offering online cooperation, communication and information environments like a blog, wikis and discussion forums. (Sources: Key Informant Interview Results) *Evaluation:* • Teacher and students evaluate the project outcomes as very positive; • Students report high value of the tools and benefits (blog: 4.2/5; n=15; wiki: 4.8/5; n=15; "Improved my knowledge about particular subjects": 4.71/5; n=14). (Sources: Key Informant Interview Results; Self Administered Questionnaires)	• Support and technical equipment of the school; • An inspired and motivated teacher; • Students with good technical equipment at home and adequate ICT skills; • Reasonable use of the tools (i.e. collaborative wiki to replace textbooks; blog and videos to provide real life examples; discussion forums for communication); • Well-structured online environment and a meaningful connection to classroom teaching. (Sources: Key Informant Interview Results)	• Learning with Web 2.0 tools can be successfully installed as a compulsory part of classes in secondary school; • Initial knowledge and ongoing motivation of the teacher are crucial; • Initial introduction of the tools and their value to the students are essential; • Intuitive navigation, easy relocation of information, not overwhelming structure (i.e. reasonable number of different tools and no other distractions) and regular updates of the online environment are important to maintain students' motivation. (Sources: All data collection instruments)
SecondReiff - WISE	*Achievements:* • Pilot project in a Second Life project space of the RWTH Aachen School of Architecture; embedded in a series of planned projects using the space for combining and using real and virtual world learning in studies of architecture. • Combination of 3D elements (Communication space; Media repository; Workbench) & 2D elements (websites & blogs); (Sources: Key Informant Interview Results) *Evaluation:* • Time constraints among teachers exist; • Initial teacher training is necessary; • Students initially possess good 3D-skills. (Sources: Key Informant Interview Results; Virtual Study Visit)	• Use of the potentials of virtual worlds (*vs.* 1:1 representations of reality or traditional web spaces); • Hybrid space using Web 2.0 mechanisms combined with functionalities of the virtual world (e.g. user-generated elements are displayed in foreground/background depending on visit rates); • Motivation (i.e. comfortable environment; attractiveness of SL for students); • Small-scale, selective pilot approach. (Sources: Key Informant Interview Results; Virtual Study Visit)	• Second Life is useful for learning about spatial understanding but can also be used as a space for communication and collaboration in all fields of studies; • Learning in virtual worlds can be connected with Web 2.0 ideas, approaches and tools; • Still, a high level of effort is necessary to be able to take advantage of the added value offered by virtual worlds like SL; • Acceptance of virtual worlds among educators is still rather low; there are several technical obstacles to overcome when using SL for teaching. (Sources: Key Informant Interview Results; Virtual Study Visit)

Protovoulia	*Achievements:* • 57 Greek schools in 'Network of School Innovation'; • 143 Greek teachers have been trained through organised, technology (i.e. Web 2.0) enhanced and project-based training offers on educational programming and organisational change; • A wiki-based informal, collaborative peer production and learning space around selected educational themes ('Thematic Presentations') has been set up. (Sources: Key Informant Interviews Results; Focus Group; Online Observation) *Evaluation:* • Majority are e-Learning and Web 2.0 first timers; • Teacher trainer report an increase in basic and complex e-Skills; collaboration and interaction/creating and sharing knowledge were mainly supported by social computing tools; • Teacher training fostered inter-and intra-institutional as well as cross-professional exchange and collaboration; • Low drop rates of participating schools and teachers (approx. 8%). (Sources: Content Analysis i.e. internal evaluation report; Self-administered Questionnaires)	• Critical mass of participants e.g. schools, teachers, experts crucial for functioning of the programme and for mainstreaming the results; • Comprehensive introduction to programme in order to overcome inertia and resistance amongst schools and teachers; • Adequate digital competences (basic and higher) amongst teachers to increase confidence to use them in the own learning, training and later on in the teaching process; continuous technical and content related tutorial support; • Reasonable and meaningful i.e. content and activity related integration of Web 2.0 technologies; • Adequate managerial, administrative organisational embedding and support on all levels i.e. organisational, pedagogical, technological as well as societal, political. (Sources: All data collection tools)	• Openness of all actors towards innovation increased the usage of Web 2.0 solutions and the access to 'open' knowledge; • Successful implementation of Web 2.0 in Teacher Training relies on: i) access (equity); ii) competences and; iii) motivation; further mediated through: iv) individual needs; v) course structure; and vi) adequate (external) support structures; • Technology enhanced, project based Teacher Training and peer production of content are adequately supported by purpose-fit first (e.g. e-mails, chat, forums) and second generation social computing tools (e.g. blogs, wikis, social bookmarking); • Social computing tools support and complement existing ICT infrastructures and e-Learning (e.g. e-mails, forums, learning and content management systems [LMS & CMS]); • Competent and qualified teachers can serve as incubators and multipliers of innovation in- and outside schools. • (Sources: All data collection tools)

IBM Internal Knowledge Management	*Achievements:* • Internal use of commercial products and methods ('use what you sell') at IBM; • Development of implementation strategies and tools for Web 2.0 in organisations and companies for internal information exchange, collaboration, informal learning and knowledge sharing; • Tools: 'bluepages' (expert search), personal blogs, wikis, discussion forums, social bookmarking; communities; virtual meeting software. *Evaluation:* • Extensive use of Web 2.0 at IBM (e.g. 13,000 blogs; 12,000 wikis with 190,000 pages; 550,000 social bookmarks); • Differences between the three user groups young professionals, professionals and senior experts have been identified. (Sources: Key Informant Interview Results)	Open organisational culture; Added value of the tools for employees = added value for the organisation; Easy integration of the system in existing environments (e.g. MS-Office or web-browser-integration), software should fit to standards and should offer various interfaces; Voluntary participation and social computing guidelines. (Sources: Key Informant Interview Results)	Various benefits n the corporate sector: internal documentation and exchange of individual knowledge and information; easier, more efficient and more open ways of communication; collaborative work; increased creativity and innovative potential; further education of employees; Challenges are the corresponding change of organisational culture, the integration of certain groups of employees (e.g. senior experts) and some technical issues (e.g. data security, software integration). (Sources: Key Informant Interview Results)
KooL – English for Glass Professionals	*Achievements:* • Federal state funded pilot project, extended on national level; • Integrated, collaborative online environment for English language learning by study subject-related media produced by students; • Using a blog, wikis, podcasts and videos. (Sources: Key Informant Interview Results) *Evaluation:* • Motivation and activation is moderated by digital literacy; • User survey results indifferent (wiki: 4.25/5; n=8; podcasts: 2.38/5; n=8; "Improved my knowledge about particular subjects": 4.0/5; n=8; "Improved my English language skills": 2.63/5; n=8). (Sources: Key Informant Interview Results; Self Administered Questionnaires)	• Stable technical environment and support by the school; • Integrated (vs. isolated tools), complex (i.e. different difficulty levels) and process-oriented (vs. product oriented) learning environment; • Digital divide among students and teachers. (Sources: Key Informant Interview Results)	• Web 2.0 provides an opportunity to bridge the gap between the two different training locations i.e. company and vocational school (e.g. by using learning diaries in personal student blogs); but mitigated by inhibiting in-company factors (i.e. reluctance, organisation, equipment), especially in SMEs; • Web 2.0 can create new ways of foreign language teaching by inclusion of native speaker digital media in class or by peer production of written (e.g. in a wiki) and spoken (e.g. by podcasts) materials in foreign language by students. (Sources: Key Informant Interview Results; Self Administered Questionnaires)

ETZ Stuttgart – ELKOnet	*Achievements:* • Federal state funded pilot project, extended on national level; • Online community for knowledge extension and exchange among students; • Discussion forums, a wiki, a blog and social bookmarks; • Step-by-step extension of the environment with Web 2.0 tools towards an integrated platform. (Sources: Key Informant Interview Results) *Evaluation:* • Community is popular among students, intensive use during exams; • A digital divide among students has been identified; • Online community can keep students in continuous learning. (Sources: Key Informant Interview Results)	• Introduction of the tools and regular support of the participants; • Integrated or embedded solutions; • Community moderation, regular blog updates; • Negative cost-benefit-ratio for user groups/forums. (Sources: Key Informant Interview Results & Observation)	• Integrated technical solutions offers advantages compared to isolated use of Web 2.0 tools (data transfer, facilitation of collaborative content creation); possible conflict between integration of tools *vs.* usability; • Active participation of learners increases efficiency of keeping content up-to-date, while initial creation of content can be done by experts; • Online community is an instrument to keep students in sustainable learning processes (e.g. continuous learning after finishing a course; information about follow-up courses). (Sources: Key Informant Interview Results)
LeMill – Calibrate	*Achievements:* • EU-funded project, establishment as national learning material platform in several European countries; • Web-service for creation ad exchange of learning materials and resources for teachers using repositories from several different European countries; • Community, collaborative resource development and sharing, blogs, wikis. (Sources: Key Informant Interview Results) *Evaluation:* • Teachers demand to share materials, methods and tools; • Teachers find Web 2.0 tools useful (blog: 4.57/5; n=7; wiki: 4.00/5; n=7) as well as the general platform (4.00/5; n=7) and see clear benefits “Helped using computers for more complex things” (4.14/5; n=7), “Improved my qualifications” (4.29/5; n=7). (Sources: Key Informant Interview Results; Self Administered Questionnaires)	• Simple and clear environment structure; • User interface; filtering and user tagging functionalities; • Adaptation of the structure and addition of functionalities according to the demand of the teachers; • Critical mass of materials/community members in each language. (Sources: Key Informant Interview Results & SAQs)	• Social communities provide group functionalities (e.g. blogs; forums) supporting collaboration and exchange of learning materials; tagging enables user generated allocation of metadata to resources; • Services should respect the demands of the target group of users; • Multilingual content and metadata is a challenge for an international resource exchange platform; similar to other popular web-services a multilingual tag-cloud with no language separation was chosen. (Sources: Key Informant Interview Result; Self Administered Questionnaires)

Nettilukio – Internet Upper Secondary School	*Achievements:* • ESF-funded pilot project, now running as an officially recognized secondary school; • Complete online study programme of Finnish upper secondary school level • Learning platform, virtual classroom technology, wikis and blogs; (Sources: Key Informant Interview Results) *Evaluation:* • 450 students, mostly with special demand for flexible studies; • Wikis (3.94/5; n=33) and blogs (2.75/5; n=32) are considered as less useful than learning platform (4.12/5; n=33) and E-mail (4.61/5; n=31); Benefits: (> 4.00/5) "Increased general knowledge", "Increased reading, writing and language skills" and "Increased knowledge about particular subjects". (Sources: Key Informant Interview Results; Self Administered Questionnaires)	• Full integration to national school system; • Personal learning plans, learning portfolios (e-Portfolios) and learning diaries/journals; tutoring/mentoring; • Privacy issues; self-organisation & self-motivation are challenges. (Sources: Key Informant Interview Results)	• Integration of wikis and blogs open a window to the real world from a closed online learning environment (e.g. through real life examples, communication with externals); • Virtual classroom technology can successfully bridge the gap between traditional classroom teaching and online learning; • Structures enabling inter-course communication between students, wikis and blogs, virtual classroom technology are important factors for successful communication processes in online learning environments. (Sources: Key Informant Interview Results; Self Administered Questionnaires)

Table 14: Key Findings of Individual Innovation Case Studies

5.2 Results Synthesis across the Innovation Case Studies

This chapter synthesizes the study results for the eight individual cases and integrates them with the aim to formulate overall findings. These are summarized below in terms of the following dimensions: Innovation; success factors; barriers; skills & competences (i.e. key competences, 'new' competences, labour market skills); institutional impacts (i.e. arrangements, changes).

5.2.1 Innovation

New ways of collaborative creation, identification, aggregation and exchange of learning content and metadata

Web 2.0 offers more possibilities for collaborative content production and review of content. Whereas in traditional web-based learning approaches the learning content is typically delivered in a top-down approach, wikis, social bookmarking systems and other Web 2.0 tools allow user-based content sharing, exchange and tagging (user-based enrichment with metadata). While, in traditional environments, user activities are usually limited to the communication about the content, users of Web 2.0 enriched environments can work more directly on the content itself. The aggregation of content and, in the future, also the aggregation of tool functionalities (mash-ups) is possible.

New forms of communication among learners and teachers/trainers (vs. digital isolation)

The different Web 2.0 tools each come with new forms of communication between users. While for some tools the focus is on the communication aspect (virtual meeting, software, virtual classrooms and partly for MUVEs) for other tools new communication structures and processes are an accompanying phenomenon (e.g. commenting in blogs, self-presentation and user-tagging in communities, commenting and rating in content-sharing tools). Communication structures like one to one and many to many have existed for a long time (E-Mail, Forums) in online learning environments. More typical for Web 2.0 initiatives is that communication between learners and with teachers is distributed through a greater number of different channels.

More personalized 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. In MUVEs the person is represented by an avatar, which makes a more playful and experimental approach to learning possible. Personal blogs are increasingly replacing the traditional individual homepage (possibly including individual documentation of competencies) and can be linked from LMS user profiles. Blogs are ideal tools for setting up personal learning plans and learning diaries.

New forms of blended learning scenarios (formal/informal; classroom/distance; intra-/extra-institutional; mixed learning scenarios & pedagogical approaches)

By its very nature Web 2.0 is predestined for informal learning scenarios. The eight case studies in this report give examples for 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 (see e.g. Welker's Wikinomics; Nettilukio). They also support new pedagogical approaches (e.g. anchored instruction by using blogs in KooL).

Motivational advantages by active, enjoyable, discovery-based learning approaches and learners' sense of ownership of produced content

In all eight case studies motivational aspects have been stressed by the project organisers and most learners have reported high motivation. A moderating variable has been the digital literacy of the user.

Low digital literacy is related to low motivation to use new ICT-based tools. Web 2.0 tools support more active learning processes (e.g. Kool) and support the learner's sense of ownership of content, which is encourages general motivation.

Trend towards embedded or integrated solutions (e.g. LMS & Web 2.0 tools) vs. isolated tools

In most of the studied cases a trend from the use of isolated tools (e.g. stand-alone wikis or blogs) towards integrated solutions (e.g. blogs and wikis embedded in a LMS) was visible. The developmental line of Web 2.0 in educational settings seems to go from more unstructured/creative tools in the past towards more structured/organised environments, which is also a current trend for Web 2.0 applications in general. Some disadvantages of isolated tools could be detected (e.g. higher efforts for software development administration, higher danger of getting lost for the learner) and some additional advantages of integrated solutions can be reported (e.g. easier transfer of data between different tools within one environment, easier navigation processes for users).

Virtual worlds and mash-ups are near-future trends; a more intense integration of external social communities and tools is emerging

Two cases studied already use virtual worlds (i.e. MUVEs like e.g. SecondLife): in the SecondReiff project SecondLife is used as the main learning environment, whereas at IBM MUVEs 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) have been mentioned. Several project managers of different case studies plan to improve their initiative by integrating external social communities like Facebook and content of other external Web 2.0 environments like del.icio.us, Flickr or YouTube. The latter tools are especially seen as rich resource databases for learning material that could be integrated in different teaching and learning scenarios.

The contribution of each case study to Innovation is summarised in the table below – whereby '++' stands for a strong contribution, '+' for a moderate contribution and '0' describes a neutral effect of the single case to innovative aspects related to the use of Web 2.0 in educational initiatives.

Innovation[22]	Welker's	SecondReiff	Protovoulia	IBM	KooL	ELKOnet	LeMill	Nettilukio
1. New ways of collaborative creation, identification, aggregation and exchange of learning content and metadata	++	++	++	++	++	+	++	+
2. New forms of interconnection and communication among learners and teachers/trainers (vs. digital isolation)	++	++	++	++	+	++	++	++
3. More personalized and learner-centred environments; individual documentation of competencies; e-portfolios; personal learning plans and learning diaries	++	++	+	++	+			++
4. New forms of blended learning scenarios (formal/informal; classroom/distance; intra-/extra-institutional; mixed learning scenarios & pedagogical approaches)	++	++	++	+	++	+		++
5. Motivational advantages by active, joyful, discovery-based learning approaches; learner's sense of ownership of produced content	++	++	+	++	++	+		+
6. Trend towards embedded or integrated solutions (e.g. LMS & Web 2.0 tools) vs. isolated tools	+		++	++	++	++		
7. Virtual worlds and mash-ups are near-future trends as well as an more intense integration of external social communities and tools		++		++				

Table 15: Contribution of Learning 2.0 Cases to the Innovation Dimension

[22] '++' = strong contribution; '+' = moderate contribution; empty cells indicate no contribution.

5.2.2 Skills and competences

A list of Learning 2.0 specific and related general skills and competences could be extracted from the case study results. It is important to mention that all of these skills and competencies are, at least to a certain extend, pre-conditions for a successful participation, while they are at the same time further developed and improved by taking part in Learning 2.0 activities.

Subject-specific and higher-order skills

Learning 2.0 can substantially support the development of subject specific knowledge, skills and competences like general and confined subject related knowledge and qualifications or language learning (e.g. KooL). Moreover, higher-order skills like reflexive thinking, learning to learn and self-organisation are trained.

Basic and more complex ICT and multimedia skills

Participation in Learning 2.0 activities can train 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. For some learning activities, a certain degree of background knowledge and initial skills are necessary.

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).

Multitasking and complexity-management skills

Multi-tasking and use of several different tools at one time 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 when looking at user-based content production and feedback circles in collaborative activities (e.g. working on a wiki). A lack of structure of the environment could be a problem for effective development and application of meta-cognitive skills.

Systematic skills development on all levels

Another key result from the case studies concerning skills and competences is the general need for systematic development of ICT (and Web 2.0)-related skills and competences in teacher training. Related competences that need to be addressed in parallel are teaching and learning of communicative, collaborative and meta-cognitive skills.

Assessment and certification

Generally the issue of assessment and formal certification of Web 2.0 experiences and knowledge needs to be further investigated and discussed. For non-formal learning, the certification of e-Learning experiences is still unsolved. Since the Learning 2.0 experiences discussed in this study are embedded in more traditional, i.e. organised, learning experiences, certification is less problematic. However,

Web 2.0 learning environments allow for the personalisation of learning processes, support collaborative processes and foster new ways of acquiring and expressing knowledge and skills, calling for a revision of traditional ways of assessing and evaluating competences.

For each of the cases, the following table summarizes the evidence on the development of skills and competence – whereby '++' stands for a strong contribution, '+' for a moderate contribution and '0' describes a neutral effect of the single case in relation to skills and competence development supported by the use of Web 2.0 in educational initiatives.

Skills & Competences[23]	Welker's	SecondReiff	Protovoulia	IBM	KooL	ELKOnet	LeMill	Nettilukio
Subject-specific and higher-order skills	++	++	+	++	++	++	++	++
Basic and more complex ICT and multimedia skills	+	+	+		++	+	+	+
Specific and general communication and networking skills	+	+	++	+	+		++	
Multitasking and complexity-management skills		++	+	+				+
Meta-cognitive and quality management skills	+	+	++		++	+	+	+
Systematic skills development on all levels	+	+	++		+		+	
Assessment and certification	+		+	+				++

Table 16: Contribution of Learning 2.0 Cases to the Dimension Skills & Competences

5.2.3 Success factors

Key question: What are the success factors that have been crucial in more than one of the cases or can be regarded as general success criteria for the implementation of Web 2.0 in formal learning settings?

Targeted use and tailored integration of Web 2.0 tools

As in the case of web-based learning environments, for Web 2.0 tools it is essential that they are adapted to the learning purposes and support learning in a targeted way and are not used in a self-serving way. When selecting tools to be implemented, the special advantages and barriers of the tools should be respected (e.g. wikis are great for collaborative content development but are a poor tool for communication). A meaningful integration of the Web 2.0 tools into existing learning settings and environments is another key factor. Web 2.0 tools are very versatile and can be tailored to support different learning approaches, pathways and needs. They can, for example, be implemented to connect classroom teaching with distance learning phases (see e.g. Welker's Wikonomics), be employed to offer additional external resources or used to support certain pedagogical approaches (e.g. KooL).

Well structured online environments respecting the needs of the respective target groups

Web 2.0 environments by nature are more unstructured compared to traditional web environments. While enabling more freedom and creativity, there are dangers that the lack of formal structure can inhibit learning processes (e.g. learners getting lost within an environment and having difficulties to find content). A trend towards more structure (e.g. by use of categories in blogs, more structured

[23] '++' = strong contribution; '+' = moderate contribution; empty cells indicate no contribution.

organisation of wiki pages) is evident. It has become clear that there is also a need to step back from extremely free and highly open environments and to integrate successful structures from more traditional online learning environments. Another key success factor is seen in the adaptation of environments to the specific user needs (e.g. in terms of function, usability, terminology) which should be accompanied by an initial user needs analysis.

Regular updates of the environment and critical mass of content and users

Regular updates are a key success factor relevant for all online learning environments, but are especially important for Web 2.0 based environments which are built on user-generated content and communication. For instance, a blog becomes attractive only when new entries are made regularly. A critical mass of initial content and users is crucial for the project's success. Without this, effective communication or collaboration is difficult and the platform is not usually very attractive to new users or motivating for present users.

Adequate and stable technical infrastructure

Key success factors as outlined by several case managers and users were that the organisation and users should have sufficient technical equipment (hardware and software) and the project should have a stable technical infrastructure (e.g. fast internet connections). Unstable or insufficient technical environments can be a high-risk factor for project success. Aspects of project finance (e.g. funds), support on institutional level (e.g. willingness for investments) and social background of the target group of users are related factors. Overall, the level of hardware is not the most important aspect when considering the use of Web 2.0 applications (MUVEs like SecondLife excluded), but the technical environment (including internet connection) has to be functional and stable. This is not always the case in the school sector.

Support by institutional management level and an open and flexible organisational culture

Support by the institution where the project is based is key, especially in the educational and corporate sectors. Usually the institutional management level has to provide the framework for financial, organisational, personnel-related or technical aspects in which a project can successfully been installed. The existence of an open and flexible organisational culture can be a related factor (see e.g. IBM). In return a Web 2.0 project has the potential to change the organisational culture.

Teachers take over new roles as learning facilitators, tutors or mentors

Teachers planning to implement Web 2.0-enhanced projects should be ready to assume new roles, e.g. as learning facilitators (space creators, see e.g. SecondReiff), tutors, and mentors (see e.g. Nettilukio). Related activities are the development and organisation of learning spaces (in contrast to content creation), providing initial or continuous support to learners or give advice, help and answer to questions of learners.

The relationship of each case study with the success factors mentioned is summarised in the table below – whereby '++' stands for a strong contribution, '+' for a moderate contribution and '0' describes a neutral effect of the single case to success factors of Web 2.0 in educational initiatives.

Success Factors[24]	Welker's	SecondReiff	Protovoulia	IBM	KooL	ELKOnet	LeMill	Nettilukio
Targeted use and tailored integration of Web 2.0 tools	++	++	++	+	+	+	+	+
Well structured online environments respecting the needs of the respective target groups	++	++	++	+	+	+	++	+
Regular updates of the environment and critical mass of content and users	++		+	++		+	++	+
Adequate and stable technical infrastructure	++	+	+	+	++			
Support by institutional management level and an open and flexible organisational culture	++	+	+	++	++	+		+
Teachers assume new roles as facilitators, tutors or mentors	++	++	++			+		++

Table 17: Contribution of Learning 2.0 Cases to the Dimension Success Factors

5.2.4 Barriers

Some key aspects could be identified that could be barriers, challenges or possible dangers for Web 2.0 based learning activities and are summarized below.

Partly higher level of technical knowledge or requirements

Overall the implementation of Web 2.0 tools in educational settings demands a standard level of hardware and internet connection speeds for individual users as well as institutions. Hardware requirements do not go beyond an up-to-date standard computer and in many cases a common internet browser is sufficient software. However, the educational organisation and/or learners' homes must have a certain technical infrastructure including a server, standard computer or laptop, and (broadband) internet, depending on the project approach. Special technical requirements exist for the use of 3D MUVEs like SecondLife including fast computers with 3D accelerated graphic cards and stable broadband internet connections.

Continuous motivation of all groups of people involved

The use of Web 2.0 applications in educational settings has the potential to increase motivation of project organisers, teachers and learners due to factors like novelty, modernity, activity of approaches and techniques and additional communicative and collaborative elements in learning processes. However, the results of the case studies show that motivation depends on the digital fluency of teachers and learners (digital divide), the added value of the tools for users and the project success. 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.

Self organised individual learning schedules vs. inter-learner communication

Self organised individual learning schedules are in most cases – but not necessarily – demanded and supported by Web 2.0 learning activities. This can lead to special challenges organising efficient and supportive content-related communication and collaboration processes among learners, due to the fact that individual time schedules might not coincide. Possible solutions which partly lead to limited individualization of schedules are fixed starting points for courses or activities, inter-course and inter-

[24] '++' = strong contribution; '+' = moderate contribution; empty cells indicate no contribution.

activity communication structures like common or general discussion forums or inter-course collaboration, for instance on a FAQ-list.

No consolidated Web 2.0-related pedagogical frameworks yet

The results of the study show that most initiatives are experimental in character; Web 2.0 are exploited, adapted and interwoven with learning processes according to perceived needs and advantages and without recourse to a particular pedagogical theory, method or framework. Innovative learning theories such as Downes' connectivism and recent developments in socio-constructivism have not been widely implemented in practice yet. Therefore, practitioners cannot rely on solid pedagogical models adapted to Web 2.0 teaching and learning spaces. However, pilot Web 2.0 learning initiatives can support and further develop existing and consolidated pedagogical approaches and models such as discovery learning or game-based learning.

Concerns about quality of user-generated content

The quality of user-generated content (e.g. in Wikipedia) is a usual 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 students. Some possible quality control mechanisms have been implemented in the case studies (e.g. the quality evaluation committee self-organised by students to ensure high-quality learning materials for test preparation in KooL) while other initiatives have not used any such mechanism.

IPR-management, identity and privacy issues on individual and organisational level

A further widespread concern voiced by practitioners and users are IPR-management, identity and privacy issues in Web 2.0 environments. These issues need to be addressed by each individual initiative separately depending on the pre-conditions, demands and needs of the respective target groups. Overall there is a growing awareness among project managers and users concerning the way in which digital identity and ownership of knowledge and data are not only managed but also ensured and protected. Terms of use, and the use of copyright and privacy regulations, as well as social computing guidelines can be recommended. The issues of privacy and (digital) identity in formal educational settings have further implications and need to be addressed explicitly by individual initiatives.

The contribution of each case study to these barriers is summarised in the table below – whereby '++' stands for a strong contribution, '+' for a moderate contribution and '0' describes a neutral effect of the single case to identified barriers of Web 2.0 in educational initiatives.

Barriers[25]	**Welker's**	**SecondReiff**	**Protovoulia**	**IBM**	**KooL**	**ELKOnet**	**LeMill**	**Nettilukio**
Partly higher level of technical knowledge or requirements	+	++	+		++		+	
Continuous motivation of all groups of people involved	+	+	++	++	+	+		++
Self organised individual learning schedules vs. inter-learner communication			+					++
No consolidated Web 2.0-related pedagogical frameworks yet					+	+		
Concerns about quality of user-generated content					++	+		
IPR-management, identity and privacy issues on individual and organisational level				+				+

Table 18: Contribution of Learning 2.0 Cases to the Dimension Barriers

[25] '++' = strong contribution; '+' = moderate contribution; empty cells indicate no contribution.

5.2.5 Institutional impacts

Innovative Learning 2.0 initiatives can lead to institutional impacts like changes in organisational culture and structures. At the same time, Web 2.0 initiatives might demand certain institutional and organisational pre-conditions and arrangements.

New interfaces between formal and informal learning environments and settings

In general, the case studies in this selection show that Learning 2.0 initiatives can be successfully implemented within formal educational settings in secondary school, higher education or vocational training. In many of the cases studied, Web 2.0 tools were used to transcend the limitations of formal learning settings by extending the classroom to become a virtual learning environment, accessible at all times and places. In other cases, like Nettilukio, the focus lies on embedding self-organised learning into a supportive online learning community. Crucial factors like the definition of interfaces (e.g. transfer of results from classroom sessions to self-learning periods and vice versa) are well-defined, the tools are used in a reasonable way and certification issues are solved.

Acceptance and support by the organisation

A highly relevant factor for projects is the general acceptance and support of the organisation where the initiative is based. This support can express itself in different dimensions like financing, supply with equipment and readiness to adapt organisational structures like time schedules. Overall, project organisers reported that without the support of their organisation the project would not have achieved similar success or could not have been done at all. A relevant intermediate factor is the presence of external funds for an initiative.

Decentralized, individual learning settings vs. rigid or hierarchical structures

Compared to traditional learning and teaching settings, Web 2.0 learning environments usually have a more decentralized, loosely connected and individualized character. These characteristics can be in conflict with organisations in formal education which usually possess more standardized, enduring and often hierarchical structures. For instance it is not always possible to have direct communication between different hierarchy levels, or that organisation members can publish directly on institutional websites. Additionally, privacy and security concerns could be hindering factors on a technical level.

Demand for open and flexible organisational structures

Successful implementation of Web 2.0 learning projects demands a certain degree of openness and flexible structures on institutional and on project level (e.g. flexible time schedules, open communication structures). The IBM case describes this institutional factor in detail. In return Web 2.0 projects can help to implement more open and flexible structures in organisations and can support changes in organisational culture.

Potential for opening of education and training organisations towards society

In several of the cases it was outlined that Web 2.0 tools are an excellent opportunity to open windows from closed environments (like for instance institutional learning management systems) to the outside world (e.g. by integration of external tools, a blog pointing to or embedding external resources, open communication tools). This impact can be transferred from the project to the institutional level by implementing similar tools and elements.

Opportunity to keep users in continuous learning processes

Finally, Web 2.0 learning environments offer the change to keep users in continuous learning processes and to establish long-term “customer”-relations with Education and Training institutions. However, open access for past participants to portals is a necessary pre-condition. Alumni-portals using social networking applications are a good example for this strategy.

The institutional impacts of Web 2.0 for each case study is summarised in the table below – whereby '++' stands for a strong contribution, '+' for a moderate contribution and '0' describes a neutral effect i.e. institutional impact caused by the use of Web 2.0 in educational initiatives.

Institutional Impacts[26]	**Welker's**	**SecondReiff**	**Protovoulia**	**IBM**	**KooL**	**ELKOnet**	**LeMill**	**Nettilukio**
New interfaces between formal and informal learning environments	++	+	++		+	+	+	+
Acceptance and support by the organisation	++	+	++	++	++			
Decentralized, individual settings vs. rigid or hierarchical structures			++	++	+			
Demand for open and flexible organisational structures	+		++	++	++			
Potential for opening of E&T organisations towards society	+		++		+		+	+
Chance to keep users in continuous learning processes				++		++	+	

Table 19: Contribution of Learning 2.0 Cases to Dimension Institutional Impacts

[26] '++' = strong contribution; '+' = moderate contribution; empty cells indicate no contribution.

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European Commission

JRC 53212 – Joint Research Centre – Institute for Prospective Technological Studies
Title: Good Practices for Learning 2.0: Promoting Innovation. An In-depth Study of Eight Learning 2.0 Cases
Authors: Simon Heid, Thomas Fischer and Walter F. Kugemann
Editors: Christine Redecker, Margherita Bacigalupo and Kirsti Ala-Mutka
Luxembourg: Office for Official Publications of the European Communities
2009
Technical Note

Abstract

Over the last few years, “Web 2.0” or “social computing” applications like blogs, wikis, photo- and video-sharing sites, as well as online social networking sites and virtual worlds, have seen an unprecedented take up, changing the way people access, manage and exchange knowledge, and the way they connect and interact. This trend is accompanied by the emergence of structurally different learning styles, especially among young people. Furthermore, social computing applications are extremely versatile and offer flexible and dynamic learning opportunities that are often more appealing and engaging than traditional learning arrangements. Their potential, therefore, for supporting and facilitating learning processes is considerable.

However, due to the novelty of social computing, take up in Education and Training is still in an experimental phase. All over Europe, various small-scale projects and initiatives, which try to exploit social computing for a multitude of learning purposes, have been started. However, data and scientific evidence on these Learning 2.0 projects is scarce. This study tries to provide some evidence of good practices for using Learning 2.0 approaches to support innovation by investigating eight examples of initiatives in depth. 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. The case assessment critically examines impacts and outcomes, as well as obstacles and barriers, and factors for failure and success. All the cases highlight the vast potential of social computing for promoting pedagogical and organisational innovation, thus transforming educational approaches, institutions and systems, and, at the same time, they indicate the existing obstacles and bottlenecks.

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