



Language Technologies for Lifelong Learning

Language Technologies for Lifelong
Learning

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Project Deliverable Report

D8.5 – Exploitation & sustainability strategy

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1 Executive Summary

For the WP8 (Dissemination, Training and Exploitation) two deliverables have been written in month 24:

- D8.4 Dissemination and training results y2 & plan y3 and this report
- D8.5 Exploitation and sustainability strategy

The aim of this report is to describe the analysis results of the LTfLL services version 1 and their position in the market and the impact on existing alliances.

The purpose of this report is to describe how the results of the project can be used by the LTfLL partners, contacts and other potential users in the market. The report is organized as follows:

- The first section identifies the exploitable results (services and side outcomes) of the project.
- The next section describes the relevant user groups and markets for using the LTfLL results.
- The third section contains a description per exploitable result about the motivation for exploitation, position in the market and contacts for exploitation per exploitable result.

2 Introduction

The LTfLL project is developing a set of next-generation services to support users during the lifelong learning process. These services are offered for the integration in existing learning environments.

2.1 Current Situation

The LTfLL project team established a set of 6 scenarios, which are the baseline for the ‘Version 1’ of the services.

These services will be improved based on the results of the validation process. The further development will result in the ‘Version 2’ of the services.

In addition a thread-based integration of the six services will be done during the third year of the project.

2.2 Purpose

This report explains the benefits of the individual outcomes of the LTfLL project and defines the activities of the exploitation strategy during the first years of the project and further methodology for promoting the results for further exploitation after the end of the project.

2.3 *Exploitable Results*

The report describes the analysis of the services with regard to their position in the market based on the following services and side outcomes of the LTfLL project:

- Learner Positioning Service (WP4.1)
- Service for Monitoring Conceptual Development – CONSPECT (WP4.2)
- Chat & Forum Analysis and Feedback System – PolyCAFe (WP5.1)
- Online Synthesis Advisor – PenSum (WP5.2)
- Formal Learning Support System – Course Editing Service (WP6.1)
- Informal Learning Support Service to Locate Content and Peers (WP6.2)
- Side Outcomes:
 - Transferability of the LTfLL services
 - NLP Knowledge
 - Integration of Widgets and Inter-Widget Communication
 - Scenario Based Design Methodology
 - Validation Methodology

2.4 Relevant target user groups and markets

Based on the report ‘D8.3 – Exploitation plan’ the project team enhanced the definition of relevant target user groups and markets. This additional input to the exploitation possibilities was identified during informal talks with contacts in different learning environments.

Even if some of the target user groups are not in the primary focus of the LTfLL project based on the DoW we are using existing contacts of all project partners to reach awareness of the project results in a wide area of interested communities.

- The ‘General Public’, ‘Policy Makers’, ‘Decision Makers’
- Formal Learning
 - Schools
 - ‘Higher Education’ Areas
 - Vocational education and training
 - Adult education
- Informal Learning
 - Informal learning for pupils and students
 - Informal learning for adults
- Developers communities

2.5 Main exploitation activities

The main activities for dissemination and exploitation of the LTfLL projects results during year 2 and year 3 are:

- Components and stakeholders
 - Awareness raising
 - Engaging interested parties
 - Providing ‘next steps’
 - Providing a clear route to implementation
- Videos and Presentations for Dissemination and Training
- Lab-Materials for Dissemination and Training
- Activities in online communities
- E-Mail activities for contacts (if the contact is not active in online communities)
- The LTfLL web site

In order to promote the benefits and use of the LTfLL project outcomes we have established workshops and training activities (on-side and on-line).

The LTfLL services as technical result of the project will be made available in well-documented releases under General Public Licence (GPL). During the project we are offering advanced implementation support of the services.

For a more detailed description of the dissemination activities see also the deliverable ‘D8.4 – Dissemination & Training Results y2 & Plan y3’.

3 The LTfLL Services and Site Outcomes

3.1 *Learner Positioning Service (WP4.1)*

The ‘Positioning Service’ performs a qualitative and a quantitative analysis of learner’s texts. Qualitative analysis involves the scoring of phrases extracted from learner texts according to distinctive features of their usage by comparing its frequency in high and low quality texts as graded by experts. Quantitative analysis uses information such as occurrence counts of these phrases to compute a measure of fit of the learner language as compared to the relevant CoP. In addition conceptual coverage of learner texts is computed using ontology by counting how many associated concepts are found in the learner texts.

Tutors can use results to decide which materials need to be studied by the learner, and in which area of conceptual knowledge the learner may require further support. Learners can evaluate their own position and identify their strengths and weaknesses.

3.2 *Service for Monitoring Conceptual Development – CONSPECT (WP4.2)*

CONSPECT is designed to provide a means by which a learner’s conceptual development can be monitored and feedback opportunities are promptly and effectively provided.

CONSPECT monitors conceptual coverage of topics based on an automated analysis of textual evidence presented by learners, in comparison with others or over time, to identify shortcomings, misconceptions, and emerging learning opportunities within the learner’s zone of proximal development. It uses textual artifacts from both individuals and groups of learners, such as essays or blogs, to establish a visual model, a “conceptogramme”, of how learners relate concepts to one another.

Learners are able to compare their own model with an emerging group reference model in order to identify differences, or to get feedback on where to seek advice from their tutor.

3.3 Chat & Forum Analysis and Feedback System – PolyCAFe (WP5.1)

PolyCAFe produces various kinds of information about discussions in chats and forums, both quantitative and qualitative, such as metrics (e.g. the relative importance of each utterance, learner grades both globally and for particular features like the involvement in the collaboration, the social effect of what they said, etc.), and content analysis results (such as the coverage of the key concepts supposed to be discussed and the discourse threads).

PolyCAFe also provides visual feedback about the interactions and the social participation.

The visualization of the conversation and forum is interactive, that means the learners and tutors may explore different perspectives and discussion threads, they may view implicit links discovered by the system between utterances or posts and they may see the threading of using different concepts.

Additionally, the system offers the possibility to search for the most important participants or utterances in the discussion given a search query, using lexical and semantic similarities, plus a social score. Thus, the users can discover other learners that are very good on a given topic and filter the conversation with regard to a given perspective given by the search query.

3.4 Online Synthesis Advisor – PenSum (WP5.2)

‘PenSum’ support learners in the automatic assessment of their essays (summaries, syntheses) in order to let teachers focus on higher-level activities (e.g., individual learner guidance or course design). ‘PenSum’ analyses how well learners understand course texts as shown by their textual productions; it provides frequent just-in-time feedback on the on-going writing activities (relevance of written sentences, inter-sentence coherence of the synthesis, résumé of each course sentence).

3.5 Formal Learning Support System – Course Editing Service (WP6.1)

The Formal Learning Support System (FLSS) as part of the Common Semantic Framework (CSF) offers various browsing and searching functionalities. A simple text search returns documents with a varying degree of relevance. Semantic search makes the results more relevant, by using different wordings of a concept and exploiting implicit semantic relations in the text. Browsing the domain ontology helps the teacher to organize taxonomically his/her curriculum.

The learning materials in FLSS are annotated automatically. Users can browse these texts with annotated concepts and contexts, and thus can compile manually a curriculum, a glossary and a test for the learners that will take into account the learner's profile (as a group and individually).

3.6 Informal Learning Support Service to Locate Content and Peers (WP6.2)

The LTfLL Common Semantic Framework (CSF) supports stakeholders in identifying, retrieving and exchanging the relevant learning material for a given learning task. The iFLSS supports the knowledge discovery process through an ontology enhanced with the vocabulary of the Community of Practice (CoP) and by recommending material on the basis of the content, tags and users belonging to the CoP. Communication is facilitated through the use of social networks and new communities of learners can be established through the recommendations provided by the system.

3.7 Side Outcomes

During the project the following ‘Side Outcomes’ are produced and will be published to enable the interested community in further exploitation.

3.7.1 Transferability of the LTfLL services

The development and validation of the LTfLL services is done based on pre-defined domains (e.g. medicine, information technology) and a limited number of different languages (e.g. English, France, German, Bulgarian).

The use of different domains and languages during the LTfLL project was important to ensure the transferability of the outcomes to different domains and languages.

3.7.2 NLP Knowledge

The theoretical and implemented NLP (Natural Language Processing) knowledge will be relevant for future projects and further development in different environment.

3.7.3 Integration of Widgets and Inter-Widget Communication

There are two integration approaches used in the project:

- Integration of widget-based services in existing learning environment.
- Establishing a widget-to-widget communication to enable the LTfLL services to work together.

3.7.4 Scenario Based Design Methodology

The ‘Scenario Based Design Methodology’ is used during the LTfLL project to ensure to develop useful services for the community of practice.

3.7.5 Validation Methodology

The used ‘Validation Methodology’ was established appropriate to the ‘Scenario Based Design Methodology’ and the requirements of learning in different contexts.

This methodology is useful for different software-projects in the IT-domain and also to improve the validation in existing learning environments.

4 Relevant target user groups and markets

4.1 The ‘General Public’, ‘Policy Makers’, ‘Decision Makers’

The lifelong-learning process is getting more and more important for the European Union:

*‘Knowledge, and the innovation it sparks, are the EU's most valuable assets, particularly as global competition becomes more intense in all sectors.’
(The ‘Lifelong Learning Program’)*

To provide exploitation strategy for the ‘General Public’ is one of the important objectives of the LTfLL project, because we agree to the above requirements for the European Union.

The LTfLL services are based on a high-level technology. This fact provides a very important opportunity for the results of the LTfLL project based on the following items:

- The use of high-level technology environments has a growing acceptability by the ‘General Public’
(e.g. SMS, Google, Facebook, Apple ‘Apps’ ...).
- Using high-level technology products is able to reach a wide area of peoples in different ages (between 6 and 100 years of age).
- Especially to reach the ‘Young Generation’ the use of high-level technology is one of the efficient methods.

To motivate the ‘Young Generation’ for lifelong learning is important for the further progress of the European Union.

4.2 Formal Learning

The ‘Formal Learning’ environments are the basics of learning in the culture of the European Union.

Tools and methods, which are established in these environments, are defining the future way of learning for many individuals. As result of this fact it’s important for the LTfLL tools to be recognized and used in ‘Formal Learning’ environments.

To address the target audience appropriate to their needs the following explanation describes the matching of the LTfLL project results to these particular requirements.

The project team will use these output to highlight the major benefits of the LTfLL services for the individual needs of the target groups and stakeholders.

4.2.1 Schools

In the school environment the primary target users are the teachers, because they are able to bring the pupils in contact with the LTfLL services.

Integration language technology into the schools learning environments provides many benefits:

- The young generation people are being motivated to develop their competence for lifelong learning activities.
- Adding technology based learning is increasing the attention for the learning content.
- A Teacher spares time in the part of traditional classroom oriented learning, which can be used to promote the individual capabilities of each pupil.
- Using technology based learning results in a possibility to different the teacher’s school from non-innovative schools. This fact will increase the number of pupils for innovative schools in the future.

4.2.2 ‘Higher Education’ Areas

For ‘Higher Education’ the European Union offers a set of different possibilities (e.g. universities, universities of applied sciences, colleges ...).

In addition the ‘Higher Education’ approach is building the bridge between universities, students and enterprises. During this process the permanent changing skills requirements and new contents, which are brought up by the enterprises have to be brought together with the existing learning materials. During this process the language technology oriented services of the LTfLL project can provide a major support to simplify and speed up this process.

4.2.3 Vocational education and training

Successful business development is based on the ‘quality’ of the companies staff. Especially for companies in the European Union the improvement of the expertise of its staff is important for the future development of the European Union’s economy.

The ‘Human Resource’ Departments (HR) of the companies are looking for new solution and tools to enable the employees to reach new skills, knowledge and qualification.

The major requirements shown by the companies are:

- Vocational education has to be time efficient.
The time used for the learning process affects the companies in two ways. On one side the amount of money paid to the third-party education companies depends on the needed time. On the other hand during the time needed for learning the employees are not performing productive work in the needs of the enterprises.
- Vocational education has to be individual for each employee.
This requirement doesn’t only depend on the different existing expertise and knowledge of the employees. Also because of the different business requirements the enterprises have to improve the expertise of their employees in different areas of knowledge.
- The employees should be personal responsible to realize their skill requirements and possibilities to reach these requirements.

4.2.4 Adult education

The requirements for the adult education are similar to the Vocational education requirements.

The adult education process is driven by either the local governments, education providers or by the learner himself. To get the LTfLL services used in these learning environments the project team will have to address the following facts. Based on the increased number of peoples in the adult education there are specific aims:

- Use of new services and practices
is helpful to support more learners with the same budget.
- Provide easy access to the tools and make them easy to use.
This enables the adult education process improve the support for learners with very different social and educational qualifications (also for peoples on the margins of society).
- Using centralised services enables the co-operation between adult education organisations.

4.3 Informal Learning

4.3.1 Informal learning for pupils and students

The informal learning process used by the juveniles is very technology based (e.g. television, internet...). The LTfLL services could be used as the basis for a new generation of informal learning environments for juveniles.

It is not part of the LTfLL project to establish these learning environments, but the project team defines to publish the characterization of these possibilities to the general public as important for further exploitation of the project results.

4.3.2 Informal learning for adults

The informal learning process for adults is a new process which has been established during the last twenty years. Especially the improvements and changes in the IT environment have enforced the informal learning for adults. Even if there are no direct needs based on their job requirements the adults are extending their knowledge in specific areas (e.g. IT, allotment garden, travelling, cooking...).

Most of the adult informal learners are used to work with the internet technology. Therefore the LTfLL tools can be established in discussion groups and communication environments for this specific target group and provide selected knowledge for the interests of this community.

4.4 Developers communities

During addressing the developer's communities the project team keeps in mind, that there are two different approaches made:

- The developers target group is one of the best samples for self-learning oriented communities.

To provide useful content for this community based on the LTfLL service tools will address a high aware group of people for our technologies.

- In addition the developers group is an important information carrier for the concepts and possibilities of the LTfLL project results and services.

Especially the intra-communication inside the developers community transfers new information and knowledge about technologies to a wide area of countries and to different domains of knowledge.

To direct the attention of the developer's community to the LTfLL project we will point out the possibilities for further development of the open source based services. This is going to address the primary interest of this target group.

5 Motivation, Position in the market and Contacts for Exploitation

In order to make the project's exploitation a success, the project team has elaborated the motivation reasons for each outcome of the LTfLL project.

These key motivation factors are used in combination with the above explained requirements of the different target user groups and stakeholders to outline the possibilities of the LTfLL project results in an optimized methodology.

5.1 Learner Positioning Service (WP4.1)

5.1.1 Motivation for exploitation

The LTfLL 'Learner Positioning Service' is designed to support tutors and learner candidates to establish a specific definition of required training units and corresponding learning methods.

The provision of detailed and optimised hints for the learning path provides many benefits:

- The learner *saves time* during the learning curve.
- This implies also that learners and tutors will be *more satisfied and motivated*.
- The enhanced functionality of the positioning process will enable education providers to develop *individualised and cost reduced training*.
- The improved positioning process will reduce the *overall cost per individual*.

The Task 4.1 scenario is based on the requirements of the Austrian Public Employment Service (AMS) which matches unemployed individuals with job openings. To achieve the required skills for the job openings an individualized training path is established.

The use and benefits of the LTfLL 'Learner Positioning Service' are transferable to different scenarios and many knowledge domains.

5.1.2 Position in the market

Currently there are mainly three positioning solutions in use in the market:

Personal interviews

The use of personal interviews provides a useful way of positioning the learner, because the human interaction between the learner and the interviewer is not limited to a predefined environment.

To achieve high quality results an interviewer with deep knowledge of the domain is required. Because of this high educated (and expensive) interviewers and the amount of time needed the concept of personal interviews is time consuming and expensive (e.g. for interviewing the IT-support team of an typical environment there are more interviewers needed – for Windows operating systems, Linux operating systems, different database environments, different network infrastructure...).

Multiple choice testing

The ‘multiple choice testing’ environment is used for different kind of certifications (e.g. driving licence, certificates in the IT-environment...). The candidates are using specialised techniques for the exam preparation, which is improving their results but not improving their real knowledge (e.g. use of ‘braindumps’ for certificates in the IT-environment).

On the other hand the ‘multiple choice testing’ is not intuitive and confusing, if the learner is not familiar with ‘multiple choice testing’ (only experienced lifelong learners are familiar with ‘multiple choice tests’).

The results of ‘multiple choice testings’ are not including the complete existing knowledge of the learner. Because of this limitation this methodology is not the best solution for positioning scenarios.

Self-Reporting

During the use of self-reporting assessment we recognised that the individuals are using a very different rating of their own knowledge.

The differences in rating are founded on the different personalities of the persons and their current situation (company, family...).

Because of this the results are not comparable and useful for the positioning task.

5.1.3 Contacts for exploitation

- An informal talk with the ‘Schulzentrum Hitzendorf’ (Primary and Secondary School in Austria) was undertaken by Christoph Mauerhofer with both directors (Veronika Schober - primary school, Gertrude Leitner – secondary school) and the IT-representative (Maria Pall).

During this informational talk the possibilities for implementing the LTfLL services in the IT environment of the ‘Schulzentrum Hitzendorf’ were discussed. As result the test implementation of the ‘Positioning Service’ for the ECDL education will be done for the secondary school.

- The version 1 of the LTfLL services were presented to the management of the company ‘bit Schulungscenter’.

A further use and development of the LTfLL services in the adult education environment was discussed. As conclusion based on the version 2 of the services an additional presentation will be arranged in January 2011. Based on the status of the version 2 of the LTfLL services the use of the project results will be settled.

- A presentation of the LTfLL positioning service was provided to ‘Gertrude Neumüller’ (Delivery Manager) from ‘Global Knowledge Education Austria’. This company is responsible for IT technical trainings in different domains (Microsoft, CISCO, Project management...).

The use of ‘Learner Positioning Service’ and CONSPECT for advanced learners were defined as useful tools for future learning environments.

- Informal talks about the LTfLL services were done by Horst Ortmann during the Microsoft PAC (Partner Advisory Council) meeting (Bellevue, WA). The PAC team is responsible for discussing further development and positioning of the ‘Microsoft Learning’.

The goal of this informal talks was to get awareness for the project and place a presentation of the final LTfLL results in a future Microsoft PAC meeting.

- Christoph Mauerhofer and Dominik Neuner (Consultant, PDA Group, Universitaetsstrasse 9/10, Innsbruck, Austria) had an informal talk during the ‘Online Educa Berlin’ (December, 2009) regarding a test implementation of the LTfLL services.

An additional contact in May 2010 was planned for defining additional details of the test implementation.

- Evgenia Terekhova (Multimedia Department, TheWebProduction, Novgorodskays str. 12A, 191144 St. Petersburg, Russia) remarked their interest on further cooperation in developing language technology based concepts. The access information for the LTfLL services will be provided to Evgenia Terekhova.
- An LTfLL presentation event with the education department of the WIFI (‘Wirtschaftsförderungs Institut’) with Mag. Ulla Föbbleitner (management of the IT education part) will be established in the second quarter of 2010.
- The bfi (‘Berufsförderungsinstitut’) as one of the major institutes in adult education in Austria will be contacted to establish an alliance with the bit group for further exploitation of the LTfLL services (Both companies are already cooperating in the adult education area and are interested in innovative tools for learning environments).

5.2 Service for Monitoring Conceptual Development – CONSPECT (WP4.2)

5.2.1 Motivation for exploitation

The LTfLL CONSPECT service supports learners and tutors by analysing the semantic content of a learning blog or other form of written exposition. It presents the results in a visualisation called a conceptogram, which highlights inclusions and gaps in a learner's text.

CONSPECT helps learners and tutors to analyse the progress of a learner, individually; and to compare the learner with another learner, with the course learning outcomes, with the emerging reference model, and with a group of learners.

The advantage of using CONSPECT includes:

- immediate feedback to learners
- enhanced motivation and satisfaction for learners to prepare summaries
- the ability for tutors to locate students lagging behind the group
- more efficient use of the tutor's time

Although CONSPECT is being tested with medical students, with the proper training material, it transfers easily to other domains. It is suitable for both formal and informal learning. It has been targeted to be useful for Problem Based Learning situations but can be used in any environment that requires periodic summaries written by the learner.

5.3 Chat & Forum Analysis and Feedback System - PolyCAFe (WP5.1)

5.3.1 Motivation for exploitation

Learners in various contexts (schools, universities, communities of practice and other web communities) are using web communication technologies such as instant messaging and discussion forums. However, most of this data is not really used by the teachers and learners after the discussion is finished and the data is lost. One of the reasons for not using this data afterward is the difficulty of getting useful information back from the conversation without reading the whole transcript. Moreover, these discussions are rarely examined by a tutor or advanced learner to offer feedback to the participants based on their participation in the chat or forum. Thus, the users sometimes feel isolated and may be not attracted to use such a technology. The PolyCAFe aims at solving these issues by offering the participants real-time feedback, support and recommendation for their participation in a web discussion. It also provides improved visualization of the discussion and implicit link detection between utterances in order to assess collaboration - one of its objectives being to stimulate the collaboration of users in web conversations.

By taking into account all this issues, the main benefits of using C&F-AFS are:

- Learners get a *useful feedback immediately* after they finish a chat discussion and *just-in-time* for forums
- Offers a *better understanding and a way of visualization* of the collaborative processes and of conversations in general
- Students are *more involved and motivated* with the course or domain of the conversation and *are attracted to use web communication technologies*
- *Reduces the time* needed by tutors to provide feedback and grading
- *Increases the quality* of the feedback for collaborative chat sessions and discussion forums
- *Increases the quality* of the support that teachers can give to learners, because they get interactive abstraction facilities on the collaborative learning, which allow them to better understand the teaching process

The scenario used by task 5.1 is based on the ideas and approaches advocated by the

Computer-Supported Collaborative Learning (CSCL) community. Moreover, it contains elements of Self Regulated Learning (SLR) when learners are part of an ad-hoc community. C&F-AFS is intended to be used in most domains and contexts where chat and forums are used as communication tools for learning tasks, being tested on both IT and Medicine.

5.3.2 Position in the market

PolyCAFe will have a unique position on the market, being the single open-source web-based (widgetised) solution for the analysis of chat and forum discussions, offering feedback and interactive graphical support to the students and tutors. Moreover, PolyCAFe combines three analysis dimensions: classical Natural Language Processing (NLP), Social Networks Analysis (SNA) and Polyphonic Inter-animation.

The other similar products that provide feedback and recommendations based on chat and forum discussion are stand-alone solutions intended mainly for research such as TagHelper Tools (<http://www.cs.cmu.edu/~cprose/TagHelper.html>). They are either based on NLP or on SNA. None of these solutions consider the original polyphonic analysis and none offer interactive graphical analysis of the threads of discussions

5.3.3 Contacts for exploitation

- A presentation of WP5.1 was performed at IBM Academic Days for Universities in Romania (15 March 2010). With this occasion, prof. Stefan Trausan-Matu discussed with professors from the Technical University of Cluj-Napoca and from the University of Suceava, Romania, following their manifestation of the interest in using the PolyCAFe system.
- We have discussed about our work in WP5.1 with the Virtual Math Teams project team conducted by Dr. Gerry Stahl from Drexel University, US and the research team of Dr. Carolyn Rose from CMU. We intend to ask them to use PolyCAFe for their classes and experiments.
- Dr. Patrick Sins from University of Utrecht has contacted the project team after the EC-TEL 2008 presentation of the prototype version of the service as he needed a service similar to PolyCAFe.

5.4 Online Synthesis Advisor – PenSum (WP5.2)

5.4.1 Motivation for exploitation

PenSum, the WP 5.2 service, is aimed at providing students attending a course at a distance with feedback on their written productions. Such students take a lot of notes, summaries, syntheses from the courses they attend and they encounter difficulties to be timely assessed by their teachers. Moreover, they have difficulties to self-assess their work and to identify possible misunderstandings. Because of the cognitive effort to assess students work at this level, teachers often postpone or delay such feedback to their students. Computer-generated feedback is thus useful, for both students and teachers.

PenSum provides semantic-based feedback at two main levels, about how well a given set of sentences is explained and argued (relevance of students' course syntheses, coherence between sentences) and about how the different sentences from the course are covered.

More generally, such a tool allows students' self-regulation of their learning and let teachers focus on higher levels of assessment and scaffolding.

5.4.2 Position in the market

To our knowledge, there are very few written-based feedback advisors in the market (even though a lot are under testing in laboratories), and those existing are not under Open Source licencing. Spell and grammar checkers put aside (as well as databases for courses and revision management like <http://www.academium.com/fr/logiciels/7x/logiciel-7x.php>), we can list the following systems. *PenSum* pertains to the third category of tools.

- **Shallow assessment:** *PaperRater* (<http://paperrater.com>), *Turnitin* (<http://www.turnitin.com>) or *ProofWriter* (ETS, <https://proofwriter.ets.org/>). These systems provide various lexical and style-oriented advice but are mainly at lexical level (word usage, grammar, mechanics, readability formula).
- **Organisation strategies prompters:** these systems do not check students' essays from a content basis, but prompt them advice to organize or revise their writing, e.g., for generating ideas (*WriteThis*, <http://www.theprint.dk/writethis.html>); *QuickStory*, <http://www.characterpro.com/quickplot/index.html>).

- **Collective course revision.** Since almost all LMS allow students collaboration to revise course, there is a special web service, myexamopedia (<http://sites.google.com/site/myexamopedia/>) which uses a special blend of web 2.0 collaborative functionalities (i.e., a wiki engine and Twitter) to let students organize in small groups their revisions and refine their work strategies. Feedback from peers or tutors is also possible, but non-automated.
- **Semantic-based assessment.** Pearson, an US publisher, developed a department (*Knowledge Technologies group*) entirely devoted to the application of Latent Semantic Analysis. They implemented a wide range of products devoted to the semantic analysis of writings in school settings (*IEA*, aka *Intelligent Essay Assessor*, *Summary Street*). Criterion from ETS is derived from *e-rater*, one of the first automated essay assessors (*Educational Testing Service*, <http://www.ets.org/>) is another automated assessor, which has in addition a scale of assessment criteria teachers can use for providing students with ready-made feedback, based on 12 criteria like proportion or grammar errors, total number of words, etc. *c-rater*, from ETS, is a further attempt to assess the content of students' essays. Eventually, MyAccess (from *Vantage Learning*, <http://www.vantagelearning.com/school/products/myaccess/>) is another automated essay assessor based on gold-standard comparisons.

5.4.3 Contacts for exploitation

- Contacts, since 2009, with “Centre National d’Enseignement à Distance” (CNED), the most important French (and European, as well) provider of e-learning courses (260.000 students per year). A first informal contact with the Campus FORSE (online campus, University of Lyon 2, France) was undertaken by Philippe Dessus et Sonia Mandin with his manager: Stéphane Simonian. These contacts were then extended to use CNED’s platforms and students to validate version 1 prototype of *Pensum* (two attempts so far). We are waiting for first validation results for disseminating them to the research and development departement of CNED.
- Contacts with *Pentila*, a software and computing services company from Chambéry (France), in March 2010.

- Some dissemination-oriented conferences have been carried out: *Education & Technology Summer School (Strasbourg, August 2009)*; *Grenoble Cognition Pole (Grenoble, June 2010)*. Two others are under negotiation: *Primary Teachers French Association Annual Congress (AGEEM, Annecy, July 2010)*; *Cognicité Conferences (La Cité des Sciences, Paris, June 2010)*.

5.5 Formal Learning Support System – Course Editing Service (WP6.1) & Informal Learning Support Service to Locate Content and Peers (WP6.2)

5.5.1 Motivation for exploitation

The LTfLL ‘Informal Learning Support Service’ is designed to support tutors and learners in finding relevant content and peers by offering ontology based and social network based search services.

The ‘Informal Learning Support Service’ provides many benefits to the learner and tutor:

- Learners *save time* during the learning curve, because the service assists the learner in *locating appropriate materials*
- Learners *save time* because the service enables the learner to locate *relevant peers* which he can ask for help
- Learners *improve their understanding of a topic* during the search process, since they *acquire knowledge* on a domain on the basis of the ontology fragment. To get a quick impression on a topic, the service also includes definitions for the search topics.
- The *quality of learning improves*, since the documents retrieved are coming from trusted users (i.e. users in the network of the tutor);
- The *collaborative building of knowledge is supported*, since the social search service allows the learner to make *valuable contacts from the tutor’s network* and to extend in this way his own network
- The *collaborative building of knowledge is supported*, since the social search service allows the learner to *identify relevant peers from his own network* with whom he can collaborate to improve his knowledge

The Task 6.2 scenario is based on a situation in which a learner needs to acquire knowledge on a topic in the context of a course. To locate relevant and trusted content and to acquire knowledge, the ‘Informal Learning Support Service’ is used.

The use and benefits of the LtfLL ‘Informal Learning Support Service’ are transferable to different scenarios and many knowledge domains.

5.5.2 Position in the market

The LtfLL Informal Learning Support Service can be differentiated from existing search engines on the basis of the search space and the search philosophy. Both aspects are especially relevant in a learning context.

Search space

The web contains a vast amount of content and it is the task of search engines to select the most relevant ones. While current search engines crawl the complete web for relevant content, the Informal Learning Support Service only considers content that has been marked by other users as being relevant. The search space for the Semantic Search includes only content that has been marked by users of social network sites (at the moment only Delicious). By using the bookmark frequencies, it is possible the results can be ranked. The search space of the Social Search is even more restricted and only investigates the content of a learner's network.

Search philosophy

Semantic search

The search philosophy that has been adopted in the Semantic Search service is based on the semantic representation of a domain in the form of a domain ontology. The semantic search does not only offer the users a list of results, but also an ontology fragment in which the relevant concept is centered. The learner can browse through the fragment and will in this way acquire knowledge on the domain: the fragment shows related concepts and how they are related to the search term.

Since we offer a functionality to enrich existing domain ontologies automatically, the Semantic Search service can easily be adapted to different domains. The enrichment process is based on social tags and the structure of DBpedia. The enriched ontology makes a distinction between expert concepts and social concepts. The expert concepts are the concepts which were present in the domain ontology created by experts. The social concepts have been added automatically on the basis of social tags, which ensures that they are relevant.

Social search

In the Social Search service, the search philosophy is based on three aspects: users, tags, and resources. These three aspects are used to recommend content that is relevant within a learner's network. In this way, a trust aspect is added to the search process, since the learner knows the people that recommended a document and can use this knowledge to assess the quality of a document.

In addition to the search for documents, the Social Search service also offers the possibility to search for relevant peers in the learner's network or the networks of his contacts. This enables the learner to establish contacts with relevant people that can assist him in his learning process.

Visualization

The Wonder Wheel View from Google is relevant for our search services. In this view, the results of a search query are visualized in a wheel structure, which shows the topics that are related to the query. For example, when one types in the query 'online social network', a wheel is shown with links to topics like 'twitter', 'facebook', and 'linkedin', while on the right the retrieved documents are shown (<http://tinyurl.com/y5cuq6v>). A clear added value of our work over the Wonder Wheels is the underlying semantic structure, which ensures qualitative good results.

5.5.3 Contacts for exploitation

We have contacts with several projects and companies.

- APOSDLE - learn@work (<http://www.aposdle.tugraz.at/>)
We talked with Stefanie Lindstaedt from the APOSDLE project on the aspects from their work that can be relevant for our search services. Relevant aspects are the work they did on determining user profiles, linking processes/tasks to required knowledge and learning goals in order to provide a learning model, and the recommendation system they developed.
- BONY - Babylon & Ontology (<http://www.bonynetwork.eu/>)
We had contacts with Alfio Gliozzo from the BONY project on the expert search they have implemented, which is relevant for our work.

- Edia (<http://www.edia.nl/>)
Edia is a specialist in education technologies. This company develops educational software. They are interested in the disambiguation system that has been developed within WP6.2.
- Hyves
Hyves is a free Dutch social networking site which has been online since October 2004. The focus of this website is on keeping in touch with existing friends and making new friends. Users can create personalized pages of themselves with rich media content, such as photos, videos, flash content and custom layouts. We had contacts with this company on the possibility to have privileges channel to social data if we decide to work more on Dutch.

6 Annex - Mapping of motivation for exploitation of LTfLL project outcomes to target user groups

Stakeholder Key:

A General public, Policy makers, decision makers

B Formal learning - Schools

C Formal learning – ‘Higher Education’ Areas

D Formal learning – Vocational education and training

E Formal learning – Adult education

F Informal learning for pupils and students

G Informal learning for adults

H Developers community

| LTfLL project outcome (service) | Motivation for exploitation (key benefits) | Target user groups | | | | | | | |
|--|---|--------------------|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H |
| Learner Positioning Service (WP4.1) | The learner saves time during the learning curve. | X | | X | X | X | | | |
| | This implies also that learners and tutors will be more satisfied and motivated | | X | X | | | X | X | |
| | The enhanced functionality of the positioning process will enable education providers to develop individualised and cost reduced training | X | X | | | | | | X |
| | The improved positioning process will reduce the overall cost per individual | X | | | X | X | | | X |
| Service for Monitoring Conceptual Development – CONSPECT (WP4.2) | Tutors are able to easily identify those learners who are not progressing in line with the intended learning goals. This will allow tutors to work with individual learners in a more time-effective manner. | X | | X | X | X | | X | |
| | Learners are provided with timely individual formative feedback, which can promote self-directed learning. | X | | X | X | X | | X | |
| | As an aid to learning, CONSPECT provides learners and tutors with a simple means of identifying the key concepts in essays, notes and resources, and comparing the coverage of their own materials via conceptogram visualisations. | X | | X | X | X | | X | |
| Chat & Forum Analysis and | Learners get a useful feedback immediately after they finish a chat discussion and just- | | X | X | X | X | X | X | |

| LTfLL project outcome (service) | Motivation for exploitation (key benefits) | Target user groups | | | | | | | |
|---|--|--------------------|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H |
| Feedback System (WP5.1) | in-time for forums | | | | | | | | |
| | Offers a better understanding and a way of visualization of the collaborative processes and of conversations in general | | X | X | X | X | X | X | X |
| | Students are more involved and motivated with the course or domain of the conversation and are attracted to use web communication technologies | | X | X | X | X | | | |
| | Reduces the time needed by tutors to provide feedback and grading | X | X | X | X | X | | | |
| Online Synthesis Advisor – PenSum (WP5.2) | Provides information on the extent a course is understood through the assessment of the quality of students’ writing (syntheses). | X | X | X | X | X | X | X | |
| | Students get immediate feedback on the relevance and coherence of the written synthesis. | | X | X | X | X | X | X | |
| | Students’ self-regulated learning is fostered. | X | X | X | X | X | X | X | |
| | Teachers can devote some of the time previously used to assess relevance/coherence of syntheses to higher-level tasks (e.g., scaffolding, tutoring). | X | X | X | X | X | | | |
| Formal Learning Support System – Course Editing Service (WP6.1) | Learners can find relevant learning materials in more effective way. | | X | X | X | X | X | X | |
| | Tutors can prepare faster their learning materials – lectures, tests, additional reading materials, etc. | | X | X | X | X | | | |
| | Learners can understand the topics of learning via connection between learning materials, ontologies and other stakeholders’ comments | | X | X | X | X | X | X | |
| Informal Learning Support Service to Locate Content and Peers (WP6.2) | Learners save time during the learning curve, because the service assists the learner in locating appropriate materials | X | X | X | X | X | X | X | |
| | Learners save time because the service enables the learner to locate relevant peers which he can ask for help | X | X | X | X | X | X | X | |
| | Learners improve their understanding of a topic during the search process, since they acquire knowledge on a domain on the basis | | X | X | | X | X | X | |

| LTfLL project outcome (service) | Motivation for exploitation (key benefits) | Target user groups | | | | | | | |
|---------------------------------|--|--------------------|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H |
| | of the ontology fragment. To get a quick impression on a topic, the service also includes definitions for the search topics | | | | | | | | |
| | The quality of learning improves, since the documents retrieved are coming from trusted users (i.e. users in the network of the tutor) | X | X | X | X | X | X | X | |