

# The Language Technologies for Lifelong Learning Project

Adriana J. Berlanga<sup>1</sup>, Peter van Rosmalen<sup>1</sup>, Stefan Trausan-Matu<sup>2</sup>,  
Paola Monachesi<sup>3</sup>, Gaston Burek<sup>4</sup>

<sup>1</sup>*Centre for Learning Sciences and Technologies (CELSTEC), Open University the Netherlands  
adriana.berlanga@ou.nl; peter.vanrosmalen@ou.nl*

<sup>2</sup>*Politehnica University of Bucharest, Rumania  
stefan.trausan@cs.pub.ro*

<sup>3</sup>*University of Utrecht, The Netherlands  
paola.monachesi@phil.uu.nl*

<sup>4</sup>*Eberhard Karls Universität Tübingen, Germany  
gaston.burek@googlemail.com*

## Abstract

*This poster presents an ongoing European project: Language Technologies for Lifelong Learning (LTfLL). The aim of the project is to create a next-generation of support and advice services to enhance individual and collaborative building of competences and knowledge creation in educational and organizational settings. The project makes extensive use of Language Technologies and cognitive models in the services to face a number of learning specific problems.*

## 1. Introduction

Van Rosmalen et al., [1] reported that stakeholders in lifelong learning identify four types of key student support activities that, at the same time, easily lead to staff work overload: assessment of student contributions, answering questions of students, monitoring and assessment of study progress, and community and group support.

The availability of this kind of support is crucial for effective task performance. Current e-learning and personal development environments, however, provide too little effective support to the users in their various tasks.

To tackle this issue, the Language Technologies for Lifelong Learning (LTfLL) project, which is funded by the European Commission under the 7<sup>th</sup> Framework Programme (IST-2007- 212578), fully concentrates on offering the learners a set of next-generation support services that can run (semi-) automatically and thus require no or only limited tutor-based support. The project makes extensive use of Language Technologies and cognitive models in the services.

The research in the project is organized in 3 themes, each leading to particular services and infrastructures:

In **theme 1** services are developed to establish the current position of the learner in a domain. Services will offer semi-automatic analysis and comparison of learner portfolios to the domain knowledge and continuous modelling and measurement of conceptual development.

In **theme 2** support and feedback services are developed based on analysis of the interactions of students in chats and discussion forums –using Natural Language Processing (NLP) and Social Network Analysis (SNA)–, as well as textual output of students (e.g. summaries) –using Latent Semantic Analysis.

In **theme 3** a knowledge sharing infrastructure is constructed that allows comparison and sharing of private knowledge towards new common knowledge and social learning. Ontologies for formal domain representation are combined with social tagging.

The research activities are enveloped by activities that ensure common ground in use cases and pedagogically sound scenarios that steer the design and development of the services and guide the validation; a technical infrastructure for the creation and integration of the services and a validation structure that ensures rigorous evaluation in realistic settings, with several languages supported: English, Romanian, Bulgarian, French, German and Dutch.

The services are expected to result in improved appreciation of learner requirements, leading to better recommendations on study plans and resources. Progress monitoring based on learning activities, rather than on formal assessments, will improve recommendations for further competence building and improved co-construction of knowledge in social and informal learning.

The work of LTfLL has been designed around three different activity clusters which together integrate the activities of the partners:

- 1) Management and RTD Activities
- 2) Valorisation and sustainability activities
- 3) Two types of S/T activities:
  - Integration activities
  - Language activities

## 2. Language Activities

Language activities, which are in line with the three themes mentioned earlier, are conducted to design, develop and validate the following services:

**Positioning the learner services**, which include:

- 1) To determine in a (semi-)automatic way learner's prior knowledge –by analyzing her ePortfolio and the domain of study– to recommend learning materials or courses to follow.
- 2) To provide formative feedback with regard to the learner's profile in the domain of study and recommend remedial actions to overcome conceptual gaps.

In the first phase of the project, an exploration on how Language Technologies can be used to develop these two services has been done. Also a plan to extend existing tools for ePortfolio analysis and an evaluation of existing tools to diagnose conceptual development has been conducted. Initial experiments to evaluate the tools have been performed, and the pilot scenarios that will be tested in the next cycle of the project have been depicted. A detail description of the work done so far can be found in [2].

**Learner support and feedback services**, which include:

- 1) To offer recommendations based on an analysis of interactions in collaborative learning using chats and discussion forums.
- 2) To offer recommendations based on the analysis of textual outputs by the learner.

To this end, a service that analyzes the content of the discussions of learners in chats and forums, as well as the summaries they produced has been designed, and a prototype has been implemented. The service generates proposals for grades, assessments of the covering of the learning topics, of the degree of involvement and graphical representations of the discussions (utterances are nodes and the arcs are links among them, e.g. co-references or adjacency pairs). A wide range of Natural Language Processing techniques are used, from lexical chains and co-references identification, discourse analysis and Latent Semantic Analysis. In addition to the cognitive approach, social

network analysis is used for calculating various measures of the participation degrees of the learners. For a detail description see [3].

### **Supporting social and informal learning services:**

To facilitate learners and tutors the access of formal and informal knowledge sources (i.e., YouTube, Flickr, delicious) in the context of a learning task. This includes:

- 1) To provide recommendations on the basis of the learner's profile, interests, preferences, network and learning task. This requires implementing a Common Semantic Framework (i.e. an ontology).
- 2) To provide a list of search results prioritized and categorized according to the conditions specified by the learner, and the opinions of the learner's trusted network of contacts.

In the first phase of the project, preliminary design choices have been made with respect to the realization of the Common Semantic Framework. The research has focused on finding how informal material, tagging and communities of learners will be related to the formal learning material that has been structured by means of an ontology. Preliminary experiments have been carried out to this end and have been summarized in [4].

For more information see: <http://www.ltfl-project.org>

## 3. References

- [1] P. Van Rosmalen, P. Sloep, L. Kester, F. Brouns, M. De Croock, K. Pannekeet, and R. Koper, "A learner support model based on peer tutor selection", *Journal of Computer Assisted Learning*, vol. 24, pp. 74-86, 2008.
- [2] G. Burek, A. J. Berlanga, M. Kalz, I. Braidman, A. Smithies, F. Wild, P. Osenova, K. Simov, B. Hoisl, L. Lemnitzer, S. Stoyanov, P. van Rosmalen, J. Hensgens, M. Regan, J. van Bruggen, and G. Armitt, "LTfLL Deliverable 4.1: Positioning Design", 2009. <http://dspace.ou.nl/handle/1820/1761>.
- [3] S. Trausan-Matu, P. Dessus, B. Lemaire, S. Mandin, E. Villiot-Leclercq, T. Rebedea, C. Chiru, D. Mihaila, A. Gartner, and V. Zampa, "LTfLL Deliverable 5.1: Writing support and feedback design", 2008. <http://dspace.ou.nl/handle/1820/1700>.
- [4] P. Monachesi, E. Mossel, V. Posea, K. Simov, P. Osenova, A. Tincheva, and L. Laskova, "LTfLL Deliverable 6.1: Social and informal learning support design", 2008. <http://dspace.ou.nl/handle/1820/1701>.