InnovativeTeacher – Enhanced IT Skills in Education

Cristina Vertan, Walther v. Hahn

Natural Language Systems Division,University of Hamburg
Vogt-Kölln Strasse 30, 22527 Hamburg, Germany
Email: `{vertan,vhahn}@informatik.uni-hamburg.de`
phone: +4940428832519 *fax*: +4940428832515

Abstract

In this paper we will describe the main criteria for the methodology handbook, the organisation of the repository and as well as the integration of the repository in Moodle eLearning platform as main communication basis for communication between teachers communities. We present also the results of a first teacher's training with the instruments developed in the project

1 Introduction

Among the aims and goals of the education in the secondary school in Europe a central role is played by the acquirement of a variety of skills related to ICT. At least three groups of ICT-skills have been identified. The first group consists of the basic ICT-skills. Pupils must have basic proficiency in file management systems, operating systems, office applications, and exploitation of web resources. In some European countries these skills are officially taught up to the level of the European Computer Driving License (see also http://www.ecdl.com).

The second group of the required ICT-skills is course-related and is embedded in the subject matter. Examples of such skills are: solving quadratic equations in math, applying a mathematical ICT-program like Matlab or Mathematica. In geography pupils can use Geographical Information Systems, or demographic databases, or even Google Earth.

Modern education is increasingly based upon active and pupil centered learning. As a consequence of that active, independent learning style a special group of skills is becoming more and more important. These so called 'soft skills' are the abilities of pupils connected to the proper fulfilment of their active, independently executed learning tasks. The four skills that we regard as most important 'soft skills' are: information searching skills, presentation skills, team working skills, and project working skills. Nowadays these 'soft skills' are close related with ICT, and constitute third group of required ICT-skills.

The term "ICT-related subject/course" (or ICT subject/course) is used to address any subject/course that develops skills, competences and knowledge for applying ICT concepts and software applications (tools) for vocational purposes – either general or sector/profession-specific.

In response to the identified needs for skills and competences relevant to the knowledge-based economy and the independent life-long learning the ***I*Teach***[1] *(Innovative Teacher)* project has been launched in the autumn of 2005 with the goal of developing a set of practical methodologies, approaches and tools targeted at day-to-day use by teacher trainers and teachers.

The target groups of the project are:

• Teacher trainers in ICT from universities and teacher training institutions (pre-service and in-service)

• Teachers (both pre-service and in-service) in ICT-related subjects within vocational school settings, in specialised secondary schools (e.g. mathematical gymnasia), vocational training centres/organisations, or HRD-departments in the business enterprises

The project addresses the needs of the ICT teacher trainers and ICT vocational teachers for developing skills and competences needed to respond to the changing role of the teachers in the educational & training process, especially in view of the new learning demands in the context of knowledge-based economy and life-long learning.

The I*Teach project developed a set of practical methodologies, approaches and tools targeted at day-to-day utilization by teacher trainers and teachers, through following steps:

1. Identification of the most appropriate active learning methods that can be applied for effective and efficient acquisition of the enhanced ICT skills, identified by the preliminary study conducted by FMI and by the European Commission's working groups on teacher education and on ICT in education.

2. Development of a teacher trainers' and teachers' Methodological Handbook of practical methods and methodological tools for design, development, and use of

• learning activities,
• learning assignment,
• assessment & evaluation methods,
for supporting students in building enhanced ICT skills and competences

3. Test and Evaluation of the developed Handbook and associated tools and instruments through a cascade model of pilot trainings conducted with teacher trainers, pre-service and in-service teachers, and students. Main evaluation criteria are Handbook Methodologies' effectiveness, added value, sustainability and transferability.

---

[1] The project (http://i-teach.fmi.uni-sofia.bg) addresses the forth call priority *"Continuous training of teachers and trainers"* in the Leonardo da Vinci programme Call 2005-2006.

4. Design and development a sample curriculum for a series of teacher training courses aimed at adoption of the methodology and acquisition of competences by the teachers to teach the identified enhanced ICT skills with the help of the Teachers' Handbook.

5. Design and development of an online multilingual content repository (a web-integrated data base) with annotated resources (methodological and learning materials, developed by following the models in the Methodological Handbook) for teachers free access.

6. Creation of Virtual training centres with the tasks to:

• assist in building national ICT-teachers communities of practice to further exploit the project findings, produced methodologies and materials, and develop such materials
• support teachers' endeavours to implement and use on a daily basis the findings and products of the project
• maintain and help in the localisation of the developed materials within the online content repository train ICT-teachers (pre-service and in-service) and trainers on a continuous base.

In this paper we will describe the main criteria for the methodology handbook, the organisation of the repository and as well as the integration of the repository in Moodle eLearning platform as main communication basis for communication between teachers communities. We present also the results of a first teacher's training with the instruments developed in the project

2   Enhanced ICT-Skills

A wide audience of teacher trainers, pre-service and in-service teachers has been interviewed by a specially developed questionnaire, disseminated through an educational web-site [1], via e-mail and by direct contact. The analysis of the results evidentiated the existence of common needs throughout Europe, with regard to teaching and learning soft skills related to:

• information
• presentation
• working on a project
• working in a team .

INFORMATION SKILLS
Finding appropriate information has always been a necessary skill, not only for pupils and students but for everybody, both in his professional and in his personal life. Using a phone book and a dictionary are the first steps. Encyclopaedias and railway timetables require a little more skills. And finding information in a library with proper use of catalogues and secondary sources, or in archives call on even more sophisticated skills. With the rapid development of Web communication the modalities for finding information have changed dramatically.

Almost all traditional information providers have made at least partially their resources digitally accessible. Libraries, archives, newspapers, and magazines all over the world can be visited electronically. Appropriate search engines have been developed. Where the traditional ways of information search used

secondary and ternary resources, based on human made annotations, the search engines nowadays can address the contents of a resource directly. Traditional information search was text based, even if the required information was, for instance, an audio fragment from a broadcasting museum. Digital information can contain a variety of media, and search engines can address those media directly.

The Information skills are defined as: "The ability to collect and process the appropriate information properly, in order to reach a preset goal".

The following sub-skills have been identified as necessary for building Information skills: ability to determine the information problem, ability to determine the relevance of the various information sources, ability to search systematically by application of relevant searching techniques, ability to localize and acquire the found information, ability to evaluate the found information and (if necessary) to readjust the search, ability to process the found information effectively, in order to reach the preset goal, ability to use the found information ethically and legally.

WORKING-ON-A-PROJECT SKILLS

The following *sub-skills* have been identified as necessary *for building skills for working on a project:* ability to identify tasks and subtasks, ability to make a planning, ability to divide tasks, ability to communicate internally, ability to communicate externally, ability to keep track of the progress, ability to integrate results, ability to use the proper tools properly.

WORKING-IN-A-TEAM SKILLS

The following sub-skills have been identified as necessary for building skills for working in a team: ability to communicate internally, ability to communicate externally, ability to give feedback, ability to receive feedback, ability to resolve conflicts, ability to support the team loyally, ability to take responsibility.

The communication includes written and oral communication, face-to-face and virtual communication, intercultural communication, reports and short notes.

PRESENTATION SKILLS

Presentation skills deal with "The ability to present information.". The following sub-skills have been identified as necessary for building Presentation skill: ability to order and select information, language proficiency, ability to build up a presentation, ability to design a presentation, ability to account for information, ability to use the proper tool properly. Three sub-domains have been identified with specifics of the presentation skills.

Written presentation: ability to order and select information, command of the language, ability to build up a report, ability to lay-out a report, ability to make correct references and citations, ability to use a word-processor properly.

Oral presentation: ability to order and select information, fluency in the language, ability to build up an oral presentation, ability to design an oral presentation, ability to make correct references and citations, ability to use a presentation tool properly.

Web presentation: ability to order and select information, command of the language, ability to build up an web presentation, ability to design a hyper structure, ability to make correct references, citations, and links, ability to use a web publishing tool properly, ability to select and use multi media.

3 The I*Teach Methodology

The methodology proposed in the current paper is based on project and problem based learning methods. It builds ICT-enhanced skills through continuous, repeatable and gradually accumulated experiences and expanded activities leading to concrete goals by performing specific tasks in different context. The goals expected to work on some core skills and to be a challenge for the students and inspired from real situations. Educational scenarios have been chosen as a methodological framework.

SCENARIOS
The scenario is a composition of tasks in the context of an active learning environment leading the students to a general goal (producing a specific product) via a path (working/learning process) traced by milestones (intermediate objectives/ stages of the product development).

At each milestone pupils are expected to have finished a concrete stage of the product development and mastered a concrete skill. By passing along the set of milestones the students/pupils would build up a set of ICT-Enhanced Skills naturally interweaved with predetermined teaching objectives. Each stage/phase could be completed by completing a task or a list of tasks. Certain fragments (phases and tasks) are given in variants so that the teacher could provide their students/pupils with a flexible choice.

TASKS
The task is a building element of a scenario. Performing concrete task student/pupil will work on concrete skill(s) or sub-skill(s). Describing the scenario as composition of tasks ensuring reusability in different contexts. A task is consequence of activities with concrete outcomes. Depending on age and experience of student/pupils:

- in case of work with smaller or less experienced pupils list of tasks could be spited in more activities (more detailed description of path which pupil should go).
- in case methodology is applied in class with bigger or more experienced pupils tasks could be in more activities (more detailed description of path which pupil should go).

3.1 Example of a scenario

We illustrate the above mentioned principles through a scenario designed and used during a teacher training session which took place in November 2006 at the university of Hamburg. Training sessions with teachers are part of the working plan of the project and aim at dissemination of the project results and introducing the methodology in schools. The domain of the scenario is computer science,

The main aim of the scenario is to familiarise students with the capabilities and limitations of human-machine communication through natural language dialogue. This is an on-going research topic and a

typical example of a subject which although included only in university curricula can be simplified in such a way that it is available for pupils.

At the beginning the students are required to test existing demos and recognize the difficulties of already implemented systems. Throughout following Information skills are trained:

- Recognizing an existent problem
- Information search
- Evaluation of found information

The scenario is divided in 6 tasks:

- Task1: Modelling of a simple dialogue by means of a finite state automata
- Task 2: Experiments with an existing dialogues system and analysis of corresponding files
- Task 3: Design of dialog-flow for the own system
- Task 4: Implementation of own dialogue
- Task 5: Evaluation and testing
- Task 6: Presentation of the system

This is an interesting example of scenario – pipeline. For task 1 the teacher can make use of (and point out to)of another scenario, namely the scenario regarding augmented transition networks. In table 1 we present a such scenario template (in German language)

Titel*: Augmented Transition Networks (ATNs) für deutsche Uhrzeitangaben		
Autor(en)*: Prof. Dr. Walther v.Hahn Dr. Christina Vertan	Land/Länder*: Deutschland	Sprache(n)*: Deutsch
Beschreibung (300-400 Zeichen)*: Dieser erste klassische Ansatz zur Syntaxanalyse natürlicher Sprachen ist direkt aus der Automatentheorie abgeleitet. ATNs sind Zustands- und Übergangsgraphen mit Subgraphen, die durch Tests und Aktionen angereichert sind. An einer Reihe von komplexen Nominalphrasen und einbettenden Aussagesätzen sollen die Arbeitsweise und die Grenzen des ATN-Konzepts vermittelt werden. Die Ergebnisse sollen in einer einfachen e-Learning Seite mit Ablaufsimulation vermittelt werden.		
Alter*: ab 16 Jahren	Dauer*: 10 Stunden	Fachgebiet(e)*: Informatik/ Linguistik
erweiterte ICT-Fähigkeit(en)*: Fähigkeit zum Erkennen eines Informationsproblems Fähigkeit Information effektiv durchzuarbeiten in Hinblick auf ein Ziel Fähigkeit, Lösungen zu integrieren Fähigkeit zur internen Kommunikation Fähigkeit, eine Hyperstruktur aufzubauen		
Lernmethode(n)*: Beispielbasiertes Lernen		

Lernziele: Kennen lernen einfacher Parsing-Methoden, Kennen lernen komplexer Strukturen der deutschen Sprache, Anwendung der Automatentheorie
notwendiges Vorwissen/Können: Grammatische Kategorien im Deutschen, Grundlagen der Automatentheorie, Kenntnisse in HTML
Arbeitsergebnis(se)/Produkt(e): Web-Präsentation einer ATN-Analyse

Ablauf:
Task 1: Möglichst vollständige Sammlung aller Ausdrucksvarianten für Zeitangaben
  Meilenstein 1: Korpus erstellt
Task 2: Formulierung des Matrixsatz-Netzes
  Meilenstein 2: Netz für typische einbettende Sätze fertig
Task 3: Formulierung des Zeitangaben-Netzes
  Meilenstein 3: Netz für Zeitangaben fertig
Task 4: Zusammenstellung der Tests und Aktionen
Task 5: Varianten der Verbindung der Netze
  Meilenstein 4: ATN für Sätze, die Zeitangaben enthalten, fertig
Task 6: Abfassen eines e-Learning-Moduls in HTML - Textueller Teil
Task 7: Abfassen eines e-Learning-Moduls in HTML - Analyseabläufe
  Meilenstein 5: e-Learningmodul fertig

benötigte Hard- und Software: PC,
Arbeitsmaterialien: Sprachlich etwas vereinfachter Übersichtstext über ATN in Englisch
Schülerbeurteilung: anhand der HTML-Präsentation

Table 1.: Example of scenario template

4   Web-based tools for Scenario management

The methodology presented in the previous sections can be successfully implemented only if a communication platform is offered to the teachers in which they can share experience related with scenario development. Therefore a repository and a virtual training center are under development[2] in the frame of the project.

The on-line repository has 2 functions:

- Collection of a large set of scenarios and related tasks in various languages and domains

- Development of new scenarios following a given template.

---

[2] Expected to be completed in September 2007

The scenarios are annotated with metadata (title, author, language, domain) encoded in XML-Format. They allow the implementation of an extended search engine, so that a user can concentrate only on scenarios in the language and domain he knows. New scenarios can be developed through a web-based form. Results are generated both in XML/HTML as well as PDF Format. An example of such scenario is presented in Figure 2. An off-line version of the tool for generating scenarios is under development.
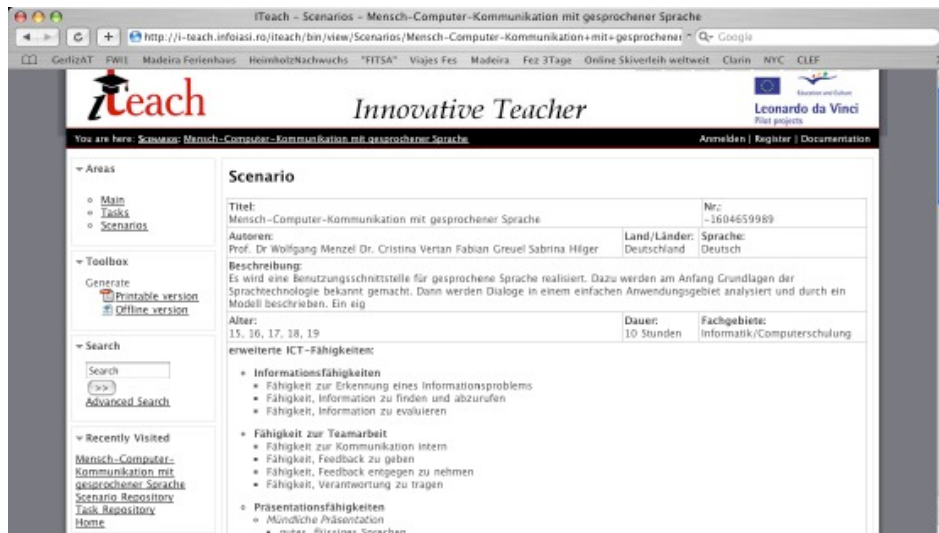

Figure 2 On-line Repository

The virtual training center (VTC) is developed in each country participating in the project. The VTC will play the role of a communication platform for teachers. The VTC is linked with the on-line repository for scenarios. As basic platform was chosen Moodle, an eLearning system which is free for academic use and largely accepted in the community. We are specifying fort he moment an interface allowing to link different teaching modules to Moodle.

5 Conclusions

In this paper we presented a new methodology for training of ICT-enhanced skills in secondary schools. The methodology can be used however also in the academic curricula. We described the skills which have to be trained and presented examples of scenarios which allow training of such skills. Web-based tools for scenario and tasks description are introduced. We are working now on the testing and evaluation of the web-based tools and the development of the on-line training centers.

6 References

1. Mariana Patru, Alexey Semenov, Leonid Pereverzev, Elena Bulin-Sokolova, Information and Communication Technologies in Schools. A Handbook for Teachers or How ICT Can Create New, Open Learning Environments, Unesco 2005
2. Rob Reynolds, Open Source Courseware – Evaluation and Rating, EdTechPost, 2003: http://www.edtechpost.ca/mt/archive/000049.html

3.   Blomqvist, U., Handberg, L., Naeve, A., "New Methods for focusing on Students Learning Process and Reflection in Higher Education". In Proceedings of the 28th IUT (Improving University Teaching) Conference. Växjö , Sweden, 2003.

4.   Brundage, D., Keane, R., and Mackneson, R. "Application of learning theory to the instruction of adults". In Thelma Barer-Stein and James A. Draper (Eds.), The craft of teaching adults (pp. 131-144). Toronto, Ontario: Culture Concepts. 1993.