Extending the Boundaries of Teacher Education with Co-didactics

Márta Turcsányi-Szabó, Zsuzsa Pluhár

Eötvös Loránd University, Informatics Methodology Group, 1117 Budapest, Pázmány Péter Sétány I.D. Hungary
Tel: + (36) 1 463 3525; Fax: + (36) 1 463 1648
turcsanyine@ludens.elte.hu  pluharzs@ludens.elte.hu

Erich Neuwirth

University of Vienna, Dept. of Statistics and Decision Support Systems Computer Supported Didactics Working Group A 1010, Universitaetsstr. 5/9 Vienna, Austria
Tel: + (43 1) 4277 38624; Fax: + (43 1) 4277 9386 erich.neuwirth@univie.ac.at

Abstract

Co-didactics is a bilateral project established between two teacher-training institutes in Austria and Hungary. The aim of the project is to inspire teacher-training activities in research and development of creative didactic tools that could be implemented in both cultural settings. Different authoring tools are used as Subject Oriented Microworld Extendible “S.O.M.E.” environments in which student teachers design and configure didactic tools. The benefits of including this extended scope in teacher training and its practical implementation are discussed.

Keywords

Educational software, teacher training, collaboration

1. Introduction

The Co-didactics project (Collaborative Research and Development on Computer Didactic Tools) has been established between TeaM Lab (at Eötvös Loránd University, Faculty of Science, Informatics Methodology Group), and CSD (at University of Vienna, Dept. of Statistics and Decision Support Systems, Computer Supported Didactics Working Group) starting 1st January 2001 and lasting for 2 years. Project leaders (Erich Neuwirth and Marta Turcsányi-Szabó) have been in close contact since more than five years and have taken all chances to meet at conferences and other scientific events to exchange views and experiences of Computer Didactics and how it is researched and implemented in their institutes and broader education. A long projected idea was to somehow collaborate in producing didactic tools and to connect teachers in their research and development work, for the benefit of both parties.

However, these meetings did not prove to be enough in really being able to join forces in research and development and connect some parts of teacher training activities to benefit both. It turned out to be necessary to get to know each other’s institute and teacher training in practice in order to be able to interconnect in this field. Additionally, to be able to produce deliverables, contacts on more levels than just the group leaders became extremely desirable. Both institutes have good reputation in the fields of Computer Didactics and are engaged in different specialities that could well supplement each other. The Austrian
partner is mostly involved with secondary teacher training and is especially professional in the field of mathematics and statistics. The Hungarian partner is mostly involved with implementations in primary school especially in the field of problem solving and developing thinking skills, though teachers are prepared to teach in secondary schools too. The exchange of lectures and workshops as well as the establishment of a common working areas would give rise to new evolving ideas in both institutes, fitting perfectly into the individual profile of each institute.

2. Rationale

Weak points in Hungarian setting:
- Teachers prepare to become informatics teachers in secondary school concentrating mainly on computer tools and programming methodologies.
  ⇒ We hope to give them more support in developing educational tools to facilitate the acquisition of subject knowledge throughout the basic education platform.
- Teachers are mainly concentrating on informatics itself as an end aim of their teaching processes.
  ⇒ We hope to raise their interest in multidisciplinary use of ICT in schools with the final aim being the improvement of subject knowledge and skills and raising awareness towards interdisciplinary topics.
- All schools are institutions with scarce budget.
  ⇒ We hope to give guidance to the use of available tools as authoring environments in developing educational microworlds.
- Teachers are not so open to the outside world, partly because of language problems.
  ⇒ We hope to give them motivation in communicating in foreign languages and/or through a common platform of ICT tools and authoring languages.

Weak points in Austrian setting:
- Teachers prepare to become informatics teachers with rather unclear concepts about the role and importance of computer science, informatics, and educational use of computer across many fields.
  ⇒ We hope to help them to understand some of the relations between the different consequences of IT in education.
- The university curriculum for teachers of informatics has been formally established less than a year ago, therefore the teacher education system within the university has to cope with a completely new subject.
  ⇒ We hope to be able to transfer some of the experiences of the Hungarian university where a similar curriculum has been established some years ago already.
- Student teacher have to have a second subject area, and in the case of the prospective computer science teachers this ranges from mathematics to foreign languages and physical education.
  ⇒ We hope to be able to use this diversity fruitfully by taking into account different approaches to IT and help our teacher students in developing their abilities to think across “subject area boundaries”.
- Similarly to Hungary, budget both in schools and in universities is very tight.
  ⇒ We hope to be able to develop example projects demonstrating productive use of easily (and cheaply) available software tools like authoring systems. Especially, we are able to test cross-cultural and cross language aspects of these tools.

Basic considerations for both institutes:
Both institutions are constantly looking for innovative tools and methods of effective learning.
  ⇒ We hope to share experiences and know-how in which we have gained locally and help the other partner in searching for ways to enhance own education by implementing usable ideas in the other culture.
  ⇒ We hope to learn more about efficient Web based technologies and methodologies in order to be able to upgrade our common project and wish to attain more effective results and a prolonged life span of our project that can be transferred to a broader scale.
3. Aims and scope of project

Aim of project:
The aim of the project is to inspire teacher-training activities in research and development of creative didactic tools that could be implemented, hopefully, in both cultural settings. A common working area would allow co-operation between students and production of Web-sites (in both languages) for the use of developed tools, that would motivate mutual exchange and communication between children from both countries. The results of the implementation would be evaluated. Another subsidiary, yet very deliberate aim is the engagement of both students and children with materials in both German and English language and the use of authoring tools for communication.

Outcome of project:
A rotary scheme would be implemented with research & development of didactic tools for the Internet and an implementation phase with evaluations. The process is repeated in the following year. The process is implemented within teacher training in a “shared classroom” scheme, which would provide collaboration between developer teachers and later children learning in the environment. This process is presumed to build closer ties between institutes and the learning communities and cultures.

Roles of participants:
- to conduct and co-ordinate undergraduate courses by opening up classes with the partner institute;
- to collect and share tools, resources and workspace during activities;
- to share ideas and added values of partner institutes;
- to give lectures and workshops at partner institutes;
- to provide research facilities for PhD students at partner institutes and evaluation of outcomes.
This would be done on both sides in co-operation.

Courses/activities involved:
- Undergraduate teacher training course involving the development of Internet based didactic tools.
- Implementation of didactic tools through Internet projects involving children.
- Evaluation of collaborative development activities is done by PhD students
- Evaluation of collaborative learning using developed tools through projects is done by PhD students.
(Semesters in Austria last from March till June and those in Hungary from February till May, so this gives a common period from March till May for co-operative work.)
Division of special roles would arise from the different specialities of the two institutes. Also the set-up of common working area for development activities would be the responsibility of the Austrian partner, whereas the development of children’s space for activities would be the responsibility of the Hungarian partner.

4. Projects to share

Hungarian local projects:
- Mentoring Logo activities (HÁLogo): Based on the teacher training material that has been developed for NETLogo project (NETLogo Pages), considerable extensions (Turcsányi-Szabó, M., 2001) have been made together with experiments in schools and tele-houses to collect evidence of the methods and tools needed for implementing activities in different settings and for different learners’ needs. The local classes in schools have been given by student teachers and supervised by schoolteachers, then in the next semester there was a turn is roles: the schoolteachers gave the class while student teachers supervised. Remote activities have been mentors by student teachers using the available telematic infrastructure of the tele-house centre and university, while helpers in the tele-houses have provided frame for the activities locally. A set of subject microworlds developed for this material have been integrated into the Creative Communications activities to motivate creative ideas, expressions and artistic works. While another set of subject microworlds were applied in school class activities to promote experimentation and learning. Evaluation and results have been concluded in the online material to be published soon.
While materials are being translated and extended to provide links with this project. Next semester this project shall proceed in a larger scale.

- **Creative Communications (KreaKom):** A complex project oriented material has been produced for tele-houses that integrates several subject knowledge and ICT skills to promote creative thinking and expression on an interdisciplinary platform including visual and literal arts as well as photography and Web design. A resource inventory has been developed to provide the learning of different ICT tools as well as meaning of the resulting work to be expressed, and recourses for methods and tools to develop creative pieces or art have been integrated into the (at present) 5 level project activities. A set of subject microworlds developed for HÁLogo material have been integrated and used as tools for experimentation and constructions. Evaluation and results shall be completed by the end of summer. While materials are being translated and extended to provide links with this project to involve an Austrian school to take part in common activities with Hungarian children, and next semester this project shall proceed in a larger scale.

**Austrian local projects:**

- **Minimalistic Multimedia (MiniMulti):** Developing a base of example projects on how to use ubiquitous tools (like spreadsheets and word processing software) to create didactically sound multimedia projects.

- **Data analysis with standard software tools (Stat4You):** Developing an introductory course about statistical methodology for secondary schools. The course is heavily based on spreadsheets as data analysis tools, and it is supposed to cover examples from many different curriculum areas. Using one of the most widely available software tools for statistics will help in integrating aspects of computer proficiency into “everyday school life”.

**Common projects:**

- **Logo as authoring tool:**

So far the Hungarian team has been using Comenius Logo (Blaho, A., et.al., 1996) as a tool for developing models and improving thinking skills of children as well as using it as an authoring tool to develop educational microworlds for subject learning by student teachers (Turcsányi-Szabó, M., 1998; Hungarian Comenius Logo Pages ). From next semester Imagine (Blaho, A., Kalas, I., 2000) shall be used for these purposes, which allows immediate publication on the Web. This will facilitate sharing of projects on a much higher level and provide an immediate contact with our affiliated schools for communication and experiments.

So far the Austrian counterpart is developing some computer science related microworlds for standard version of LOGO (especially for free MSWLogo). Recently, Netlogo (developed by Uri Wilensky and his team at Northwestern University, and available without cost, and not to be mistaken for the European NETlogo project) has been introduced to the teacher training computer science curriculum at the University of Vienna. A Web site making projects especially adapted for the Austrian secondary school curriculum will be made available.

- **Excel as authoring tool:**

The Austrian side is using Excel as an authoring tool for animated models for quite some time now (see SunSITE Austria for examples). These examples will be modified and adapted for use in Hungary. As part of the project we will also develop some guidelines to identify projects where spreadsheets might be a fitting authoring tool for learning environments, and identifying projects where some other tools (e.g. Logo) might be a better choice.

- **Robotics:**

In the past years the Hungarian team has involved student teachers in LEGO-LOGO activities and have developed good ties with the distributors of LEGO products. These activities have been mostly done in their show room, where schoolteachers could also attend and some demonstrations in schools and workshops have also been conducted. Meanwhile the Austrian counterpart has been involved with fischertechnik and very recently has developed or adapted the software tools necessary to control fischertechnik from Microsoft Office applications (especially Word and Excel) and from MSWLogo.
From next semester we have decided to work using Imagine in our activities, but keeping the robotic tools as previously used. Contacts to the Imagine group have been established, and there is agreement to develop the robotics tools for this software platform also. Generally speaking this subproject will tie robotics into many different software tools do demonstrate that the basic ideas of robotics (control of physical objects as opposed to software only virtual objects) can be learned and fruitfully applied in many different software environments. As a consequence, we will be able to develop recommendations on use of robotics in different contexts and environments.

- **Telematics:**
  It is our uttermost aim to improve our tools used for collaboration in this project so as to be able to transfer these experiences in our other teaching and learning processes on a larger scale. For this purpose, co-operative learning environments (e.g. BSCW) have been set up on a Web server hosted by the Austrian partner, and supported by Sun Microsystems.

**Underlying methodologies:**
The constantly increasing complexity and variety of educational software increases the burdens of the user for effectively utilising computers in the learning process. Features of Subject Oriented Microworld Extendible “S.O.M.E.” environments and their virtue in developing confidence in “learning by doing” subject explorations as well as designing and configuring subject oriented microworlds by students and/or teachers themselves are discussed in another paper submitted to Eurologo’2001 (Turcsányi-Szabó, M., 2001). Here Logo and Excel are considered as S.O.M.E. environment and the project aims to show and experiment on the extent of expanding these tools in collaborative development.

5. Activities done so far

- Both project leaders have given presentations at the Hungarian Academy of Sciences, about the basis of activities underlying the Co-didactics project. The conference was organised by the “Digital Pedagogy Subcommission” of the Pedagogic Commission of the Hungarian Academy of Sciences which held the annual reading session on 15th February, 2001. This also gave a chance for the Austrian project leader to get acquainted with the institute and the educational program of the Hungarian counterpart.
- In spring the Austrian counterpart has set up access on their BSCW server (BSCW) and both parties uploaded necessary materials for use and introduced students to the use of the common workspace. At the same time a Web page (Co-didactics Pages) is being set up by the Hungarian counterpart, which will continuously update the records and results of activities during the project.
- Zsuzsa Pluhár has visited the Austrian part for a few weeks, where she attended classes, demonstrated the educational microworlds done by the Hungarian party and gave workshops on LEGO activities. While taking part fully in the courses, a questionnaire has also been composed to evaluate the impressions and resulting change in the attitudes of student teachers. The questionnaire shall be evaluated by the end of June.
- A Netmeeting (class to class video conference) has taken place in June 2001. During this meeting, microworlds developed by the Hungarian student teachers were demonstrated and discussed for further improvements.

6. Results

Logo is a common topic in both institutes as a tool for developing thinking skills as well as an authoring tool for developing educational microworlds. In this respect, students understood fairly well what the microworlds developed in other languages and software tools tried to achieve for the learner. Our experiences support that students will be able to transfer these experiences into their own versions of Logo (or spreadsheets) and be able to create effective microworlds on their own.

Robotics is also a common topic handled in both institutes even though the Hungarian partner uses LEGO, while the Austrian partner uses fischertechnik as tool. The workshop handled building and programming of models used in everyday life (eg. Automatic door) and students were allowed to use any element they chose.
It was concluded that C-like programming languages included with the LEGO interface would be far too difficult for school children, while the graphic interface was too closed and did not allow development of procedures and facilitate creative modelling. Thus a Logo type of interface language was sought for. Building on these ideas, the Austrian partner has already developed interface software for controlling fischertechnik robots from MSWLogo (as already mentioned).

By these collaborative sessions we not just wish to extend student teachers thinking about ICT use in general education, but also hope to imply and investigate the role of the teacher in ICT immersed cultures.

7. Acknowledgements

It is necessary to mention here and also to thank the great efforts contributed by all students participating in the undergraduate C Block classes and Ph.D. classes of TeaM Lab in the years 1999/2000 and 2000/2001, where students took part in adjusting the final form of the HALogo and KreaKom material. Students also took part in activities and mentoring as well as the evaluation process, and developed educational microworlds for the present project. The extensive work of Andrea Pásztor, Éva Viktor, János Sziklai, Orsolya Ronacher, Roland Fazekas is to be thanked as well here for producing learning aids for distance learners in tele-houses and teaching and supporting the work of student teachers as mentors. It is necessary to amplify the role of József Windisch, who has preformed an extensive evaluation of the HALogo visual problem solving methodology; Andor Abonyi-Tóth, who was the technical director of the production of HALogo material, and Gábor Hollai, who was the technical director of the production of KreaKom material and have implemented the material to be used in this international project. Without them, these activities and results could not have been achieved and are making considerable contribution to the present Co-didactics project.

This publication has been produced in the frame of the Hungarian-Austrian intergovernmental science and technology co-operation programme, which is sponsored by the deputy state general of the Hungarian Ministry of Education and its counterpart the Bundesministerium für Auswärtige Angelegenheiten.

References

BSBW pages http://bscw.gmd.de
Co-didactics pages http://www.elte.hu/∼codidactics
Hungarian Comenius Logo Pages (in English too), http://www.elte.hu/∼comlogo
NETLogo Pages, http://www.netlogo.org (European NETLogo project)
NETlogo Pages http://cel.northwestern.edu/netlogo/ (Participatory programming environment)
SunSITE Austria Spreadsheet Pages http://sunsite.univie.ac.at/Spreadsite