

# Netpro: Tools for web-based project learning

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## Abstract

Le projet européen NetPro développe la pédagogie par projet sur Internet. Des modèles, outils et services ont été créés afin de faciliter la communication et la collaboration entre étudiants, et de gérer leurs travaux. Ces outils intègrent la gestion de communautés d'apprentissage issues de divers pays et gèrent des groupes issus d'institutions différentes. Cet environnement permet, ainsi, le partage et la coopération dans des activités pédagogiques, comme la relecture par des pairs et les discussions dirigées, malgré les différences d'organisation locale aux diverses institutions. La méthodologie et les outils Netpro sont validés à travers des cours pilotes dans les quels participent plusieurs partenaires. Cet article présente un aperçu de ces outils et des cours pilotes. Les résultats préliminaires de l'évaluation montrent les avantages de Netpro et les améliorations à y apporter.

**Mots clés :** pédagogie par projet, apprentissage coopératif, environnement web pour télé-formation, contenus pédagogiques par projet.

NetPro European project develops project-based learning through Internet. The project has created models, tools and services to facilitate communication and collaboration between distant students, and to manage access and control of project deliverables. NetPro project teams form cross-institutional learning communities. This new learning environment allows knowledge sharing and collaboration through various pedagogical activities, like peer reviewing, group discussions, regardless of how studies are organised locally. NetPro methodologies and tools are being validated through pilot courses: four streams of pilots have been run during the project life. The paper presents an overview of these tools and the pilot courses. Results of preliminary evaluation highlights strengths and weaknesses of NetPro, as expressed by students and teachers.

**Keywords:** collaborative learning, project-based learning, web learning environment, shared project learning content

## Introduction

The development of information and communication technology has led to the reorganisation of work methods and processes. Collaborative work in geographically distributed teams is increasingly being used. Moreover, life-long learning approaches are being favoured due to continuous changes in technology and their consequences

on the job market. The advent of e-learning has raised the hope for the development of advanced distant learning methods and infrastructures that make initial and vocational training flexible and more effective at lower costs. Major effort has been put on the development of web-based virtual learning environments and tools for education and training. However, most of these products and tools are based on simple and classical pedagogies. Their main functionalities are the management and distribution of learning materials, synchronous and asynchronous communication, and progress tracking and reporting (Collis, 1997). They do not support effectively innovative pedagogical approaches based on models of collaboration used in modern working life.

NetPro (Network Based Project Learning in Engineering Education) is a European project aiming to address this issue. Its objective is to develop methodologies and tools for supporting network based project learning within the engineering education and training. The approach adopted applies principles found in collaborative (Johnson & Johnson, 1996), constructivist (Korhonen and Välimäki, 1995) and self-directed learning paradigms (Knowles, 1990). No standardised, flexible and affordable tools exist to support student learning activities in this context. NetPro is creating Internet tools and services to facilitate communication and collaboration between distant students, and to manage access and control of project deliverables as well as electronic publishing. These tools simplify the management of project-based learning activities, saving time for staff and students.

## Project based Learning Approach

Project Based Learning (PBL) is a teaching/learning model that involves students in problem-solving tasks, allows students to actively build and manage their own learning, and results in students-built realistic deliverables. This approach is characterised by the following features: a project centred curriculum, largely autonomous students, authentic tasks, active learning, preponderant role of feedback, and development of generic skills. Projects are used as teaching/learning method. Students work on concrete, close to real world tasks and produce realistic products. The underlying principle is the assumption that learning occurs during these unstructured, complex activities. Ways of implementing and using PBL are diverse and multiple. They differ by the complexity of the

projects, their combination with classical lecture-based methods, the role of the teachers and students in planning these projects, and the group or individual approach etc... Teachers and students activities in PBL context are different from those in classical pedagogies. As a consequence, the implementation of PBL in an Internet based environment requires specific tool.

In Netpro, a project is considered as a course. Teachers define the objectives, content, activities, working method, tasks, deliverables and assessment strategy of the project. A project is divided into tasks, each task consisting of certain activities and resulting in creating deliverables. Learning materials, guidelines, and templates that help students to complete tasks are provided. Students are organised into groups; every group carry out a project. Pedagogical activities such as peer reviewing, group discussion, peer coaching and self/peer assessment can be set up by teachers to enhance the learning effectiveness of the project. Groups of students plan their work, complete the scheduled tasks, and produce deliverables. A deliverable can be any kind of document (e.g., engineering design, progress report...) or other products (e.g., software programme). These deliverables are shared with their peers locally or in an international learning community. Groups are asked to review work produced by their peers working on similar topics and provide feedback to authors. This activity is done based on guidelines created by teachers and result in filling-in peer-review questionnaires that depend on the nature of the deliverable and the topic. Discussion forums between reviewing and reviewer groups allow them to justify decisions and explain feedback. This allows students to develop a good judgement of quality and to learn from the errors and experience of their peers. Peer coaching is another activity being experimented. Senior students act as coaches for junior. They provide them with assistance and support during the project work.

### Netpro Tools

In order to implement the PBL approach described above, Netpro developed a set of tools targeted at the students and teachers. They allow teachers to manage project work and students to complete their project learning activities. These tools are organised in a database application accessible from the web. The application has two main parts: the project management tools and the reuse tools. The first set of tools is composed of teacher and student tools. The second is intended for archiving, exchanging, or reusing project materials. The following sections describe briefly each category of tools.

**Teacher tools:** allow teachers to create new projects, define deliverables, assign tasks to students, and set up pedagogical activities such as peer review.

**Student Tools :** allow students to visualise projects progress, view learning materials, upload/download deliverables, communicate with peers or teachers, collaborate with peers...

**Reuse Tools:** allow teachers to package a project for archiving or dissemination. They can also unfold a package for to reuse it with Netpro tools or to browse its contents. Packaging uses a standard metadata (IEEE-LOM) to describe the project course content.

### Pilot Course and Evaluation

Three pilot courses, run twice each, have been organised to validate the Netpro methods and tools. The topics of these courses were Electronic System Design, Software engineering, Multimedia Authoring and applications. Pilot partners shared materials and methodologies and developed common guidelines, templates, peer review forms and other required materials for their projects. Groups of students from distinct partner sites engaged in peer review and discussion activities. At the end of each pilot, evaluation questionnaires were filled-in by students and teachers. Results of this evaluation showed students and teachers satisfaction. Language, time management, and discussion problems were also pointed out.

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