

TRANSNATIONAL ONLINE PROJECT MANAGEMENT CURRICULUM MODEL FOR ENGINEERING STUDENTS

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Abstract

The EU Leonardo da Vinci project POOL - Project Organisation OnLine - aims to enhance current practices in project management by adding two new dimensions to the traditional project management approach. The first dimension is the distributed aspect, whilst the second is the transnational, intercultural perspective. For the students this involves not only acquiring certain technical skills but combining these abilities with non-technical knowledge, competencies such as intercultural awareness, presentation skills, online collaboration, project planning and time management knowledge as well as available tools.

In order to achieve the goal, the POOL project is composed of 10 institutions and industry partners from 7 European countries. The main outcome of the POOL project is a curriculum model which integrates the virtual and transnational elements. The development of this model is carried out through a process of refinement and adaptation of the curriculum in two phases: year one comprises a needs analysis and the development of the POOL curriculum model – year two comprises an evaluation of the draft curriculum model in a real-life student project in the field of telecommunications.

The project-based approach in POOL facilitates the practical application of the intended curriculum, to allow the students to develop their competencies in virtual project management tasks through “learning by doing” in a distributed collaborative learning environment.

Keywords: Curriculum development, virtual collaboration, competencies and learning outcomes, online project management, transnational projects

1. Introduction

The use of new technology in project management is nowadays a fact. Many companies and educational institutions have recently been using Information and Communication Technologies (ICT) tools with different purposes, in order to successfully carry out project in a variety of areas.

When introducing project management, everyone seems to be very clear about which are the competencies that every member should have. It is relatively easy to identify the needs in terms of knowledge; that is, listing a set of requirements which could be considered to be positive when selecting a candidate for a certain job in a company. To be able to work in such projects using traditional management, some competencies that might be required, could be either the use of ICT, proficiency in a certain language, knowledge in managerial issues, etc. However, what would change in project management if the team members couldn't work in the same workplace and moreover working from their respective countries, with different cultures? POOL project gives answers to these questions with concrete solutions through the development of a model of curriculum.

2. Project Organisation Online

The POOL project

The POOL project [1] is a Leonardo da Vinci project that comprises 10 partners – 7 universities, 2 SMEs and a Chamber of Commerce - from 7 countries:

- Austria (Fachhochschule Salzburg GmbH, Badegruber & Partner GmbH, 3S)
- Finland (Kemi-Tornio Polytechnic)
- Romania (Technical University of Cluj-Napoca)
- Spain (University of Alicante)
- Estonia (Tallinn University of Technology)
- Ireland (Galway-Mayo Institute of Technology)
- Lithuania (Kaunas College).

This set-up of the project will guarantee a valid academic and practice-oriented input so that the resulting curriculum model will be beneficial for the students as more highly qualified future employees thus increasing the competence and competitiveness of companies operating in transnational and distributed project settings.

Each partner institution leads at least one of the 11 work packages (WP) in which the project has been divided, as well as assisting in other WPs.

Aims and outcomes

The main aim of POOL project is, from a general point of view, to provide a curriculum model for integrating practical project work and distance education. On an intercultural level the goal is to best prepare students to work in multi-skills and multinational teams in a distributed setting. Another priority is agree on a set of quality criteria for online project management training in university-level education based on current industry practices, as well as evaluate the curriculum development process through the active involvement

and dialogue between university-students-industry; and finally enhance awareness of the sensitive issues involved in online project collaboration.

Two will be the products resulting of the work in POOL project. The main outcome is a model of curriculum, which will be very useful for those trainers implementing it. In terms of usability, the model has been designed so that it can be directly put into practice; that is, all general aspects of online project management obtained from the research activity can be easily integrated in the form of a concrete training plan. On the other hand, it is expected that the range of applicability of the model is wide enough to cope with any of the existing educational areas (technical, social, economic, etc.) The second outcome of POOL is a handbook, which will support the trainers working in the field of curriculum design. Apart from collecting the experience during the project - in research, evaluation activities and testing of the model-, it will be presented as a guideline for curriculum developers who would like to start building a curriculum following the same approach as in POOL. It will be a valuable reference containing all the key aspects of online project management and the processes required in order to build a model of curriculum that truly integrates them. Although these are two documents that complement each other very well, the intention is that they can also be consulted independently.

The innovative approach in POOL project

In this paper we would like to place particular emphasis on the innovative aspects of the POOL project with regard to curriculum design, that is, the working methodology used during the project. The original approach is not only present in the final product – a model of curriculum that integrates the distributed and transnational dimensions – but also the process of development and working methods within POOL are presented here as innovative and might be taken as a referent.

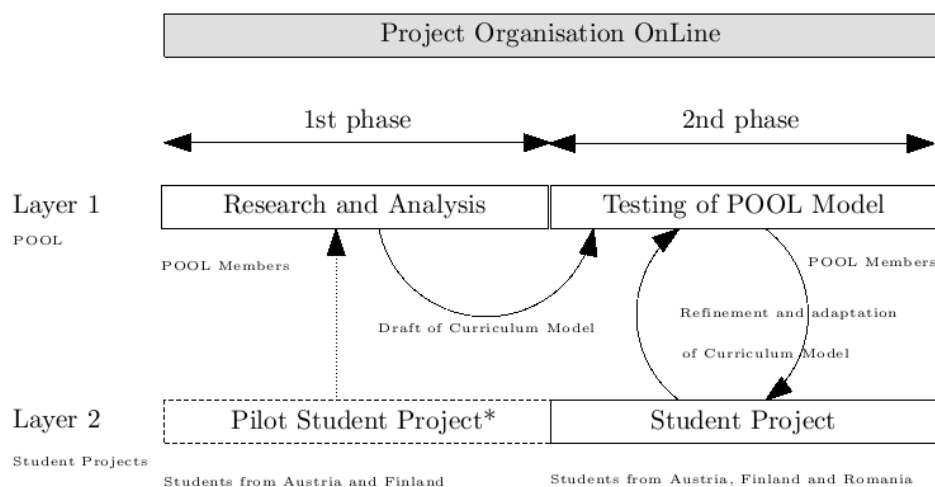


Figure 1. Process of development of the curriculum model in POOL

As it is shown in the figure above, the project was organized in two phases; each one comprising one year. In year 1, research on relevant competencies for OPM was made and a draft of the curriculum model was designed. At this stage, POOL project counted on a pilot student project which was useful to identify some critical factors of virtual collaboration in order to pave the way for the testing of the model [3] with a second student project in the next stage.

POOL project can also be conceived as a project in two layers. On a higher level, the process involves the POOL project itself that has been working during both phases on the creation of the model. The student projects are in a lower level. This real student project constitutes the centrepiece of POOL project in the sense that, it has been the reference for reflecting on all essential aspects when carrying out a project of this nature. Therefore, communication with the students has been a continuous source of feedback that has facilitated the process of refinement and adaptation of the model.

The definition of very concrete interfaces between them has been essential. This configuration entails a different working methodology between the different work packages, since more communication has been required and had to be reported, apart from the fact that some results depended on the experience within the student activity. If we also take into account that the different WPs work online in their respective countries, it may be deduced the need of a clear planning and definition of interfaces between the different working groups. The result of the work using this special composition of the team is a model that not only includes, but also integrates the distributed and intercultural elements in the curriculum.

3. Curriculum development: innovation of POOL

Two elements provide POOL with two new dimensions rarely considered in combination in project management: a distributed and transnational approach. Besides, POOL model includes another innovative element related to the competencies and materials required to carry out a project in a distributed and intercultural environment. POOL project aims to combine in the curriculum the technical skills with the soft skills. [4]

For that purpose, the selected telecommunications student project (in which the need of acquiring and developing non technical skills is more evident) is a good case study that clearly reflects what is expected of this combination of different kind of skills and knowledge. Since the extensibility of the model is another goal in the project, it is therefore important to mention that the different competencies defined in it, as well as the learning outcomes and the set of general activities suggested for online project management, provide the model with enough flexibility to be applied in other educational areas, for example, in the economic or social field, where it might be more necessary to develop competencies in ICT, rather than focusing on managerial skills. With the intention of not restricting the model to the technical field, the Virtual Collaboration module in POOL has been raised from a more abstract perspective, focusing on the study of the processes and roles [3] that have to be

defined among the students in order to successfully collaborate in a common project.

The following table shows an example of a training unit in the learning module “Virtual Collaboration”, with the list of learning outcomes and competencies:

Training Unit 2 Project management and group processes in virtual collaboration Groups, roles, roles in virtual collaboration, project management and virtual collaboration, processes and time.	
 Study (self/group)	(L1): Concepts: communication, ICT-supported communication, tools, collaboration, virtual collaboration, matrix for collaboration tools, levels of collaboration, projects, cooperative projects. (L2): teams, types of teams, team composition, roles,
 Report:	Synthesis of the study (5 pages/lecture) with target on needs for student project.
 Forum	Debate on 2 topics: a) How virtual collaboration may improve my projects?, b) What processes should I set up for proper virtual collaboration with my team members?
 Collaborative	Production of the synthesis report, forum discussions, local decisions on roles in the project: communicator, scientific, documentation. Online meeting.
 Experimenting	Testing various tools for virtual collaborations and give the impressions in forum.
 Demonstration	Demonstration of the various tools for virtual collaboration.
☒ Check List	Verify the state of accomplished educational activities. Make suggestions for improvement.
Learning Outcomes	
Knowledge on efficient communication and collaboration practices in virtual frameworks	
Develop best practices models for online collaborative projects	
Capacity to identify collaborative interactions in the virtual space.	
Appropriate definition of roles, responsibilities and tasks for team members in the context of virtual collaboration framework.	
Identify collaboration patterns : ability to generalize and think in a more abstract way.	
Be able to prepare a complete Collaboration Plan .	
Competencies	
Manage virtual collaboration processes .	
Facilitate virtual collaboration.	

Table 1. Training Unit 2 in Virtual Collaboration learning module

In the student project carried out during 8 months, it became evident the need of focusing more on producing a collaborative plan, that is, planning the project in terms of virtual collaboration, rather than concentrating on the usage of specific tools, which are skills that, in this particular case, the students of telecommunication engineering already have.

In relation to the educational modules developed in POOL project, each WP in the project was responsible for researching on a specific area of competency development. The figure below shows the different modules (and additionally the WP responsible for the online assessment):

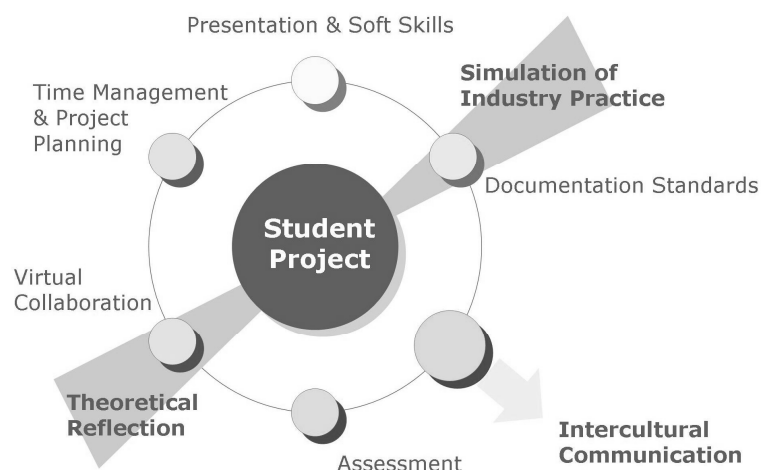


Figure 2. Learning Modules in POOL project

The following table shows some of the competencies defined [2] during the first phase of analysis for each training module in POOL. This set of skills tried to cover, as far as possible, all the competencies that should be present in the students collaborating in an online project:

Module	Competencies
Virtual Collaboration	Develop the project plan in a collaborative/distributed vision, maintaining professional and collegial relationships Knowledge and skills to understand the roles, to feel as part of the group, to apply different participatory processes, to demonstrate the team values and to show the capacity to collaborate for the implementation of the project plans agreed by all team members.
	Manage virtual collaboration processes Show abilities and proficiencies in mapping project planning into the virtual collaboration platform in order: to have full-control of project management, to be effective in project documentation and to solve possible technical problems using the community experiences.
Time Management & Project Planning	Adaptability to Different Work Attitudes PROJECT MANAGERS ... should understand differences in work attitudes and behaviours between team members and incorporate those in project planning. They should be able to provide an environment that integrates and allows a highest level of conformity to work attitudes of different kinds, both in terms of work and time commitments. TEAM MEMBERS ... should understand and consider other team members work attitudes in their own work and time management activities.
	Managing Project Complexity and Transparency PROJECT TEAMS ... should be able to always estimate and redefine the scope and effort of project activities (in work and time) in both initial project plans and continuous progress reports that comprehensively show transparency of all project proceedings and time correspondence to other team members.
Presentation & Soft Skills	Organisational / Presentation Skills Organising a presentation adequately and for the proper type of medium.
	Non- Verbal Communication The use of non-verbal communication strategies for presentations.
Documentation Standards	Correctly fulfilled formats Clearly and correctly fulfilled project documentation formats
	Project documentation is kept by rules Project documentation should be kept by (programme) rules and legislative framework
Intercultural Communication	Develop communicative awareness and recognize different linguistic conventions Knowledge about different communication codes and the awareness about different linguistic conventions is essential in order to be able to cope with problems in communication that result from non-native language skills by adapting to different levels of foreign language competence or by using meta-communicative strategies for clarification.
	Demonstrate tolerance for ambiguity The willingness and readiness to embrace and work with ambiguous situations and the ability to deal with them in a constructive way, is a core competence that allows members of transnational teams to resolve possible misunderstandings and prevent conflicting situations which might arise from different cultural standards, behaviours and attitudes.

Table 2. Examples of competencies defined for each learning module

One of the greatest challenges in POOL project was to guarantee the integration of each didactic module. The aim was that every student understood that all the contents presented were closely related; although occasionally these were given in different modules (the incorporation of joint training sessions played a decisive part here). After the training, the students were able to understand their project in a more abstract way, having a more general idea of what involves collaborating virtually and understanding the need of certain soft skills in IT projects.

Figure 3 shows pairs of modules which are more related and need more integration in POOL:

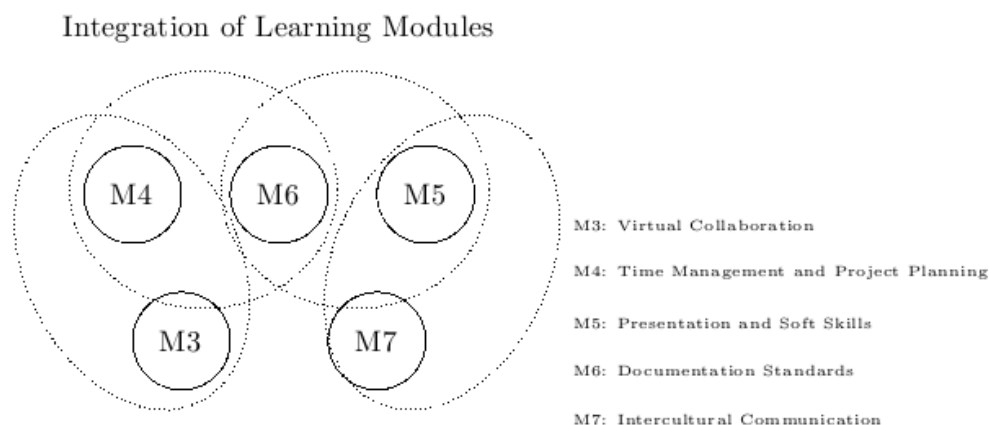


Figure 3. Integration of didactic modules

4. Testing the curriculum model: simulation in a real scenario

The centrepiece of POOL project is a real student project in the field of telecommunications engineering, in which 12 students from 3 countries – Austria, Finland and Romania – took part for several months. The different teams collaborated in the development of a temperature measurement system, which mainly involved programming mobile devices and embedded systems and designing a database.

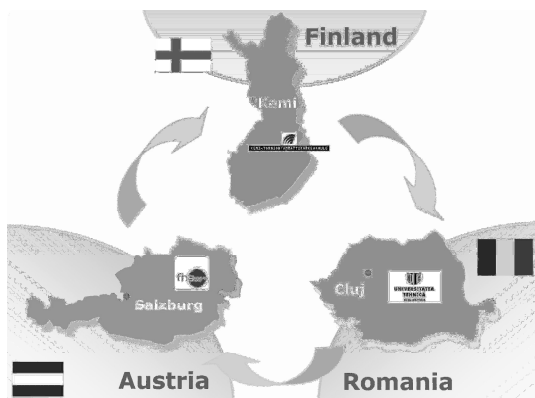


Figure 4. Student Project between Austria, Finland and Romania

The fact that the POOL project team (researchers and teachers) counted on a real student project, facilitated the simulation of a possible application of the designed curriculum model and the direct evaluation of several aspects of online project organisation. This telecommunication project became a reference for the researchers, which could put into practice through different training sessions, working as trainers, some of the training units proposed. A whole training plan was provided as an annex of the curriculum document by way of example of application.

The selection of the specific training units [5] to put into practice was done based on different criteria. First, the students were able to use directly the materials and the lessons given in each session in order to make progress in their work. Another aim was that, with the selected courses, all learning outcomes and competencies defined were respectively achieved and developed with success. Although the selection of training units being evaluated was made in an atomic way – only a few of them were extracted from the whole training plan – the trainers always tried to include in a certain manner concepts from the rest of the didactic outcomes defined in other courses.

Another great contribution to the model of curriculum was the joint sessions, in which different areas of competencies were put into practice together. The students could benefit from this configuration “learning by doing” from different training units that combined, providing the students with a more general view of what virtual collaboration is.

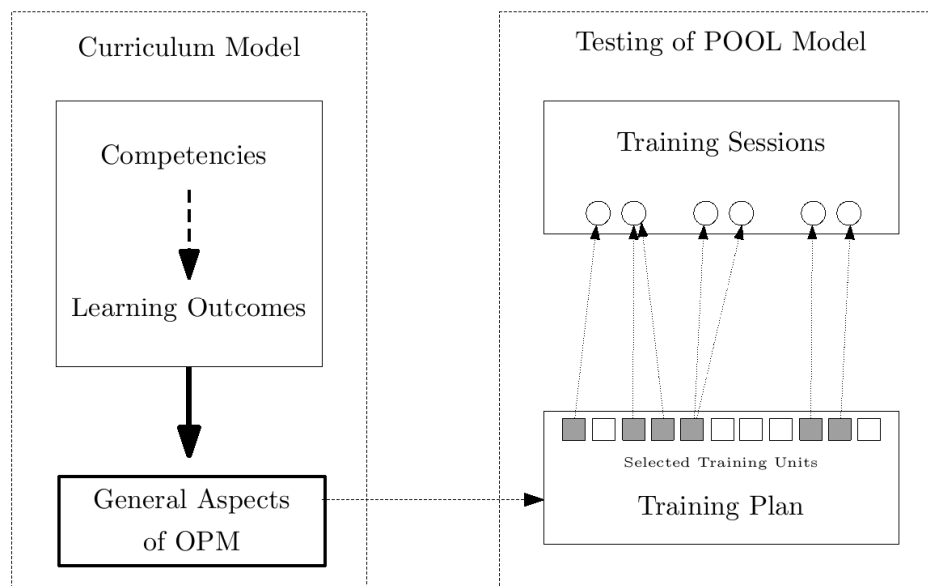


Figure 5. Selection of training units for evaluation

This way, the most relevant competencies were tested. The relevance analysis was the result of the work in each work package and was also based on the results obtained from the several questionnaires provided to companies around Europe that established relevance for them.

5. Conclusion

Constant communication with the students was the key to obtain the necessary feedback. The fact that POOL partially put into practice the model of curriculum, made easier to identify the real problems, like synchronization between modules. Therefore, the final version of the model will not only present the set of general aspects for Online Project Management with some examples of training activities, but POOL will also propose a model for synchronization, that is, some methods and advice about how to best locate the different units in each educational module.

Based also on the experience in the training and the student activity (presentations, meetings, discussions, etc.) we could verify that a good definition of processes and roles within the participants is essential. We realized that in most cases this was the focus of some other problems encountered when collaborating virtually. Carrying out online projects requires a good organisation of the group and success can only be achieved when team members are aware of this need.

6. Bibliographical references

- [1] *"POOL – Project Organisation OnLine"*, <http://www.pool.fh-salzburg.ac.at>
- [2] *"A multidimensional approach towards project management training in a distributed setting"*, G. Abermann, E. Benimeli Bofarull, P. Haber, EDEN 2005 Conference Proceedings.
- [3] *"Integrated curriculum for distributed, transnational project management training"*, E. Benimeli Bofarull, P. Haber, M. Mayr, G. Abermann, SEFI 2005 Conference Proceedings.
- [4] *"Establishing and interactive e-learning programm by using project based computer supported collaborative learning"*, E. Benimeli Bofarull, P. Haber, EDEN 2006 Conference Proceedings.
- [5] *"Modern curriculum design and knowledge transfer in a virtual collaborative environment"*, E. Herber, E. Benimeli Bofarull, P. Haber, SEFI 2006 Conference Proceedings.