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## **Learning social competence in virtual interdisciplinary multicultural team project: Example from an EU project of building bridges between practice, learning, research & innovation**

115 – Social Competence in Action: Research – Innovation – Values in Theorie und Praxis des Lehrens, Lernens und Forschens an Fachhochschulen / Inter- und transdisziplinäre Erkundungen im Dreieck Praxis-Lehre-Forschung

### **Abstract**

In today's globalized world and industry 4.0, flexibility in workplace and process oriented international virtual team work has become *sin qua non* for successful companies. Studies have shown that for the employability of students coming from engineering and technical colleges depend on their soft skills. However, these competencies are not usually addressed in engineering. In the diverse environment of the current labor markets, it is essential to promote teamwork and communication skills at an international level. The Multinational Undergraduate Teamwork Project was one of the projects which was funded by the EU as a pilot project to encourage the development of social competencies of the students coming from different disciplines. In the Multinational Undergraduate Teamwork course, students conduct a major project as members of an international team coming from different disciplines and different institutions. Except for the kick-off and final meeting, students work in a virtual team and atmosphere. Team members are geographically spread to ensure that the teams are heterogeneous and to promote international cooperation. It is argued that this paradigm can be applied to any project or internship course unit. The results from the pilot programs support the authors' initial hypothesis that this innovative paradigm significantly promotes the development of soft skills in students.

### **Keywords:**

Employability; soft skills; capstone project course; curriculum; intercultural competence; social competence

## Introduction

Technological and social developments in the last couple of years have caused significant changes in the way how people live and work. Internet, for example, has introduced a whole new variety of ways how people can collaborate in virtual teams across geographical and cultural borders (Odlyzko, 2003). The implication of technological progress has the potential to shape our environment significantly. Fraunhofer Institute, for example, has termed this as the “Working Environment 4.0” based on a forecast of 100 experts (Fraunhofer IAO, 2014). This scenario describes the work and living environment of office and knowledge workers in the year 2025. It shows that in the knowledge intensive society of today, the capacity to be efficient, innovative and creative at the same time is a crucial factor for success. Experts agree that the importance of these skills will increase due to the new era of industry 4.0 (Fraunhofer IAO, 2014). An increasing number of people are facing highly flexible and multi-local forms of work in their daily life. Synergetic demands of individuals and organizations support this development (Guichard, 2001; Crites 1974).

A segment which is particularly affected by rapid technological progress and growing requirements concerning constant self-development and flexibility are the students from the IT sector (Karsenti, 1999). In 2010, the Association for Computing Machinery and the Association for Information Systems presented a revised model curriculum for undergraduate degrees in information systems (ACM, 2010). This model identified leadership, collaboration and communication as the basic components of knowledge and skills required in information system graduates. Modern economies are highly dependent on technology, requiring engineers to excel in collaboration and communication skills in international settings (Wieman, 2008). However, these competencies are not usually addressed in engineering and information science courses. One of the basic problems is how to create an environment in universities and colleges offering technical courses which helps in the development of such skills.

The Multinational Undergraduate Teamwork Project (MUTW) is one such attempt to find a solution to the existing problem in technical and engineering institutions. Funded in the beginning as a pilot project by the EU, its main purpose is to test new pedagogical instruments to encourage the development of interdisciplinary and intercultural competencies of the students. In the Multinational Undergraduate Teamwork course, students conduct a major project as members of an international team coming from different technical, management and art disciplines and from different institutions and countries. Except for the kick-off and final meeting, students work in virtual teams and scrum environment. Team members are geographically spread to ensure that the teams are heterogeneous so as to promote international cooperation. The collaboration which lasts a full semester has the aim to develop and present a solution to a given problem. (Escudeiro & Escudeiro 2012). Beside the possibility of developing soft skills, the MUTW project is supposed to teach other competencies like, for example, applying the innovative scrum project management methodology (as in [MUTW project in 2015](#))

## Literature Review

It is of extreme importance to assist the teaching community and to provide strategies how learners can learn in an interactive virtual environment. These strategies should be more centered in the learners' projects and less in the transmission of contents, which refers to the valorization of the analysis and comprehension processes of the pedagogical methods and of students' learning processes (Simão, 2006). Based on the self-efficiency and results expectations, and on personal objectives, the authors of the career socio-cognitive theory have explained the influence of school and of the peer group in several aspects of the vocational development. They affirm that the peer group is a relevant source of information in building meaning around the roles given in shaping, evaluation, performance and merit,

contributing to the development of the individuals' vocational interests and values. The comfort models articulate the academic and professional objectives with the other life roles and tasks (Lent *et al*, 2004; Super and Sverko, 2005), as is the case of the role of the student in academic work teams.

The quality of the student's adjustment to higher education is strongly associated with the social support and with the resources made available by the peers simultaneously with the students' competencies to face the higher education challenges (Brooks and Dubois, 1995; Felner and Felner, 1989; Terenzini and Wight, 1996). In the last decades, the theoretical and empirical development around the social support have enabled the researchers to define, understand and detail the role of perception and social support as a strongly predictive factor of well-being (Antonucci and Israel, 1986; Cohen, 1988) and of individual adjustment (Cohen *et al*, 2000; Cutrona, 1986; Cutrona *et al*, 1994).

That is why MUTW projects concentrates on learning based on the team work assumption. The team research (Sharan and Sharan, 1992) assumes that the students are the ones to determine what they should learn and how to do it, considering the learning capabilities of each team member. According to the authors "the goal of this organization is to create conditions to allow students, in collaboration with their peers, to identify problems, plan together the procedures needed to understand and cope with these problems, collect the relevant information, and in cooperation (though not necessarily collectively) prepare a report of their work, usually in some creative and interesting way".

According to the literature review outlined above, it seems highly pertinent to foster the improvement of employability and communication skills of higher education students. It can be achieved with the help of a systematic and deliberate exploitation of teamwork in an international and intercultural environment.

## Hypothesis

Based on the above literature, it is hypothesized that the MUTW project results in visible improvement in communication skills (including intercultural communication skills), and the ability to work in virtual teams. Accordingly, the null hypothesis shows no impact of the MUTW project on the communication skills of the participants.

## Implementation of the MUTW project/Testing of Hypothesis:

The hypothesis was tested by collecting data obtained by quantitative and qualitative methodology and the interpretation of the data.

In MUTW project, cooperative learning paradigm is used as the basic concept. Cooperative learning is instruction that involves students working in teams to accomplish a common goal, under conditions which include the following elements (Tapscott and Williams, 2008, Escudeiro & Escudeiro 2012):

- 1) *Positive interdependence*: team members are obliged to rely on one another to achieve the goal. If any team member fails to do their part, everyone suffers the consequences;
- (2) *Individual accountability*: all students in a group are held accountable for doing their share of the work and for mastery of all the material to be learned;
- (3) *Face-to-face interaction*: although some of the group work may be distributed and carried out individually, some must be done interactively, with group members providing one another with feedback, challenging each other's conclusions and reasoning. Perhaps the most important part of the interaction is teaching and encouraging one another.

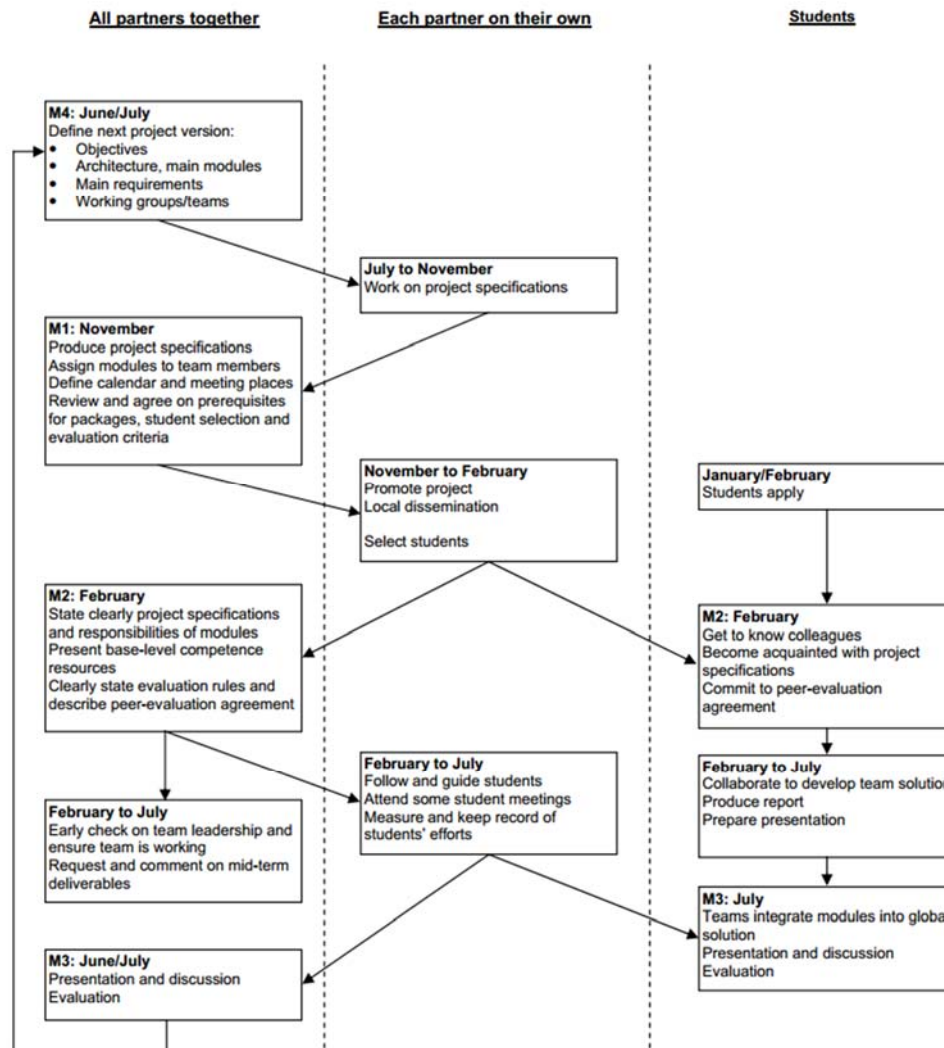
(4) *Appropriate use of collaborative skills:* students are encouraged to help each other which teaches them the practice of development of trust, leadership, decision-making, communication and conflict-management skills.

(5) *Group processing:* team members set group goals, periodically assess what they are doing well as a team and identify changes they will make to function more effectively in the future.

The MUTW methodology (Figure 1) is based on the creation and management of international teams of students who will collaborate, during a full semester, with the aim of developing and presenting a solution to a given engineering problem. For the pilot projects for analyzing the hypothesis, students from 11 HEIs (Higher Educational Institutions) in 9 different countries were organized into two teams: the Orange team, which had 12 students, two from each of six institutions; and the Blue team, with 10 students, two from each of the other five institutions. The specifications of the problem presented to students – its architecture, main building modules and interfaces – were first described in brief by the group of partner institutions. Only the general operational rules were initially provided: students were required to interact and cooperate during the project in order to become familiar with other rules and protocols. At the end of the project all modules had to be integrated and a fully operational system had to be presented.

Each team member was responsible for (a) developing a part of the whole solution; (b) justifying their technical options as an integrated part of the complete solution proposed by the team; and (c) collaborating with other team members to ensure that problems are solved within the agreed time and that all parts integrate to produce a unique solution. The team as a whole must produce a report and present the solution to the project jury.

*Multinational Undergraduate Teamwork and improving soft skills*



## Evaluation

Evaluating students and their progress throughout the semester and their final assessment were based on data collected from several sources, including a student feedback form, final grades and grading criteria, assessment questionnaires from the initial seminars on competencies and usage statistics derived from the groupware platform used.

The student feedback form is a questionnaire that students complete, together with a peer evaluation form, at the end of the MUTW course and immediately following their final presentation, while the jury is deliberating on their grades. The student feedback questionnaire contains both multiple choice and open questions (the latter so that students can offer narrative comments on MUTW). The peer evaluation form allows students to express their opinions on the commitment of their team mates and on the overall performance of their team. Grading of students in MUTW is done by an international jury and is based



on a set of criteria previously defined by the MUTW consortium. The grades achieved are, in part, a measure of the quality of the course and the extent to which students feel committed to it. This data is extremely important for the evaluation of the quality of MUTW as a course unit. Usage statistics provided by the online tools supporting communication among team members, the management of teams and the development of the final product were used mainly to confirm the commitment of the students to their teams. These statistical data served to confirm the perceptions obtained from students' supervisors as well as from the students themselves. The core data used in the current study came from the following sources: students' grades, peer evaluation and student feedback forms.

The data which was generated was then analyzed with the help of quantitative and qualitative methodology. Linear regression models were generated from feedback questionnaires and cluster analysis was done to test the quantitative data. For qualitative analysis, for open-ended questionnaires and content analysis based on Bardin's (2004) methodology was conducted. In this manner, following results were obtained in the first and second pilot study (2009-2010, 2010-2011):

(1) MUTW improved teamwork skills due to academic/learning outcomes of the MUTW, personal outcomes and benefits from individual skills of team members; and (2) MUTW improved communication skills in an international setting due to the academic learning outcomes of the MUTW. The main outcomes from cluster analysis highlight the following aspects:

- The overall evaluation by students of the project seems to be consistent and in agreement with the evaluation of specific aspects;
- Some students had particular problems with the project; however, that does not appear to have had an effect on either its overall or its partial evaluation;
- Of particular note were the support given by home institutions and the opportunity to benefit from an intercultural experience, both of which received positive feedback from all students;
- The groupware platform used by students to communicate during the semester seems to be perceived as a weak aspect of the project. The level of satisfaction with this variable is below the level of satisfaction expressed for other aspects of the project.

The subset of the questions asking students to rate their level of motivation and the level of their satisfaction with the project were analyzed in terms of academic, language, job and Europe. This data showed that the majority of the students exceeded or matched their expectations in all dimensions.

## Discussion of the results

Quantitative analysis of the results of the pilot project from 2009- 2011 has shown that this program has promoted soft skills without much change in the curriculum of the normal teaching (Escudeiro & Escudeiro 2012).

One of the basic assumptions of the MUTW project is the post- modernist concept that knowledge is created as a result of co-construction of meaning within a group. This is the *sin qua non* for sustainable learning as it is based on lived experience. (Schwandt, 1994; Guba & Lincoln, 1994; Philips, 1995). Since students coming from different educational, social and cultural backgrounds meet on a virtual platform, learning takes place as a process of creation of new knowledge, it confirms previous studies done in this area based on social constructivism (Spivey, 1997).

To conclude, this project shows not only how the process of learning takes place in a group, it also shows how cultural differences and multidisciplinary can foster erudition of formal and informal skills.

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