

DEVELOPING UNDERGRADUATE PROJECTS IN MULTINATIONAL TEAMS TO ENHANCE EMPLOYABILITY

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ABSTRACT

Our society is experiencing sudden changes in work organization in part due to the growing ease with which people can collaborate. Many successful cases of peer-to-peer models of organization arise and assume leading positions in world economy replacing, in many cases, the traditional hierarchical organization. People are evolving and interacting within heterogeneous teams composed by members from many different cultural groups and with distinct skills and backgrounds. Modern economy requires engineers to excel in collaborative and communication skills at an international setting. However, these competences are not usually addressed in most engineering curricula. We believe that in such a demanding and culturally diverse environment as the labour market is today, it is essential to promote team work and communication skills at an international and intercultural level. In the Multinational Undergraduate Team Work course, MUTW, students develop their capstone project as members of an international team while working at their home institutions. MUTW projects are to be developed by teams of final-year-undergraduate students from a multinational group of higher education institutions working to solve some engineering problem. Team members are geographically spread to assure heterogeneous teams and to promote international cooperation. This paradigm can be applied in any project/internship course unit. The results from the first edition are very encouraging supporting our initial hypothesis that MUTW significantly promotes students soft skills without requiring any change to prior degree curricula.

KEYWORDS

Employability, soft skills, capstone course unit, curriculum development.

INTRODUCTION

Recent results from the European Association for Education in Electrical and Information Engineering network [1] point out that students complain about a big gap between what they would like to know and what is taught at school related to the ability to work in an international context.

On the other hand, the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS) have recently revised a model curriculum for undergraduate degrees in Information Systems [2]. This model identifies leadership, collaboration and

communication as foundational knowledge and skills required from information systems graduates.

Modern economy is highly dependent on technology requiring engineers to excel in collaborative and communication skills in international settings [3]. However, these competences are not usually addressed in engineering curricula.

Students' motivation and enthusiasm is another fundamental aspect requiring our attention. There is a big gap between the environments where students perform schoolwork and other activities. General activities involving students outside the academy are much more engaging and immediately rewarding than academic tasks. This gap suddenly got bigger with the advent of the web and mass collaboration. This is probably one of the reasons lying behind students' lack of enthusiasm and motivation for schoolwork [4].

Our society is experiencing sudden changes in the way people and institutions produce and manage value. Many successful cases of peer-to-peer models of work organization arise and assume leading positions worldwide. Take the cases of Linux, Wikipedia, InnoCentive and the Human Genome Project, for instance [5].

People are developing and interacting within heterogeneous teams composed by members from a lot of different cultural groups and with distinct skills and backgrounds but these issues are not generally addressed by engineering curricula. We believe that in such a demanding and culturally diverse environment as the professional world is today, it is essential to promote team work and communication skills at an international and intercultural level.

Developing curricular activities involving students from different countries, collaborating to complete projects that generate relevant outputs to the community might improve students' enthusiasm as well as their teamwork and communication skills. The Multinational Undergraduate Team Work project (MUTW) (see <http://www.mutw.eu>) presents a proposal that might come to fill the existing lack in this area.

Our hypothesis is that MUTW promotes students soft skills and, as a consequence, their employability, without the need to change curricula, just by applying a more effective paradigm than the traditional project/internship model.

The MUTW project is devoted to the creation and management of international teams of students who will collaborate in order to develop a solution for a given engineering problem. MUTW courses are developed by a group of higher education institutions working as a team. Final-year-undergraduate students from the partner institutions are the target of our project. Under MUTW, these students are engaged in the development of a common project, each partner being responsible for only a part of the final product.

By the end of their graduation, engineering students have to develop some project within a generic project course unit; MUTW replaces that course unit for those students who decide to cope with the project.

Taking the above mentioned aspects into account, MUTW generally intends to prepare students for an emerging economy based on active (mass)collaboration while increasing their enthusiasm and motivation for schoolwork.

The main results from the first edition of the MUTW course point out the benefits of this innovative project course unit. Students recognize that team work skills are improved mainly due to the academic outcomes of MUTW. The innovative aspects of the MUTW project

execution as well as the chance to profit from an intercultural exchange of experiences both contribute to improve students' communication skills in an international environment.

In the rest of the paper we will review MUTW background then we will briefly describe the MUTW methodology. The results from the first edition of the MUTW course are presented just before the conclusions which will be provided in the last section of the paper.

BACKGROUND

The international guidelines for education expressed by Jacques Delors in his report to UNESCO (1996), enclose four pillars of education for the twenty-first century: learning to know, learning to do, learning to live together and learn to be. These embody important dimensions of formation of the person as an individual and citizen, and form a set of principles that, once accepted, may help to overcome traditional views of a purely instrumental education. The main objective of the Bologna Process proposals is to create a European area of mobility of teachers, students and to improve the employability of graduates. The first studies stressed that the so called knowledge society should be supported by their institutional and human resource whose quality levels should increase in a solid and progressive manner. Quality and efficiency are essential goals to the construction of a European area of education and training [6]. In Portugal, with more than 10 years after signing the Bologna Declaration, it is evident how the higher education institutions have sought to adapt to new requirements of this European Higher Education Area (EHEA). Providing training courses that are more than sets of disciplines and promoting academic experience scenarios in which students actively participate in the construction of their training, thus stimulating self-learning, has been perceived as necessary to achieve the high standards of the EHEA. The efforts of Higher Education Institutions (HEI) should be focused on setting and providing environments where students can learn in an active fashion.

Considering the vocational development as a continuous process occurring throughout life as well as the analysis of the adjustment process as a product of dynamic interactions between individuals and contexts, together with the consideration that the higher education objectives are fulfilled by the students' complete training, lead us to the need of taking into account the personal and contextual factors that may be behind the higher education career adjustment. Lent, Brown & Hackett [7] defend that the focus of the adjustment study should be put in the social conditions that shape the learning opportunities, which students are exposed to in interpersonal relationships (e.g., those of support and indifference), and in the results anticipated by the individuals according to their choices, involvement and persistence in certain activities.

The Bologna process has become a paradigm of the European higher education. It is undeniably the current engine propelling discussion about the European higher education. The Bologna process has polarised the debate and the search for solutions to problems that had been piling since the previous decade. Among these problems it is to be referred, for example, the maladjustments to the work demands in the knowledge society, the funding decrease, the strictness of the system suffering from lack of diversity and adjustment capability, lack of competitiveness, inefficiency of the relations with society, and scholar failure. The success of the EHEA depends on the students' effective mobility as well as on the quality generalisation of the training proposals at the European Union scale.

It is of extreme importance to think of strategies to support the teaching community that enable to question and to understand the learning and the pedagogical mediation problems. These strategies should be more centred in the learners' projects and less in the transmission of contents, which refers to the valorisation of the analysis and comprehension processes of the pedagogical methods and of students' learning processes (cf., for example,

[8]). 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 for the development of the individuals' vocational interests and values.

Several theories assume that the work satisfaction depends on the degree with which individuals understand that their work environment provides a favourable set of conditions (e.g., [9]) or a set of enforcing elements consistent with their working personal values (e.g., [10]).

The comfort models articulate the academic and professional objectives with the other life roles and tasks [7,11], as it's the case of the role of the student in academic work teams.

Brooks and Dubois [12], Felner and Felner [13], Terenzini and Wight [14], in the scope of the student's adjustment to higher education, defend that simultaneously with the students' competences to face the higher education challenges, the quality of the adjustment is strongly associated with the social supports and with the resources made available by the peers. In the last decades, the theoretical and empirical developments around the social support have enabled to define, understand and detail the role of perception and of the social support as a strongly predictive factor of well-being [15,16] and of individual adjustment [17,18,19]. The perception of the social support names the expectations that there will be a basis or support if we need one [20]. This has revealed to be a mediator factor of the impact of the troubling or adverse situations in the physical and emotional well-being [16].

Although we don't want to be too exhaustive, we believe to be relevant to state that the theoretical body on which MUTW is sustained include such diversified domains like elaborating the globalising models for studying groups' internal dynamic (e.g.,[21,22]), namely by analysing the value of peer interactions and the way these are processed in the different types of groups (e.g.,[23,24,25]) or by observing the mutual help processes (e.g.,[26,27,28,29]); studying their effects on different psychological variables (e.g.,[30,31,32,33]); using cooperative learning as a tool to reduce scholar conflicts (e.g., [34,35]) and to promote social inclusion (e.g., [36]); training the teaching and non-teaching staff for cooperative work and for the creation of schools as communities of individuals who learn by cooperating (e.g.,[37]).

In the scope of MUTW, our proposal is to lead the participating students to work based on the team work assumptions. The team research was proposed by [38]. The team research presupposes 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. As the authors refer, "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 relevant information, and cooperatively (though not necessarily collectively) prepare a report of their work, usually in some creative and interesting way" [38].

Schlossberg, Lynch and Chickering [39] point out the social resources in general and the social support perception in particular as facilitating elements of the individuals' social and personal adjustment, and defend that the students' vocational success depend a lot on the level of concern they perceive from the others and on the fact of being, both as student and person, valued and protected. Astin [40] also affirms that the larger the amount and the quality of the students' investment in the diverse experiences related to the academic life, without excluding the relational and social aspects, the more possibilities those students have of being successful in their education and professional life. This way, and according to these authors, it is advantageous for the student to believe that the others care about him,

value him and accept him, and at the same time that they are there to help him solving problems and overcome difficulties in case he needs. Cutrona and collaborators [41], in researches within the area of the social support evaluation in higher education context, identified the social support made facilitated by the peers as a predictive factor of the students' academic productivity, as regards their average grades, controlling the academic aptitudes and the conflicts between peers statistically [42]. On the other hand, in a study developed with higher education Portuguese students, Pinheiro and Ferreira [43], showed that perceiving the social support may be an important condition for the student's general well-being.

It is our belief, in accordance with the empirical literature and research of reference in the area, that the existence of satisfactory interpersonal relationships and the perception of a solid social support may be facilitating elements for the academic personal and social adjustment of the individuals in a specific context [39,41,44,45].

Therefore and in conclusion, the literature review here explained, allows us cite as relevant the purposes of our project. Of all our purposes, and according to the literature review outlined here, we conclude as being highly pertinent to foster the improvement of employability and communication skills of higher education students, through the systematic and deliberate monetization of teamwork.

MULTINATIONAL UNDERGRADUATE TEAM WORK

The MUTW methodology is devoted to create and manage international teams of students who will collaborate in order to develop an engineering problem. For the first editions of MUTW this was a software system. These teams are set up for a semester with the purpose of developing and presenting a solution to a given engineering problem. For the first editions, running during 2009/10 and 2010/11, students from 11 HEI from 9 different countries have been organized in two teams: the Orange team has twelve students, two from each of six institutions, and the Blue team has ten students, two from each of the other five institutions.

The problem specifications, its architecture, its main building modules and interfaces will be briefly described by the consortium – at this stage, only the central rules are provided; students have to interact and cooperate during the semester in order to agree on the other necessary specifications. At the end of the project all modules must be integrated and the fully operational system, a unique product, will be presented by the students as a team.

Each team member will be responsible for: (a) developing a part of the whole solution, (b) justifying their technical options as an integrating part of the whole solution proposed by the team, (c) collaborating whenever needed with other team members, either from their own team or from another MUTW team, to guarantee that problems are solved in due time, and (d) that all parts integrate into a unique final solution.

The team as a whole must: (a) guarantee that all parts integrate well to produce a unique solution for the problem, (b) produce a unique report describing the full solution and (c) present the full solution to the project jury. The project jury will be composed by a teacher from each partner institution.

Partner institutions are responsible for: (a) selecting students for the team, (b) defining a supervisor and (c) following, guiding and evaluating students.

The MUTW methodology is being reviewed based on the experience of the first year. Nevertheless, the preliminary version can be viewed in detail [46].

EVALUATION

One of the main concerns of the MUTW project is to tune up a methodology that might be used in the future by any HEI wishing to setup a MUTW-like course. Monitoring students and their progress throughout the semester and at their final evaluation is a main activity in the MUTW Multilateral Erasmus project providing very valuable information which is essential for tuning the MUTW methodology.

We have collected data from several distinct sources, during the first pilot edition of the MUTW course unit, held in the Spring semester of 2009/2010, including: students' feedback form, students' final grades and grading criteria, assessment questionnaires from the base competences seminars and usage statistics from the groupware platform.

After attending the kick-off meeting students provided their comments on the meeting and filled in online questionnaires, through the MUTW Moodle platform, to evaluate both base competences seminars. These questionnaires were focused on the evaluation of the seminars' quality and its relevance to students. The results from the analysis of this data were used to improve the content of the seminars and also to adapt the organization of the kick-off meeting to comply with the need to have students spending more time working in their team than in instructive activities like the seminars.

The usage statistics provided by the online tools supporting the communication among team members, the management of teams and the development of the final product were used mainly to confirm students' commitment to their team. This data merely confirmed our perception as obtained from students' supervisors as well as from the students themselves.

Students' grading in MUTW is performed by an international jury and is based on a set of criteria previously defined by the MUTW consortium. Students' grades are, in part, due to the quality of the course and to the extent to which students feel keen on it. From this point of view, this data also contributes to evaluate the quality of MUTW as a course unit.

The students' feedback form is a questionnaire that students fill in, together with a peer evaluation form, at the end of the MUTW course just after their final presentation, while the jury is deliberating on their grades. The students' feedback questionnaire has several multi-choice questions as well as open questions for students to provide their comments on MUTW. The peer evaluation form allows students to provide their opinion regarding the commitment of their team mates and on the global performance of their team.

The core data used in the current study comes from these last sources: student feedback form, peer evaluation form and student grades.

Student grades

Students from MUTW come from different HEI with different grading scales. The final grade that a student gets from the MUTW course is conforming to the scale in Table 1. The way these grades are then converted to their home grading scheme is a concern of each institution.

This final grade is a weighted mean of several criteria assessing several competencies that are promoted in MUTW courses. For the first edition of MUTW these criteria have been organized in two groups: one group, with four criteria, assessing the project as a unique product delivered by the team and another group, with two criteria, assessing individual aspects of student's performance. Each of these groups stands for 50% of the student's final mark (see Table 2). Mean students' grades by team are presented in Table 3.

Table 1
Students' Evaluation Scale

| | |
|--------|-----------|
| <40 | Fail |
| 40-50 | Pass |
| 50-60 | Fair |
| 60-75 | Good |
| 75-90 | Very good |
| 90-100 | Excellent |

Table 2
Assessment Criteria

| Weight | Apply | Evaluation criteria |
|--------|------------|---------------------------------------|
| 10% | Team | (A) Base competences seminars |
| 20% | Team | (B) Product, process |
| 10% | Team | (C) Report |
| 10% | Team | (D) Presentation |
| 25% | Individual | (E) Management competence within team |
| 25% | Individual | (F) Supervisor opinion |

Table 3
Mean Grades Per Team

| Weight | Apply | Evaluation criteria | Orange team | Blue team |
|--------|------------|---------------------------------------|-------------|-----------|
| 10% | Team | (A) Base competences seminars | 95 | 95 |
| 20% | Team | (B) Product, process | 90 | 98 |
| 10% | Team | (C) Report | 95 | 85 |
| 10% | Team | (D) Presentation | 80 | 90 |
| 25% | Individual | (E) Management competence within team | 83 | 84 |
| 25% | Individual | (F) Supervisor opinion | 82 | 93 |

It's clear from Table 3 that students performed very well. This is an important observation supporting our hypothesis that the MUTW paradigm is attractive to students and motivates them. Although we have no control group to compare these figures, we can confidently claim that these grades are above the average in common Project/Internship courses at our own institutions.

Peer evaluation

After the end of the MUTW course, once the final presentations from both teams have been concluded, students filled in the peer evaluation questionnaires.

The peer evaluation questionnaire has three parts:

1. One for students' appreciation regarding the global team results,
2. One for students to provide a mark for each team member, including their own, and
3. An optional open question where students are free to give their opinion upon any team member.

Our analysis was based only on parts 1 and 2.

In part 1, students are asked to grade their own team results, on a scale from 0 to 100, on the following aspects: Analysis, Development, Integration and Test. Figure 1 show the comparison between both teams regarding their perception on their own work.

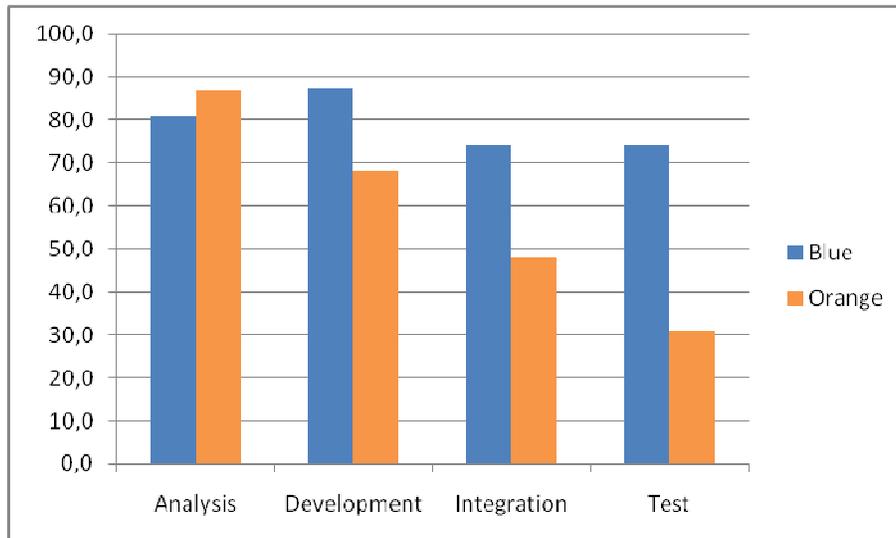


Figure 1. comparison of team performance as perceived by team members

The Blue team seems more confident on their performance than the Orange team. The fact is that the Blue team was able to present a product running online while the Orange team presentation didn't go that well.

One of the main reasons for this fact is probably related to both teams' dimension. The Blue team is smaller – there are 9 members in the Blue team and 12 in the Orange team – and, therefore, easier to manage, mainly taking into consideration the lack of previous experience from students in managing international project teams.

Part 2 of the peer evaluation questionnaire is devoted to grade individually each team member, including the student who is filling in the questionnaire himself. Students are graded in two distinct indicators: percentage of participation in project, on a scale from 0 to 100, and motivation, on a scale from 1 to 5 (best).

The aggregated results on participation for the Blue team members are presented in Table 4 while those for the Orange team are presented in Table 5.

Table 4
Member Participation in Blue Team as Perceived by Peers

| Student | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---------|------|------|------|------|------|------|------|-----|------|
| Mean % | 14,6 | 10,3 | 14,6 | 14,6 | 11,7 | 10,0 | 11,7 | 0,9 | 11,7 |
| StdDev | 2,7 | 2,6 | 2,7 | 2,7 | 1,4 | 2,9 | 1,4 | 2,3 | 1,4 |

Table 5
Member Participation in Orange Team as Perceived by Peers

| Student | O1 | O2 | O3 | O4 | O5 | O6 | O7 | O8 | O9 | O10 | O11 | O12 |
|---------|-----|------|-----|------|-----|------|------|-----|-----|------|------|-----|
| Mean % | 4,0 | 10,7 | 3,9 | 12,4 | 6,7 | 10,6 | 10,6 | 3,5 | 6,7 | 12,9 | 11,4 | 6,5 |
| StdDev | 2,9 | 1,8 | 2,7 | 3,6 | 4,0 | 3,2 | 3,6 | 3,3 | 3,9 | 3,8 | 2,9 | 3,3 |

Students' motivation (Figures 2 and 3) is another indicator of the benefits of the MUTW paradigm. In the Blue team we observe a high level of motivation in the generality of the team members. In fact, six out of nine have been granted a maximum motivation level (5

points) unanimously. Only one student, the only one that failed MUTW first edition had a low level of motivation.

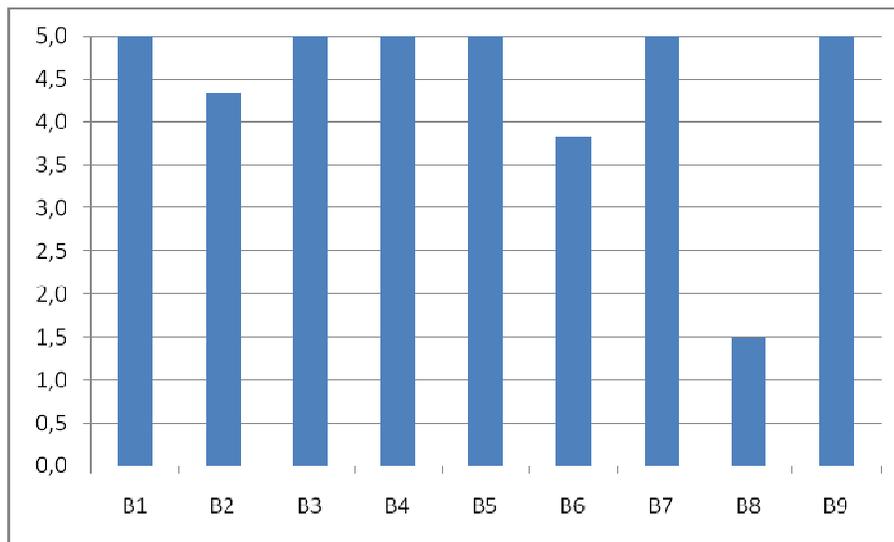


Figure 2. Blue team students' motivation

In the Orange team we can identify two groups (Figure 3), each one with six students that have clearly distinct motivation levels. This pattern was also obvious from students' behavior during the last project meeting when students were concluding the final arrangements for their presentations. In the Orange team there was one group of students working hard to conclude their tasks while another group was not that enthusiastic.

We have noticed that some of the MUTW students in the first edition were not being credited for their work in MUTW. Although this is a scenario that shall not happen in the future, it might have been one of the main reasons for low levels of motivation. Students that are moved by extrinsic motivations, highly indexed by their ECTS credits, need this incentive to feel committed. It was however interesting to notice that some students were moved by intrinsic motivations and that MUTW provides these incentives to students.

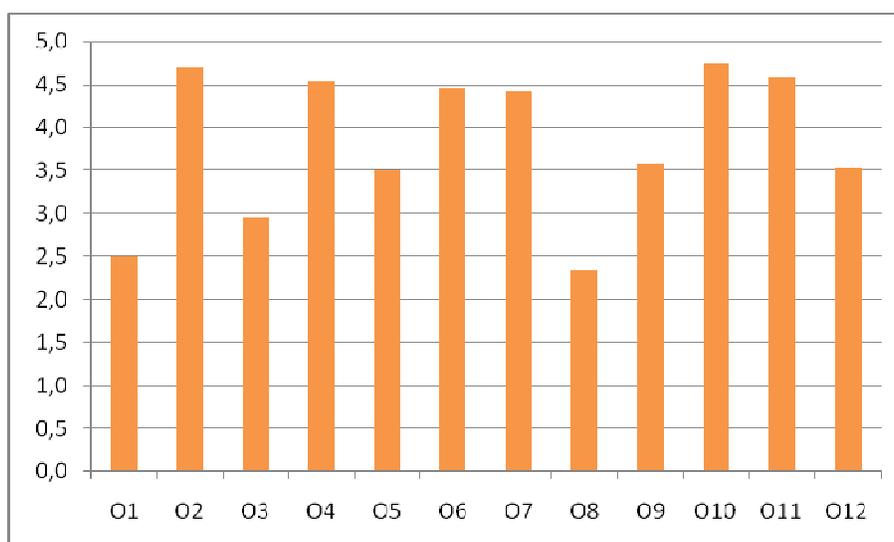


Figure 3. Orange team students' motivation

Tables 6 and 7 reveal that, as expected, there is a very strong correlation between students' motivation, their participation in the team and their final grade. This is particularly obvious in the Blue team.

Table 6
Correlation Between Student Participation, Motivation and Final Grade in the Blue team

| | Participation | Motivation | Final grade |
|---------------|---------------|------------|-------------|
| Participation | 1 | | |
| Motivation | 0,95 | 1 | |
| Final grade | 0,97 | 0,99 | 1 |

Table 7
Correlation Between Student Participation, Motivation and Final Grade in the Orange team

| | Participation | Motivation | Final grade |
|---------------|---------------|------------|-------------|
| Participation | 1 | | |
| Motivation | 0,97 | 1 | |
| Final grade | 0,82 | 0,80 | 1 |

Student feedback

The student feedback questionnaire is the most informative and most relevant tool for the evaluation of MUTW. We have collected data from the 18 students who have filled in the questionnaire. This questionnaire collects students' feedback on 33 variables (Table 8).

Linear regression analysis

The student feedback questionnaire has 33 variables each being evaluated by students from 1 (worst) to 5 (best). We have decided to reduce the number of variables to analyze, discarding the less relevant ones. From all the 33 variables we have discarded 12. 21 variables remained to be analyzed.

From the remaining 21 variables, 7 were considered as target/dependent variables, given our goals, and the remaining 14 were viewed as independent variables. Dependent variables (G, 5n, 5m, 5l, 5k, 5j and 5i) were analyzed one at a time.

Missing values have been replaced by the respective variable average rounded to unit.

Linear regression models have been generated for each dependent variable. From these, only the 5i model is significant at 10% significance level. These regression models have been computed from a sample with 18 examples and 14 independent variables.

To improve regression quality we have tried to reduce the number of independent variables to the ones that seem more important. In a second try we have used 5 independent variables to predict five distinct targets. From these 5 regression models only 5m and 5l are significant at 5% significance level. However, these are precisely the outcomes we are really interested in (5m - team work skills and 5l - communication skills in international setting).

The model on 5m presents a determination coefficient, R^2 , of 75% while the one on 5l is 59%. In the 5m model only the variable 5a - Academic outcomes of MUTW is significant at 5% significance level.

Table 8
Students' Feedback Variables

| |
|--|
| 2a - Project assignment |
| 2b - Duration of the MUTW meetings |
| 2c - Subjects of the MUTW seminars |
| 2d - Groupware platform |
| 2e1 - Motivations: Academic |
| 2e2 - Motivations: Cultural |
| 2e3 - Motivations: Practice of foreign language |
| 2e4 - Motivations: Friends living abroad |
| 2e5 - Motivations: Career plans |
| 2e6 - Motivations: European experience |
| 3a - Support of MUTW consortium |
| 3b - Support of home institution |
| 4 - Academic recognition |
| 5a - Academic/learning outcomes of the MUTW |
| 5b - Innovative aspects in the project execution |
| 5c - Interdisciplinary elements |
| 5d - Personal outcomes |
| 5e - Chance to profit from an intercultural exchange of experiences |
| 5f - Benefits from individual skills of team members |
| 5g1 - Seminars: hours taught |
| 5g2 - Seminars: teaching equipment |
| 5g3 - Seminars: capabilities and expertise of the professors |
| 5g4 - Seminars: overall quality of teaching |
| 5g5 - Seminars: expected learning outcomes |
| 5g6 - Seminars: work sessions besides the seminars |
| 5h - Serious problems during the MUTW |
| 5i - MUTW will help in further studies/career |
| 5j - MUTW helped improving creativity |
| 5k - MUTW will help in finding a job |
| 5l - MUTW improved communication skills in an international setting |
| 5m - MUTW improved team work skills |
| 5n - MUTW improved European feeling |
| G - Overall evaluation of MUTW |

The model on 5l has two significant variables at 5% significance level. These are 5b - Innovative aspects in the project execution and 5e - Chance to profit from an intercultural exchange of experiences.

This led us to conclude that:

1. MUTW improved team work skills (5m) due to Academic/learning outcomes of the MUTW (5a)
2. MUTW improved communication skills in an international setting (5l) due to the Innovative aspects in the project execution (5b) and the Chance to profit from an intercultural exchange of experiences (5e).

Cluster analysis

Cluster analysis relate to grouping or segmenting a collection of objects into subsets or clusters, such that those objects within each cluster are more closely related to one another than objects assigned to different clusters. There are two major methods of clustering --

hierarchical clustering and k-means clustering. We have applied both to group students and also to group the variables under analysis with the goal of perceiving patterns in both views. All the computations required by the cluster analysis have been performed with the support of the statistical software tool SPSS 17.0.

In short, the main settlements from cluster analysis let us highlight the following aspects:

- a) The student's project overall evaluation seems to be consistent and agree with the evaluation of specific aspects.
- b) Some students had particular problems with the project but, that does not appear to have hindered neither its overall nor its partial evaluation.
- c) Standing out positively, the support given by home institutions and the opportunity to profit from an intercultural experience, which has been exposed in a comprehensive way, by all students.
- d) According to the number of clusters considered, the influence of geography also suffers variations. Opting for a smaller number of clusters seems to show the existence of a relationship between satisfaction and geographical location. With the consideration of a greater number of clusters, only one group of students from the same institution belonged to the same cluster. This reinforces our opinion that is necessary to invest joint efforts to enable us to achieve greater and more diverse sample characterization.
- e) We have also noted that, in one institution, each one of the two students belonged, respectively, to the cluster with the highest and lowest satisfaction degree, information that came back to put in evidence the importance of knowing personal aspects relating to participants, so that we can characterize the causes for these differences in more detail.
- f) The groupware platform used by students to communicate during the semester seems to be perceived as a project weak point. The satisfaction degree with this variable is below the level of the expressed satisfaction with other aspects of the project.

Analysis of students' expectations

The subset of the questions asking students to rate their motivation degree and the degree of their satisfaction with the project (Table 9) were analyzed separately. The existence of four dimensions (Table 10) for which this happened simultaneously was verified. These dimensions are: academic, language, job and Europe.

Table 9
Motivation/Evaluation Questions

| Motivations | Evaluation |
|---|---|
| 2e1 - Motivations: Academic | 5i - MUTW will help in further studies/career |
| 2e2 - Motivations: Cultural | --- |
| 2e3 - Motivations: Practice of foreign language | 5l - MUTW improved communication skills in an international setting |
| 2e4 - Motivations: Friends living abroad | --- |
| 2e5 - Motivations: Career plans | 5k - MUTW will help in finding a job |
| 2e6 - Motivations: European experience | 5n - MUTW improved European feeling |
| --- | 5m - MUTW improved team work skills |
| --- | 5j - MUTW helped improving creativity |

Table 10
Dimensions for which Students Were Asked to Rate Both Their Motivation and Satisfaction Degree with the Project

| Motivations | Evaluation | Dimensions |
|---|---|------------|
| 2e1 - Motivations: Academic | 5i - MUTW will help in further studies/career | Academic |
| 2e3 - Motivations: Practice of foreign language | 5l - MUTW improved communication skills in an international setting | Language |
| 2e5 - Motivations: Career plans | 5k - MUTW will help in finding a job | Job |
| 2e6 - Motivations: European experience | 5n - MUTW improved European feeling | Europe |

The comparison of students' responses for each dimension of analysis has created three levels expressing the strength of the motivation and satisfaction with participation in the project – mismatch, match, exceed. Mismatch means that the score given to the experience evaluation is worth less than the score given to the corresponding motivation; match means that the assigned values are equal; exceed occurs when the score given to motivation is lower than the score corresponding to the evaluation experience.

Table 11 allows the identification, for each one of the analysis dimensions, of the proportion of responses corresponding to different levels of expectation.

Table 11
Expectation Degree per Dimension

| | | Dimensions | | | |
|--------------|----------|------------|----------|-----|--------|
| | | Academic | Language | Job | Europe |
| Expectations | Mismatch | 29% | 18% | 47% | 18% |
| | Match | 41% | 41% | 41% | 53% |
| | Exceed | 29% | 41% | 12% | 29% |

The data in Table 11 shows that the Job dimension has the highest mismatched expectations value. Europe dimension is the most common in the set of matched expectations. Concerning the exceeded expectations, there is evidence highlighting the language dimension.

Considering all the expectations dimensions (Academic, Language, Job, Europe), it is possible to obtain the global expectation, EG, which can be compared with the global evaluation, G. The intensity of the relationship between global expectation, EG, and global evaluation, G, was measured with the correlation coefficient Spearman's Rho (with the software SPSS 17.0). It was verified the existence of a very low linear association, with Spearman's Rho = 0,199, sig = 0,444, which is not statistically significant.

The lack of correlation may indicate:

- The four dimensions evaluated in global expectations fall short, thus not allowing the comparison to the global evaluation. Therefore, it is recommended to adjust the student feedback questionnaire so to have a complete correspondence between the motivations questions and evaluations questions of the project.
- Doing motivation evaluation at the same time as the project evaluation may bias the students' responses. Therefore, is recommended that the motivations be evaluate prior to the start of the project (pretest) and also at the end (posttest).

Content analysis of open questions

The analysis of qualitative data obtained from the open questions of the Student Feedback Form was completed using the content analysis, having been given the analysis of frequency as a criterion of objectivity and scientism.

Following the parameters used by Bardin (2004), content analysis behaved pre-analytical steps, scanning and processing and interpretation of responses to questions relating to the MUTW experience.

The pre-analytical observation of the rules meant to be exhaustive (selection of any material likely to be used), representativeness (the data were obtained through the same technique and performed with similar individuals), homogeneity (the withheld documents comply with specific criteria of choice) and relevance (the withheld documents were adequate to the purpose of analysis). In this first phase, after the organization of materials and systematization of the initial ideas, we performed a systematic reading of the open answers. In the exploration phase of the material, following the recommendations of Bardin [47] and Minayo [48], the raw data were processed to reach the core of understanding the text. We performed the classification and aggregation of the material responses. In this exploratory phase it was necessary to transform the raw data of the text to achieve a representation of its content. All responses to each open question were taken as context units. Each of the responses was the target of treatment and qualitative interpretation of its constituent parts, the units of analysis, resulting from the analysis of these units, the categorization. As a rule of enumeration, we have used frequency, represented by the number of times that a particular category appeared referenced in a response to the item under review. Systematization of the categories of analysis emerged from their respective themes or meaning units, found from the literature review that guided the preparation of this study.

The information collected in connection with the description of the aspects of MUTW that were perceived by participants in the project to be most useful for promoting their academic development has allowed the identification of five themes, which together add a total of eleven categories of analysis.

The analysis of these responses revealed the following themes: cooperative structure, identified in 83.2% of responses; nature of the tasks presented in 69.4% of responses; process of self help / personal development, identified in 84.3 % of units of analysis, interpersonal development, cited in 70.5% of the units of analysis and perception of high levels of equality and reciprocity, present in 32.7% of responses.

Under the theme cooperative structure, the responses were divided into three categories: cooperative learning itself (17.2% of respondents); explanation by peers (5.9% of responses) and collaboration among peers (60.1%). As examples of analysis units that allowed the identification of categories of cooperative structure theme we have found: "colleagues give individual contributions to the success of collective work," each one is helping isolated and there is no difference between the group members' and "colleagues with the same level of knowledge working together on tasks."

The subject nature of the tasks was established based on the categories: specialization of tasks (8.7% of responses) and group tasks (58.6% of responses). This theme includes responses such as: "meeting of routines written," every part of the protocol meets fellow, "" joint decision-making (...) thinking about ideas, ", " discussion and confrontation of perspectives, peer interaction in attempt to solve problems".

The theme of self-help process | development staff was composed by the resilience (24.2%) and feeling of enjoyment (74.2%) categories, categories that resulted from responses such

as "adaptation to new contexts"; " more capacity to accept change, " adapting to situations of competition between colleagues "; " correspondence between individual needs prior to group work and peer reinforcement and stimulation group", "confirmation of expectations pleasant experience".

The theme of interpersonal development includes conflict reduction in school (32.7%), and promoting social inclusion (42.3%) and was formed based on units of analysis as: "It helped to be more comfortable to know colleagues "" I'm more comfortable talking with people who previously did not know " and " I belong to different groups in different contexts and it is good to increase the number of friends".

The reference to the perception of high levels of equality and reciprocity (32.7%) includes the response category on the perception of competence between the group members (14.1%) and the category of responses equal status among group members (20.2%) and this theme include units of analysis such as: "Everyone contributes in equal measure to all of the tasks of work"; "All decision makers and opinion of everyone has the same weight than that of any colleagues "; " There's specialists and responsible work, and (...) all are important for the final result. " .

The information collected in connection with the description of recommendations and ideas for the MUTW organizers allowed the identification of a theme, promotion of soft skills, which adds a total of four categories of analysis: need for training in the skills of time management (39, 3%); proposal to increase opportunities for reflection, discussion and confrontation between the peer group (28.7%); perception of shortage of skills for managing conflict (21.7%) and increase opportunities for training of communication skills (10.9%).

CONCLUSIONS

The analysis of the data obtained through the student feedback form, allows us to conclude in general that the pattern of findings of MUTW evaluation is favourable.

Our hypothesis – MUTW contributes to improve students team work and communication skills at an international level – is statistically supported by students' answers. We may accept at a 5% significance level that MUTW improved team work skills due to the academic/learning outcomes of MUTW and also that MUTW improved communication skills in an international setting due to the innovative aspects in the project execution and the chance to profit from an intercultural exchange of experiences.

Taking into account empirical evidence from social cognitive theory of career and academic adjustment by Lent and colleagues (eg, [7,49,50]), we can affirm that such results reflect positive students emotional attitudes compared to academic life as well of self-efficacy beliefs and perceived availability of support and environment resources to pursue their personal goals.

Experience with MUTW is perceived by participants as being useful to support the role of cognitive and socio-environmental integration and adjustment to a career in higher education, which falls in line with Holland [51,52] and Lent [53], authors who guided the construction of the theoretical foundations of this project.

Concluding the assessment of the first edition of MUTW, maximizing the contributions of Shuell [54], and being aware that the fundamental task of teachers, especially higher education teachers, is getting the students to engage effectively in learning activities, we deem pertinent to stress that it is our conviction, after this year's work, that what the students perform is more important for determining what is learned than what the teacher does.

Therefore, and since in recent years, the authors of social cognitive theory of career have been explaining the influence of academic experiences and the peer group in various aspects of vocational development, it is important to emphasize that peer group in an academic context, is a source of relevant information in the process of constructing meaning around the assigned roles in modeling, evaluation, performance and merit, contributing to the development of higher education students vocational interests and values.

This analytical work, depending on its crosscutting nature, does not allow time to assess the prevalence of the analysis presented, which leads us to believe that this is a limitation of the assessment methodology implemented in this MUTW edition and suggests to conduct a longitudinal study, at the next edition of the project, that may enhance the examination of the temporal relationships between variables and the degree to which the predictors may be relevant to the change of criterion variables, as explained by social cognitive theory of career.

Given the incipient state of research-based test of an integrative model of well-being [53] and its application to specific career environments [55], theoretical model that guided the construction of this project, we think it will be useful in the future to examine the temporal relationship between variables in both samples of students who attend courses leading to different degree.

Since several of the relationships between variables that were tested in this MUTW edition are similar to those found in social cognitive theory of career [56], we deem relevant, that at the next edition of the project, we engage more explicitly evaluation of how the results boosted by participation in the MUTW project can be generalized to the labor field.

It also seems relevant at this stage of final evaluation of MUTW's first year to express our conviction that at project next edition, our concern should be to develop sample characterization, as exhaustive as possible. The sample characterization should include information regarding the route and level of academic success, and the existence of professional experience. The collection of social and academic information may increase our ability to identify the design features that benefit most the different groups of participants, and fostering the identification of projects strengths and weaknesses, that are experienced and valued differently by different groups of participants. This analytical work will suit the characteristics of the project groups, as we are better able to identify those who most benefit from it.

It also seems useful to consider the use of a quasi-experimental design, because such research will offer us a more rigorous testing of hypotheses. With this objective it is our conviction that we must consider the profitability of control groups in the next edition of MUTW. Using control groups may allow us to withdraw inferences that examine the temporal precedence or causality in the relationship between the specific variables under study.

Going according to the positions advocated by Crites [57] and Guichard [58,59], for whom the ideal context of the construction of representations of students' career in higher education is the shared meanings among the peer group, this international experience has enabled us to reflect on the importance of teamwork, as agents of socialization and "vocationization" of excellence for students in higher education.

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