AC 2009-1337: TEAM WORK AND DEMOCRATIC LEARNING IN PROJECT MANAGEMENT TRAINING

Ivan Lidon, University of Zaragoza
MSc from the Engineering Faculty of Zaragoza University. He has worked as assistant at the Design and Manufacturing Engineering Department of the University of Zaragoza since 2004. His current interests are project management and product development areas.

RUBEN REBOLLAR, University of Zaragoza
MSc and Doctor from the Engineering Faculty of University of Zaragoza. He is Associate Professor in the Design and Manufacturing Department at this university. In his present academic career he is focused on teaching and researching in the areas of project management and product development.

Palle Qvist, Aalborg University
He is associate professor and lecturer in Technology, Humans and Society and in Cooperation, Learning and Project Planning. His interest fields are ICT and faculty development, organized learning, digitalised learning, PBL and the history of the problem. He is staff member at the UNESCO Chair in Problem Based Learning in Engineering Education.

Juan Luis Cano, University of Zaragoza
MSc and Doctor from the Engineering Faculty of Madrid Polytechnic University. He has held different positions at private companies (Mech. Engineer, consultant, project manager) until 1982 when he took up the chair of Project Engineering of University of Zaragoza. Since 1993 he has been involved in different EC educational projects (SIM, CAESAR I, CAESAR II, GEM) connected with Comnet, Leonardo and IST. His research topics are project management, experiential learning and product development
Team Work and Democratic Learning in Project Management
Training

Abstract

Project Management is a discipline of a basically professional nature. Training in Project Management must provide students with a series of professional competencies, among which teamwork stands out as one of the most important, since all projects, by definition, must be carried out by teams.

The functioning of a team will be characterized, among other things, by the way it is organized and the way decisions are reached within it. A new term has appeared lately to refer to this concept: Democratic Learning.

This paper shows the results obtained in an experiment carried out at the Universities of Zaragoza (Spain) and Aalborg (Denmark). The experiment involved the validation in a culturally different context of the results obtained previously in each of these universities, by means of questionnaires developed by them.

The Preventive Simplified Teamwork Questionnaire developed at the University of Zaragoza, which makes it possible to detect problems of teamwork functioning in groups while they develop their projects, in order to prevent possible failure once projects are completed.

The Democratic Learning Questionnaire developed at Aalborg University, which studies the decision-making process within project groups in order to obtain an indication of the degree of student participation in a democratic learning system.

The results obtained have confirmed the validity of the first questionnaire for the early detection of teamwork functioning problems in groups. The second questionnaire has made it possible to establish a correlation between a group's decision making process and the quality of its functioning as a team.

1. Introduction.

A project can be understood as a temporary effort undertaken to achieve a particular aim, e.g. create a material or immaterial product. The aim is restricted in time – it should be reached within a certain time and with the use of human, technological or other resources. It is a solution to a problem, an answer to something required, wanted or needed. It is a unique and singular task or venture which normally is not done in the same way again and again.1,2

Project management is both a discipline and an activity. It is defined in numerous ways. It involves – according to the dominating paradigm – planning, organizing and managing of resources with the purpose of reaching predefined goals, objectives or outcomes of a project.3,4,5,6
Over the last decade, the growth of the project-oriented model has been spectacular, as the increase in the number of certified professionals in Project Management worldwide shows. The availability of people with the appropriate skills in managing projects is a powerful development tool that should be considered at all levels of society.

Project management as an academic subject is in its infancy, and in Europe there are now still few universities offering standard courses as part of their curriculum, it being mostly the province of business schools. The offer of training products at the university level ranges from 30-hour courses to 120 ECTS (European Credit Transfer System) Masters. Most of the approaches to training undergraduates, with regard to content, are oriented towards the Bodies of Knowledge of associations such as the Project Management Institute (PMI), the International Project Management Association (IPMA) and the Association for Project Management (APM); with regard to their methodology, they combine lectures, case studies, role-play, e-learning and, occasionally, the carrying-out of real business projects.

Within this profession it has been observed that a majority of the personnel working on a project (85%) acquires its knowledge from the day to day experiences of their work, it being assumed that project management is a field tightly bound to professional practice, reality being the main source of individual learning for new managers. In fact, there is currently a demand for training in project management more clearly aimed towards practice of the profession. Actually, recent research on the results of higher education points to the existence of a gap between the kind of competence required at the workplace and the knowledge and skills acquired at university. In this regard, Markes points to the growing concern among employers faced with the scarcity of qualified candidates to cover the vacancies regularly appearing.

Among the competencies most demanded by employers, teamwork features conspicuously, and therefore there is an ever greater effort to train students in this regard in the context of college education, resorting in many cases to teaching methodologies such as Problem Based Learning or Cooperative Learning. These are usually based on the performance of work as a team, and seek to provide students, among other things, with certain skills that will allow them to work effectively and deal with the situations arising in this kind of work.

Teamwork skills are an essential part of training in project management, since projects are indeed managed by teams. Team members are dependent on each other in the effort to reach the common tasks and the goal of the project. Typically, projects are complex and require independent efforts of people with diverse skills, competencies, and sometimes, background and perspectives. A team typically represents many different functional areas. The needed combination of skills, competencies and backgrounds is seldom found in one individual, which is one reason why teams are highly valued in modern organisations of all kinds.

Teams may be relatively autonomous. How often and for how long members of a team wish to meet is often their own decision. How they make decisions, handle conflicts, communicate with one another, and who should take what kind of responsibilities can be decisions taken within the team. This does not mean that teams lack internal processes for managing communication, resolving conflicts, solving problems, making decisions, and reaching goals. They have these,
and these may have been set up by the members themselves. Deciding on common processes is one of the first tasks of a newly formed team.

Teamwork and the decision-making process within a group have been two fundamental aspects of project management training and research in the universities of Zaragoza (Spain) and Aalborg (Denmark). Next, we briefly present some of the works carried out.

One of the most common causes of failure in project management has to do with the people working in the project teams and with the coordination among them. This has been reflected in the series of projects which have been unfolding within a Project Management course taught at the University of Zaragoza.

In order to become better acquainted with this phenomenon, preparation of a “Teamwork Questionnaire” (TQ) was proposed that would make it possible to study the influence of group functioning on the quality of the results it achieved, that is, on the quality of the project itself. The questionnaire led to finding a statistically significant positive correlation between both variables.

Likewise, and as a result of this work, it was found that a set of variables having to do with coordination within groups presented a positive and statistically significant correlation with the quality of the project. Study of this set of variables made it possible to create the “Preventive Simplified Teamwork Questionnaire” (PSTQ), capable of evaluating how a group was functioning as the course developed, in order to prevent possible failures of projects at the end of the course.

In Aalborg University, the decision-making process within project groups has been studied, along with aspects having to do with, for example, what methods are used for reaching agreements (discussion, conversation rounds...), whether there are within groups members who impose their criteria upon the rest, or whether groups are or not conditioned in their decision-making by the figure of the facilitator.

A “Democratic Learning Questionnaire” (DLQ) has been developed for the purpose of getting an indication of the degree of student participation in a democratic learning system such as the Aalborg Model. A democratic learning system is defined as:

\[
\text{a system where decisions, processes and behaviour related to learning are established through argumentation (discussion) or negotiation (dialog), voting or consensus (alone or in combination) between those affected by the decision simultaneously reaching the learning outcomes, the technical and professional knowledge and insight. In principle the participants must be equal with equal rights and feel committed to the values of rationality and impartiality}.\]

The present article will present the joint research carried out in the University of Zaragoza and Aalborg University, as a continuation of that carried out formerly in each of these institutions, dealing with the functioning of groups of students carrying out projects, the quality of the work performed, and the way in which decisions are made within the groups.
2. Objectives.

The objectives sought with the work presented here are the following:

- To study the validity of the PSTQ within the context of Aalborg University for early detection of functioning problems within groups carrying out projects.
- To check the validity of the DLQ within the context of the University of Zaragoza for studying the decision-making processes in work groups, and to get an indication of the degree of student participation in a democratic learning system.
- To explore whether any statistic correlation can be found between the decision-making process and the quality of functioning of a group, on the basis of the results gathered from the former questionnaires in both contexts.

3. Methodology.

In this chapter, the two contexts where this study has been conducted are presented, along with the design and content of the questionnaires used.

3.1. Context of the research.

The work has been developed jointly in the context of two Project Management courses taught at the universities of Zaragoza and Aalborg.

3.1.1. The Project Management Course at Zaragoza University.

Within the Industrial Engineering degree at the Faculty of Engineering at the University of Zaragoza the students practice project management in a “real world” in their last semester. The students form groups of 5 to 6 participants, and they perform a project for a real client which they find by themselves. Clients may be SMEs, NGOs, small town councils, etc. They prepare a Project Management Plan which is accepted by the client. The project has a duration of one semester. The first 1 to 7 weeks are used to find a client and define the project. From week 8 to week 12, the project is planned, producing a rough draft of the Project Management Plan. In the last 4 weeks the project is written and finally presented orally. During the semester the students are mentored by their teachers, who act as facilitators in a fictitious consulting environment.

In spite of being in their last year and just before their first professional tasks, students have never before worked in a group, except for small laboratory assignments, or participated in a project. They have never given an oral presentation, written a technical report, or faced solving a real problem presented by a client.

To support the project, students attend a project management course of 6 ECTS (European Credit Transfer System), lasting 16 weeks.

The course is evaluated through an individual as well as a group exam. The individual exam is written and based on a questionnaire. At the group exam, the report written for the client is
presented by the group in front of a panel comprising the teachers and the client and attended by the rest of the students in the cohort. The aim for the group is to defend the project and the validity of the solution.

3.1.2. The Cooperation, Learning and Project Management Course at Aalborg University.

At Aalborg University the students at The Faculties of Engineering, Science and Medicine practice project management with the Aalborg Model as the dominating frame for learning during their whole life at the university\textsuperscript{29,30}. The students themselves select problems from “real life” for their projects, fulfilling one project each semester. Mainly in their last semester, students have deeper contact with their client. Students form groups of 6-7 participants the first year, later groups being smaller – 3 to 5 students. The problem for the project is selected within the theme or frame defined for the semester. Each group organizes and plans the semester itself. In the first weeks members define the project which they discuss with their facilitator, and in the following weeks they produce working papers which are transformed to chapters in a scientific document – the project report. Students work in the traditional academic environment, except for those in the first year, who are mostly located in a building of their own with very limited day-to-day-contact with elder students or academic personnel\textsuperscript{31}. Each group has a room of their own – a group office. For elder students the group office is next to other employees, professors and administrative personnel of the university.

The team and project work account for approx. 15 ECTS per semester (except the last semester, where it is 30 ECTS), and the rest of the time is occupied with courses. This means that bachelor candidates have worked in projects for more than a year and a half year, and full candidates more than two years and a half. Before they arrive at the university they have met and practised project and team work (although in a small scale and in small groups, 2-3 in each) at the high school (secondary school) level. Students from technical high schools have given oral presentations of written technical reports, but have not solved real problems presented by a client. Students from ordinary high schools have given oral presentations, but not of technical reports. The use of project management tools is limited.

Supporting the project the students are attending a project management course of 2.2 ECTS lasting half a day during 11 weeks – 9 times in their first semester and twice in the second semester. The rest of the time consists in learning project management by doing.

The course is evaluated through a process analysis and as part of the project exam. The exam is individual and based on the project report which is presented before the exam.

3.2. PSTQ and DLQ questionnaires.

3.2.1. Preventive Simplified Teamwork Questionnaire (PSTQ).

Once established that, historically, among the most common causes of failure in the Project Management course of the University of Zaragoza have been deficiencies in the functioning of groups, those responsible for the course set out to prepare the “Teamwork Questionnaire”, in order to study the influence of such functioning upon the quality of the projects developed.
The questionnaire was prepared by a process developed in two stages, in which more than 100 students and a total of 5 teachers took part. As an instrument, it passed all the reliability and validity tests it was subjected to, and pointed, among its most important results, to the existence of a statistically significant correlation between the quality of group functioning and the quality of the work performed, according to the results obtained from a non-parametric Mann-Witney test ($U = 551, p < 0.05$).

From the analysis of all the results obtained, it was observed that certain aspects that students related to the quality of teamwork within a group, from the point of view of the teachers, had to do with internal coordination:

- All members of the group had a clear idea of what was to be done.
- Work has been performed as a team.
- The members of the group have had timetable incompatibility.
- Each member of the group had a clearly defined role.
- There has been an even distribution of tasks.
- Coordination within the group has been good.

It was checked whether these items, conceptually related with coordination within the group, constituted a variable or construct of one or several dimensions. In order to do this, a factor analysis was performed which yielded a positive result, grouping these items in a one-dimensional construct with high reliability (Cronbach Alfa = 0.80).

Once these items were constituted as a single variable or construct called “coordination”, its correlation with the variable “quality of the group project as perceived by the students” was studied. Although no statistically significant correlation was found, when the individual correlation of each of the items with that variable was studied, it was established for 5 out of the 6 elements, as shown in Table I.

<table>
<thead>
<tr>
<th>Items of the “coordination” variable</th>
<th>$r_s$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>All members of the group had a clear idea of what was to be done.</td>
<td>0.28</td>
<td>0.01</td>
</tr>
<tr>
<td>Work has been performed as a team.</td>
<td>0.37</td>
<td>0.00</td>
</tr>
<tr>
<td>The members of the group have had timetable incompatibility.</td>
<td>0.32</td>
<td>0.00</td>
</tr>
<tr>
<td>Each member of the group had a clearly defined role.</td>
<td>0.22</td>
<td>0.03</td>
</tr>
<tr>
<td>There has been an even distribution of tasks.</td>
<td>0.31</td>
<td>0.00</td>
</tr>
<tr>
<td>Coordination within the group has been good.</td>
<td>0.12</td>
<td>0.24</td>
</tr>
</tbody>
</table>

The results gathered in Table I suggested a control variable for “coordination” of groups which may be used to detect possible problems of functioning within groups. This was the basis upon
which the PSTQ questionnaire was built, for the purpose of acting upon a group and preventing the damage that inadequate functioning can do to the quality of its achievements.

With the first five variables collected in Table I, plus the evaluation of the quality of functioning within groups, the PSTQ questionnaire was built. Students taking part in this study had to mark their answers on a “continuous classification”, 10-interval ordinal scale, ranging from 0 (most negative, completely disagree) to 10 (most positive, completely agree). The final content of the PSTQ questionnaire was as follows:

- **PST1.** I would rate the functioning of my group up to now as…
- **PST2.** The members of the group are clear about what they have to do.
- **PST3.** Work is being done as a team.
- **PST4.** Timetable incompatibility has been solved.
- **PST5.** Each member of the group has his/her function.
- **PST6.** Task distribution is balanced.

To determine whether a group had functioning problems, a variable was created which we will hereafter refer to as “PGLOBAL”, this being the result of adding up the scores given by each individual to the items of the questionnaire (PST2 to PST6).

The criterion to identify the presence of problems in a group was that the value of the median ($p_{50}$) of the PGLOBAL variable in a specific group were below the percentile 25 ($p_{25}$ Reference) of the values attached to these variables by all the students of the course.

This questionnaire, originally written in Spanish, was translated into English by an inverse translation procedure carried out independently by two translators. In the first stage, one of them translated the questionnaire from Spanish to English. The resulting version was sent to the second translator, who translated it back into Spanish. After that, the differences between the original text and the translated one were checked in order to verify whether the content and wording of the questionnaire was true to the original.

### 3.2.2. Democratic Learning Questionnaire (DLQ)

Comparing the Aalborg Model to the definition of a democratic learning system shows that the Aalborg Model is such a system, although not 100% democratic. The influence of the students on their own learning does not extend to e.g. the teaching in the courses, which occupies approx. 50% of student hours. Facilitation in the groups might also – when it comes to reality – be elitist. Groups might even if they in principle are communication communities, free and without supremacy, where it is possible for everybody to participate – be run in undemocratic ways by a small group of strong students. The questionnaire was constructed to get an indication of the opinion among the students in the group.

- **DL1.** In the group we use rounds before taking important technical decisions.
- **DL2.** In the group we use rounds when we take important decisions related to project work.
- **DL3.** In the group we use discussions to reach technical decisions.
- **DL4.** In the group we use discussions to reach decisions related to project work.
DL5. In the group it is one or a few which dominates and make the technical decisions.
DL6. In the group it is one or a few which dominates and make the decisions related to the project work.
DL7. In the group it’s the facilitator who makes technical decisions.
DL8. In the group it’s the facilitator who makes decisions related to project work.
DL9. The group is democratic (decisions are discussed and everybody can participate).
DL10. The group is elitist (decisions are seldom discussed and are reached by few).
DL11. The group is directed/controlled by the facilitator.
DL12. The group is participant controlled/directed.

For each of these questions there were 5 answer options:

- No.
- In a small degree.
- In some degree.
- Quite often.
- Always.

As in the case of the PSTQ, this questionnaire was translated from Danish to Spanish using the same inverse translation procedure.

4. Results.

4.1. Results of the PSTQ questionnaire.

The PSTQ questionnaire had been tried successfully with the students of the Project Management course of the University of Zaragoza during term 07–08. With the purpose of studying its validity in other educational contexts, during term 08/09 the questionnaire has been handed out to students at the universities of Aalborg and Zaragoza. In Zaragoza, a total of 75 out of 80 registered students (93.75%) took part, representing 17 groups, and in Aalborg, 144 out of 252 registered students (57.14%), representing 36 groups. The students answered anonymously, being linked only to the group they belonged to.

With the aim of studying the psychometric characteristics of the questionnaire, its reliability was analyzed by calculating Cronbach’s alpha coefficient, thus obtaining a value of 0.89 for the Aalborg group and a value of 0.85 for the Zaragoza group. The reliability of the questionnaire is therefore guaranteed, given values for Cronbach’s alpha coefficient above 0.70.

In order to study the tool’s construct validity, a discrimination analysis of the items of the questionnaire was performed, by means of item-total correlation analyses in each of the contexts, so as to evaluate the integration of each of the questions within the totality of the questionnaire. The criterion applied for inclusion of a question was to obtain a correlation index equal or higher than 0.25, obtaining values above 0.25 for all questions.

With the aid of this questionnaire, 3 problematic groups (out of 17) were detected in the context of the University of Zaragoza, and 5 (out of 36) in the Danish context. Table II shows the values...
obtained for each of these groups, under the variable PGLOBAL, as well as the reference values used as criteria to determine whether a group had functioning problems.

<table>
<thead>
<tr>
<th>Reference values</th>
<th>ZARAGOZA</th>
<th>AALBORG</th>
</tr>
</thead>
<tbody>
<tr>
<td>p25 PGLOBAL</td>
<td>33.00</td>
<td>26.00</td>
</tr>
<tr>
<td>p25 PGLOBAL</td>
<td>25.00</td>
<td>26.00</td>
</tr>
<tr>
<td>Group 1</td>
<td>31.50</td>
<td>19.00</td>
</tr>
<tr>
<td>Group 2</td>
<td>31.00</td>
<td>25.00</td>
</tr>
<tr>
<td>Group 3</td>
<td>25.00</td>
<td>25.50</td>
</tr>
<tr>
<td>Group 4</td>
<td>-----</td>
<td>25.00</td>
</tr>
<tr>
<td>Group 5</td>
<td>-----</td>
<td>21.00</td>
</tr>
</tbody>
</table>

In the case of Zaragoza, to validate the results obtained by this questionnaire, both the facilitator and the members of the groups concerned were asked to confirm in a joint meeting whether they actually had problems functioning as a group. In every case, the diagnosis was confirmed.

This questionnaire is a tool for facilitating group reflection about coordination problems. So, PSTQ works like a mirror that shows to the members how is the group performance currently.

For each case, and according to the various problems detected in each group, a plan of action was set up with the help of the facilitator, with the aim of solving those problems and improve the group’s functioning. The result at the time of presenting this work is that two of the groups have passed the course easily once their problems were solved, while the members of the third have been unable to take their exams, since their situation kept them from finishing their work on time. They are now implementing that work in order to present it at a future date.

In the case of Aalborg, to validate the results obtained by the questionnaire, the process analysis (self-assessment) written by the groups detected to be in trouble has been consulted. All groups reported that they had problems, although none indicated a crisis which they could not overcome themselves.

4.2. Results of the DLQ questionnaire.

As mentioned, this questionnaire has been used in previous terms in the Aalborg group of students\textsuperscript{28}.

During term 08/09 the DLQ questionnaire was handed out to the same groups of students in Aalborg and Zaragoza, with the same level of participation and the same conditions of anonymity as in the case of the PSTQ.

As previously done with the PSTQ questionnaire, the reliability and validity of the DLQ questionnaire were studied. The values obtained for Cronbach's alpha coefficient were 0.24 for
the Aalborg group and 0.41 for the Zaragoza group. Both values, below 0.70, indicate that the questionnaire is not very reliable in its behaviour.

Likewise, on performing discriminatory analysis of the items making up this questionnaire in order to study the validity of its content, it was found that only one of the questions passed the test in Aalborg, and 3 in the case of Zaragoza.

The results obtained regarding reliability and validity of the content of the questionnaire indicate that DLQ's psychometric characteristics are not good enough. This has meant that when analyzing the answers of the respondents, it is only possible to study each question separately, it being impossible to perform any assessment regarding the questionnaire as a whole.

In the light of the above, it was decided to present what the authors have deemed were the most significant results of this questionnaire. Thus, the results obtained in each context for questions DL3, DL4, DL9, and DL11 are compared, since they are considered as the most closely connected to a democratic learning system.

Questions DL3 y DL4. In the group we use discussions to reach technical decisions and decisions related to project work.

As shown in figures 2 and 3, no significant differences are observed between both contexts, and it appears that a high percentage of the students of both universities resort to debate to make technical decisions and others to do with their projects.

Figure 1. Results for question DL3.
Question DL9. The group is democratic (decisions are discussed and everybody can participate).

As shown in Figure 3, nearly 80% of the students in both contexts state that the behaviour of their group is always or very often democratic. Conspicuously, none have answered that their group is not democratic, and the percentage of those answering that their group is democratic in some degree is low, below 5%. Once again, there are no substantial differences between the two contexts.

DL11. The group is directed/controlled by the facilitator.

As shown in Figure 4, in this case there are some differences in the answers collected in one context and the other. In the case of Aalborg University, students understand that they are not basically directed by the facilitator, since over 90% of them believe that this is no or in small
degree the case. In Zaragoza the situation is different, and the students generally perceive their groups as partially controlled or directed by the facilitator.

![Bar chart showing results for question DL11.](image)

**Figure 4. Results for question DL11.**

4.3. **Analysis of the existing correlation between questionnaires PSTQ and DLQ.**

In order to establish whether there was any kind of correlation between the functioning of a group and its decision making process, the authors of this work set a series of hypotheses which they attempted to prove on the basis of study of the correlation between the items of both questionnaires.

**Hypothesis 1. Democratic groups work better.**

On studying the correlation between these two variables (DL9 and PST1), a statistically significant positive correlation ($r_s = 0.27; p = 0.01$) was found in the Danish group. The group in Zaragoza, however, showed no statistically significant correlation ($r_s = 0.11; p = 0.34$), although a tendency towards a positive correlation between the two variables is observed.

**Hypothesis 2. Groups using debate and discussion in their decision making work better.**

Arriving at decisions in a group through debate and the participation of all members involved is an undoubtedly democratic attitude. The intention was to study whether the groups who debated in order to make their technical decisions (DL3) and their project-related decisions (DL4) worked better (PST1). The results are shown in table IV.
As shown, in both contexts there is a statistically significant positive correlation between these variables.

Hypothesis 3. Groups that are directed/controlled by the facilitator work better.

Here it was intended to explore the relation between “excessive” participation or intervention on the part of the facilitator of the group regarding decision making (DL11) and functioning of the group (PST2). The results for Aalborg show no correlation whatsoever, but in the case of Zaragoza, there is a statistically significant negative correlation between both variables \( (r_s = -0.29; p = 0.01) \).

5. Discussion.

The results obtained regarding the psychometric features of the questionnaires presented in this work have led to the conclusion that the reliability and validity values of the Democratic Learning Questionnaire (DLQ) are below those recommended for a measuring instrument. This may be due to the preparation process of the questionnaire itself, in the design of which there has been no direct participation of the students object of the study. The Preventive Simplified Teamwork Questionnaire was developed on the basis of a very reliable and robust instrument, the Teamwork Questionnaire, in which many students and teachers have taken part since 2005; in the process, the questionnaire has undergone several modifications and been adapted until the final version presented here was arrived at. Future developments of this work would involve redesigning the DLQ with the aim of creating a valid and reliable measuring instrument.

Regarding the results obtained using the PSTQ, significant differences have been observed between both contexts as far as determining the level of reference for classifying a group with functioning problems. Generally speaking, the scores given to the items of the questionnaires by the Danish students are markedly lower than those given by their fellows in Zaragoza, and thus the levels of reference are 26 and 33 points respectively, Zaragoza applying a stricter criterion than Aalborg. Such values may be due to the fact that the Danish students, in spite of being in the first year of their college studies, are more familiar with teamwork situations than the Spanish students. That greater experience may have made them more critical in judging their own group performance, whereas the students in Zaragoza seem to be more optimistic in this regard.

It must be considered that work teams go through several stages, improving their performance over time\(^{36}\). It is likely that the teams of the Aalborg group are more seasoned that the ones in Zaragoza, and are able to manage the problems that may arise in their functioning more efficiently.
The usefulness of a questionnaire such as the one developed is greater for the Zaragoza group than for the Aalborg one; in the Zaragoza course, work lasts only one semester, students are in their final year, and also they are performing work for a real client. In this situation, teams must solve their problems quickly in order to prevent a negative impact on their projects, and therefore the likelihood of making mistakes must be reduced to a minimum. In Aalborg University, however, students are in their first of several semesters working in teams so, there is time for teams to work through their conflicts and learn from their own mistakes.

As for the results obtained with the DLQ, and with the reservations due to its psychometric features, it has been studied whether the contexts researched behave as Democratic Learning Systems on the basis of analysis of the students' answers to each separate question. This analysis shows that a significant part of the students surveyed in both contexts perceive the decision making processes of their groups as democratic and usually involving debate and discussion.

One of the hypotheses contrasted in this work is that of whether groups that consider themselves democratic work better than those that do not. The result has been that the hypothesis was proven only in the Danish case. In the light of the results gathered, among the students in Zaragoza it was not proven that a group has to be democratic in order to work well. However, students in Zaragoza received no instructions regarding the matters dealt with in this questionnaire, such as the very definition of what a democratic group is, or how to make decisions resorting to conversation rounds. In Aalborg, however, such instructions were offered, and this could possibly explain the differing perceptions of one and another context.

Finally, we should comment on the results obtained regarding the incidence of the facilitator's involvement in the work of a project group. In the case of Aalborg University no correlation of any kind was obtained; in Zaragoza, however, a negative and statistically significant correlation was found: according to these students, groups that were led or controlled to a considerable degree by the facilitator worked worse than those functioning more independently.

6. Conclusions.

This work has presented the results obtained using two previously developed questionnaires (PSTQ and DLQ), in two project management courses taught in the different learning contexts of the University of Zaragoza and Aalborg University.

The results obtained have shown that the PSTQ is a robust measuring instrument in both cases, and a valid and reliable tool for assessing the functioning of a work team as the course develops, in order to prevent possible failures in projects before they are delivered.

The analyses performed regarding DLQ have shown that this questionnaire is not currently a reliable measuring instrument. However, it has proved very useful for study of the decision making process in a group and its relation with how the group is functioning.

Future developments of this work may be aimed at improving the DLQ and later validation of both questionnaires in other educational project management contexts, or even other disciplines in the field of engineering.
Moreover, considering the results obtained by this work, it becomes necessary to introduce certain changes in the configuration of both courses. In the case of University of Zaragoza, they would have to do with intensifying training for teamwork and providing knowledge and skills that will increase the independence of students for solving their conflicts, and at the same time consider the basic aspects of decision-making within the course. On the other hand, in Aalborg University, it would appear interesting to gradually introduce projects of a more real content, as in the case of the University of Zaragoza, which would offer students an experience of the added pressure of having to provide service to a client.

Bibliography