

COMPETENCE TEAMWORK: PERCEPTION AND DEVELOPMENT THROUGH ACTIVITIES

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Abstract

In the labor market, it has been shown that to have the ability to work as a team is very important. Since the work of university teachers is to form as best as possible students, it is considered that it should give special attention on understanding and incorporating classroom activities that may support the development of this competence of teamwork. Relying in the theory that teamwork provides a deeper and more meaningful learning of contents, when used in a context of active methodologies, and supported by the fact that it makes positive effects on students' academic performance, motivation and attitude toward learning, we present a qualitative study of the evolution in teamwork perception for students working in groups within an academic year. In doing so, we have based our study in grounded theory, and we have used ATLAS-TI as analysis tool for process and compare two different surveys that have taken part one in the very beginning of the course, and the second one at the end of the course after the interventions. As a later step, we present a quantitative analysis of the evolution of the different typology of perceptions and its relation with the work done in each course. Thus, this paper pursues two objectives: first, to be able to categorize in terms of the perception of teamwork for university students, and secondly, to draw conclusions about the possible influence of the different activities in changing perceptions to the beginning and end of the course.

Keywords: Teamwork, skills, competences.

1 INTRODUCTION

Nowadays, teamwork is one of the most sought after skills in the workplace (Abbott *et al.*, 2006, Baker *et al.*, 2006, Becker, 2007, Delarue *et al.*, 2008). In this context, and immersed in the process of implementing the requirements that Bologna requires to lectures, we are trying to implement a great number of active methodologies in the classroom that may allow the students be better trained and better prepared in the most demanded professional skills for the labor market (ANECA, 2005, Pozo Muñoz *et al.*, 2011).

Using teamwork in university settings, we help the student in training a large number of skills, as for instance: interpersonal communication (Brewer & Mendelson, 2003, Christoforou & Yigit, 2008, Fruchter, 2001, Gatfield, 1999, Jenkins & Lackey, 2005, Michaelson, 2003, Orsmond *et al.*, 1996), group problem-solving (Bolton, 1999, Christoforou & Yigit, 2008, Jenkins & Lackey, 2005), leadership (Christoforou & Yigit, 2008, Jenkins & Lackey, 2005, Sheppard *et al.*, 2004), negotiation (Bolton, 1999, Brewer & Mendelson, 2003, Fruchter, 2001, Michaelson, 2003, Sheppard, Dominick, & Aronson, 2004) and time management (Bolton, 1999, Jenkins & Lackey, 2005, Young & Henquinet, 2000) among others.

Moreover, teamwork provides a deeper and more meaningful learning of contents, when used in a context of active methodologies (Wenger & Hornyak, 1999, Young & Henquinet, 2000). In addition, positive effects on students' academic performance, motivation and attitude toward learning have been shown (Anson *et al.*, 2003, Gatfield, 1999, Holtham *et al.*, 2006, Kalliath & Laiken, 2006, Michaelson, 2003, Watts *et al.*, 2006).

If we analyze teamwork from the student's point of view, some of these advantages are also highlighted. There are studies that show us that they consider group activities as more

interesting, fun and learning facilitators to traditional teaching } (Bacon *et al.*, 1999, Watts, García-Carbonell, & Llorens, 2006).

Therefore, we can conclude that teamwork is a very important aspect to be considered in university teaching and learning (Bacon, Stewart, & Silver, 1999, Bolton, 1999, Brewer & Mendelson, 2003, Chen *et al.*, 2004, Christoforou & Yigit, 2008, Fruchter, 2001, Gatfield, 1999, Kalliath & Laiken, 2006, Michaelson, 2003, O'Doherty, 2005, Sheppard, Dominick, & Aronson, 2004, Young & Henquinet, 2000).

However, despite the many advantages offered, it implies some drawbacks that hinder its implementation in regular classroom work. For instance, in certain contexts there is resistance from students, who are not used to this way of working and feel confused (Brooks & Ammons, 2003, Felder *et al.*, 1997, Holtham, Melville, & Sodhi, 2006, Wenger & Hornyak, 1999). Even sometimes they think they know to work in group, but they don't really do it, they just fragment the work into pieces and afterwards, they simply bind it, so they hardly take advantage of the benefits of this way of working. One of the most common disadvantages they accuse while working in group, is that it makes them waste a lot of time (Anson, Bernold, Crossland, Spurlin, McDermotr, & Weiss, 2003, Holtham, Melville, & Sodhi, 2006, Marin-Garcia & Lloret, 2008, Struyven *et al.*, 2005).

If we analyze the drawbacks raised by the lecturers (Bolton, 1999, Holtham, Melville, & Sodhi, 2006), we find, among others: the lack of time in the class (this impedes incorporate group activities because they are slow and prevent the syllabus can be completed); the lecturers does not really know how to organize group activities or does not have time to prepare them; the lecturers fear losing control of the class (Michaelson, 2003, Wenger & Hornyak, 1999); or they have difficulties in assessing group work properly (Anson, Bernold, Crossland, Spurlin, McDermotr, & Weiss, 2003, Bacon, Stewart, & Silver, 1999, Lloret & Marin-Garcia, 2007).

Finally, noteworthy that, in the competitive world where we live in, in general, students are often not prepared for teamwork. In a mismanaged team, it is very common that conflicts arise among team members, or that even the result of teamwork is less than the quality obtained through individual work. For this reason, and since in real life, they will probably have to work with others who do not necessarily they will have chosen, it is important to learn to work in groups, so they need time, training and practice for it (Shtub, 2001, Young & Henquinet, 2000).

This paper shows the result of practical experience implementing various methodologies to encourage active teamwork in the classroom. Our goal is to check the evolution undergone by students throughout the course as a result of the actions taken. This paper pursues two objectives: first, to be able to categorize in terms of the perception of teamwork for university students, and secondly, to draw conclusions about the possible influence of the different activities in changing perceptions to the beginning and end of the course.

The methodology employed for this study is based in Grounded theory. Grounded theory is one of the most commonly used for qualitative analysis. According to this theory, the data form the foundation of theory and analysis of the data generates the built concepts. The aim of using this methodology is to eliminate prejudices that may have prior to the study of a certain issue and build theory from the field data obtained from a systematic and rigorous way (Glaser & Holton, 2004, Glaser & Strauss, 1967, O'Reilly *et al.*, 2012).

The structure of the paper is as follows: in section 2 the experience analyzed is described, specifically, the activities undertaken in each of the subjects are described. In section 3 we describe the material that is available for analysis, that is, the surveys of students in two different courses, and the methodology used. In section 4, we present the results obtained regarding the qualitative analysis that allows us to obtain a list of perceptions, as well as the quantitative analysis allows us to assess your progress relating it to the activities in the classroom.

2 EXPERIENCE DESCRIPTION

The experience was conducted in this academic year 2012-2013 in two semester courses of two different degrees from the School of Industrial Design Engineering at the Polytechnic University of Valencia. Specifically, the subjects chosen for experience are 'Marketing and Legal Aspects', in the 4th year of Engineering Degree in Industrial Design, and 'Business

Organization', in the 3rd year of Electrical Engineering Degree. It should be noted that the experience has been carried out during the practices of both subjects, regardless of the actions undertaken in the theory part.

Regarding the Marketing and Legal Aspects course is a mandatory semester course with 94 students enrolled in the 2012-2013 academic year. The course has a total of 15 hours of training (practical part) that comprises 7 practices 2 hours long. For the development of each lab, students are divided into 4 groups with an average of 20-25 students per class. The purpose of these practices is the implementation of a marketing plan throughout the semester. The content of the project to be undertaken is fragmented along the 7 different classes, although part of it requires autonomous work outside the classroom. During the first session both, the members of each team, and the scope of the marketing plan, are defined; keeping both unchanged throughout the semester. We work mainly by project-based learning.

Regarding the 'Business organization' course, it is a mandatory semester course with 94 students enrolled in the 2012-2013 academic year. The course has a total of 20 hours of training (practical part) that comprises 5 practices 4 hours long. For the development of each lab, students are divided into 4 groups with an average of 25 students per class. In this course, unlike the previous one, there isn't a link between the different practices, each of which has independent content. Each practice requires previous preparation by autonomous work, for an estimated time on average in 40 min. Two of the 5 practice also a later autonomous work of about 40 min. The composition of the working groups is also different for each practice. For the first one, third one and fifth one, the students are distributed in groups of 4. For the second one they work all together (group of 25). And for the fourth one, there is no team work at all. We work mainly by project-based learning, and cooperative-learnig.

3 MATERIALS AND METHODOLOGY

Materials

To measure the evolution of students' perceptions of teamwork, we performed a qualitative study comparing perceptions at two different times, before and after interventions in the classroom, that is, at the beginning of the course, and the end.

To encourage participation of students in this research, they are informed that one of the objectives pursued by it is to identify potential opportunities for improvement in the activities undertaken in the course towards the achievement of better quality of teamwork performance by students. The activity does not arise as compulsory for students, however offered a reward for participating in the same, namely to 0.3 extra points in the final grade for this part of the course.

The surveys used are qualitative, and consist of short questions open-ended, with limited space and time to reply. The survey was sent through the institutional e-learning platform called PoliformaT UPV. The surveys sent were available from an opening date until an end date. Students could not respond outside the preset period to avoid disrupting the information. The questionnaires were designed to capture the initial perception of the students about teamwork, before the interventions in the classroom, as result of their previous knowledge and experience. The second part of the questionnaire is designed to identify how their perception has changed after interventions in the classroom.

We present in tables 1 and 2 the questions from both surveys.

Table 1. Initial questionnaire

1. Explain briefly what is for you teamwork. Write at least 3 facts
2. Advantages and disadvantages of teamwork
3. What kind of commitment would you demand your team?
4. What do you think you can contribute to your team?

Table 2. Final questionnaire

1. Write some specific examples of something you have learned working in group that you probably would not have learned working individually.
2. What do you think that you have contributed to your team when you've worked in a group? Indicates some specific examples of something that another member of the team has learned from you that he/she probably would not have learned working in a different way.
3. Suggest a change for the group to improve its effectiveness
4. After this experience of team work, what kind of commitment you would demand a team?
5. After this experience of teamwork, explain briefly what does teamwork mean for you. Give us at least 3 facts.
6. After this experience of teamwork, indicates which advantages and disadvantages do you find in teamwork.

Participation of students is shown in the following table (table 3)

Table 3. Student's participation

Course	Enrolled students	Not participating in the survey	Just participating in the initial survey	Just participating in the final survey	Participating in both surveys
Business Organisation	94 (100%)	16 (17%)	33 (35.1%)	2 (2.1%)	42 (44.7%)
Marketing and Legal Aspects	94 (100%)	25 (26.6%)	20 (21.3%)	4 (4.2%)	45 (47.9%)

As it is shown in table 3, participation of students of 'Marketing and legal aspects' is slightly higher. It is also noted that for the course 'Business Organization' percentage survey dropouts despite having started at the beginning of course is higher than for 'marketing and legal aspect' course. One justification for this fact is that in 'Business Organization' course, teamwork activities are not as relevant to the development of the classes and the project derived from them, as to the activities holding in 'Marketing and legal aspects' course.

Methodology: Qualitative and Quantitative Analysis

The first step of the analysis is qualitative. We have analyzed the data using ATLAS.TI tool. The purpose is to codify the initial and final perception of the students about teamwork. ATLAS.TI is a powerful tool for the qualitative analysis of large bodies of textual, graphical, audio and video data. In order to start the analysis, we imported the answers of the questionnaires from Excel to csv format. Each answer is transformed into a primary document with the student ID as identification of the document.

The objective of this stage is to encode the different perceptions of teamwork from all the primary documents (including initial and final responses of students). As we move forward in the treatment of primary documents, new codes are being identified, to the point of theoretical saturation, each of these codes is related to an assertion from the original document. The theoretical saturation point, is the point from which the researcher decides not to seek more information related to a given category, since from that point, there isn't any additional information that allows the analyst to develop new properties of the category. For this work, when we had processed 45% of primary documents, such theoretical saturation point had been reached. However, we continued processing all primary documents since we wanted to observe the evolution of perception for all students in the sample for each of the subjects.

As a result of analysis of the survey, we obtained 14 perceptions of teamwork (called codes in ATLAS.TI). These codes are shown in the results section. Each of these codes has a specific number of statements from the students that supports them, this figure is called 'quotations' in ATLAS.TI.

Once we had all the information codify and quoted, we went through a quantitative analysis using ATLAS.TI tool.

4 RESULTS AND ANALYSIS

As a result of the qualitative analysis with ATLAS.ti, we obtained the codes shown in table 4, as student perception of teamwork, with the corresponding quote.

Table 4. Perceptions and quotes

Course/ perception	Business Organisation		Marketing and Legal Aspects	
	Initial survey	Final survey	Initial survey	Final survey
1. The best way to work	1	2	0	2
2. Almost the best way to work	2	2	3	4
3. An opportunity to learn new concepts	11	17	21	16
4. An opportunity to get better results	26	26	17	18
5. An opportunity to help others	15	15	14	14
6. An opportunity to do less work or under less pressure	10	9	2	1
7. A way of working that implies job tasks division	4	1	3	0
8. A way of working that wastes more resources than individual work (time, coordination, planning)	18	23	18	4
9. A way of working in which, as a consequence of job tasks division, there are always problems for integration	0	0	1	3
10. A way of working that involves conflicting opinions (you can't do whatever you want)	15	9	25	3
11. A way of working that can imply problems in time availability	2	1	10	11
12. A way of working that can imply that the leader imposes his/her criteria on the rest of team members.	16	7	2	0
13. A way of working in which you may work with people with different requirement levels, and that can imply differences in workload and responsibilities and therefore unfair results	11	22	24	12
14. A way of working that may imply a source of personal problems	17	12	15	3

The first 7th perceptions for the students are positive. However, it is worthy to be noted that the perception 6th and 7th are not positive really. Perception 6th 'An opportunity to do less work or under less pressure', it is not positive since they give it an approach to avoid responsibility. On the other hand, perception 7th 'A way of working that implies job tasks division', does not define properly teamwork as a way to find synergies and get further together, but only a way to divide the job and do less work. This perception is related to the perception 9th, where they put emphasis in the integrating process required after the small parts of the jobs are done. Despite this fact, for this work, we have considered the first 7 perceptions as positive as students do so and we are measuring their perception. Perceptions from 8th to 14th are considered negative.

From the positive perceptions, we note that the most frequent, in both the initial and final survey, is 4th which states that teamwork is an opportunity to get better results, It can be highlighted some of the statements of the students for which this perception has been created:

"The final work is more complete, thanks to the pooling of all the team members"; "The advantages of working in teams are the joint and dialogued work, which is much more mature in my opinion"

The 5th perception is worthy of note too. It states that team work is an opportunity to help others:

“To help giving ideas and solutions. To collaborate in the development of the project”, “To help each other”

Regarding to negative perceptions, the most frequent citations are those which refer to the 13th perception that claims that teamwork is a way of working which is a problem because you work with people with different requirement levels and that can imply differences in workload and responsibilities and therefore unfair results:

“Some team members always have more workload than others and most of the time ,there is not the same level of commitment to between them”, “Some members of the group work harder than others”, “There is a lack of commitment from peers”

It is also very frequent the appreciation of perception 8th which states that teamwork is a way of working that wastes more resources than individual work (time, coordination, planning):

“The disadvantages are that if group members do not work well together, they cannot reach the desired goal, they may require a greater level of planning”, “you lose a lot of time when planning and dividing the work”, “The time required to complete the project or activity is greater than doing alone, since it is more difficult to reach a consensus on which solution is the best to be adopted”

In the initial surveys for both courses is due to be noted the strength of perception 10th that states that teamwork is a way of working that involves conflicting opinions:

“There are difficulties to choose or reach agreement”, “Most of the times there is no way to reach agreement”, “non-conformity of opinions”.

We show below in table 5, an aggregate summary of the students who have had both positive and negative perceptions in the initial and final survey for each courses, and the number of quotes associated to this perceptions. For ‘Business Organisation’ course, you can see that, in both, initial and final surveys, all the students expressed statements that were coded as positive perceptions about teamwork. Moreover, the average quote per student slightly rises in the final survey. In ‘Marketing and Legal Aspects’ course, all the students expressed positive perceptions also in the initial survey, however, 7 student (15,5%) doesn’t show positive perceptions although the average quota per student increases compared to the initial survey. As far as the negative perceptions concern, only 2 students enrolled in ‘Business Organisation’ course (5%) do not express any negative perception in the final survey. Thus, the average quote per student in negative citations is slightly larger than in the initial survey. In ‘Marketing and Legal Aspects’ course, there is a considerable decrease in the number of students who do not have negative perceptions in the final survey (26,2%), although the average citations increases.

Table 5. Summary of positive and negative perceptions

Course	Initial survey						Final survey					
	Positive perceptions			Negative perceptions			Positive perceptions			Negative perceptions		
	Students	Quote	Average (Quote/students)	Students	Quote	Average (Quote/students)	Students	Quote	Average (Quote/students)	Students	Quote	Average (Quote/students)
Business Organisation	42	69	1.64	39	79	2.02	42	72	1.71	37	74	2.17
Marketing and Legal Aspects	45	60	1.33	42	31	0.74	37	55	1.48	31	36	1.16

Finally, we can conclude from this aggregated summary table 5 that there were no major changes in the perceptions of students for ‘Business Organisation’ course, being always more marked the negative perceptions than positive both before and after the intervention. However, the changes in perceptions on ‘Marketing and Legal Aspects’ course are more pronounced.

In order to assess the evolution of the perception of the students, we establish a criterion to define what we will call students with positive, negative and neutral vision in teamwork terms.

For each student, we count the number of positive and negative perceptions expressed in the survey responses, both initial and final, and we proceed to their subtraction. If the subtraction is positive, it implies that the student in question perceives more positive aspects than negatives about teamwork so we will affirm that he/she has a positive view of it. Otherwise, ie if the subtraction is negative, we will suggest that the student's vision is negative, since it has more negative than positive perceptions about teamwork. In the case where the subtraction is zero, we will suggest that the student has a neutral view on teamwork. In table 6 the result of this operations is shown.

Table 6. Vision of students about teamwork

Course	Students with positive vision		Students with negative vision		Students with neutral vision	
	Initial survey	Final survey	Initial survey	Final survey	Initial survey	Final survey
Business Organisation	8	12	19	18	15	12
Marketing and Legal Aspects	8	17	23	12	14	16

We can see how, for the 'Business Organization' course, as the data of Table 3 has shown in advance, the results of the initial and final surveys are more stable than for the 'Marketing and Legal Aspects' course. Students with negative vision of teamwork enrolled in 'Business Organization' course almost maintained that vision after the interventions in class. However, 52% of the students enrolled in 'Marketing and Legal Aspects' course having a negative vision of teamwork leave this perception. Particularly, as it is shown in table 5, the majority goes to increase the number of students who have a positive vision of teamwork. This category increased by 112%, the rest goes for the neutral vision which rise slightly (14%). For 'Business Organisation' course, the amount of students having a positive vision rises in 50% while decrease students having neutral vision.

5 CONCLUSIONS

As a result of this work, we have achieved both objectives we set out initially. On one hand, we have been able to establish 14 perceptions of teamwork from the survey carried out in two different courses taught at the University Polytechnic of Valencia, by analyzing the information gathered from the perception of students enrolled in the courses using ATLAS.TI tool. These 14 perceptions have been classified as those representing either a positive perception, or a negative perception of teamwork for the students. This is very interesting because it allows us to assess developments in the students' vision of teamwork during the course, gathering the number of positive and negative perceptions of it. Thus, from the quantitative analysis of the number of each student's perception and their evolution, we can obtain the following conclusions:

For 'Business Organisation' course, the teamwork has been carried out without maintaining continuity in the number or identity of students forming the teams, and teamwork has been limited to the hours of class using case-method as active methodology. When analyzing the aggregated perceptions changes are not that great. If we focus on the evolution of the cluster of perceptions, known as student's vision on team work, we can conclude that students' negative vision do not improve, however, the positive vision increases 50%.

Regarding to 'Marketing and Legal Aspects' course, the teamwork was focused on cooperative learning and project-based learning, in which students remained in the same workgroup throughout the semester. For the proper development of the work, it was necessary interaction of students outside class hours. In this context quite large changes have been observed throughout the semester. 52% of the students with a negative vision of teamwork at the beginning of the semester, after carrying out the Project changed their vision to positive. Students having neutral vision remain without large changes.

As a conclusion of this study, we can state that the implementation of methodologies such as case studies, cooperative learning or project-based learning, in a context of teamwork, increases the number of students having a positive vision of teamwork. Particularly, this

increase is much greater when using cooperative learning within stable groups during an academic semester.

As future research it is propose to increase study comparing the perceptions of students in courses in which computer-based activities are different from those presented here, in the same or different degrees or not to share the same teaching center. It would also be interesting in future surveys providing experiences raising a priori list of insights gained in this work to compare the results

Agreements

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