Cooperative assessment in the hands on skills of computer networks subjects

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Abstract—**The cooperative assessment system promotes teamwork, increases the mental practice and develops the social skills that are so necessary in the working life. In this paper we present the experiences and methodologies undertaken to assess the subjects "Local Area Networks" and "Networks Integration" of the Degree in Technical Engineering in Telecommunications of the Higher Polytechnic School of Gandia of the Polytechnic University of Valencia, Spain. This courses attempt to stimulate the students' motivation and teamwork through various activities and to provide the appropriate training to safely resolve situations that may be happen in real life. This article shows the opinions of the students, their feedback and their marks. All these data will be used to improve the teaching methodology for the next year. Finally, we can say that the main aim of the courses has been achieved, because the survey results, the opinions of these students, and their marks have been very satisfactory.**

Keywords- Cooperative assessment, Collaborative groups, Work in groups, Problem-Based Learning.

I. INTRODUCTION

The assessment of the student's training, as an individual or as a part of a group, is a process that has to be continuously done along the course. Moreover, the end of the teaching period carries a closure and any closure involves some results review. But, what and how should we evaluate it? These questions are very difficult to answer when a complete assessment of the skills of the students is wanted.

The evaluation can be conceptualized from different points of view. It is important to know the difference between the formative evaluation and the summative evaluation. In the first type of evaluation, the information is used to guide and to improve the learning and training processes. In the summative assessment, the information is used to determine the student's final mark, which gives the learning level of the student, and the marks that are added to the final part.

Sometimes the assessment process may be understood as a set of useful tools in order to improve the quality of the teaching-learning process. The relationship between the quality of teaching and the evaluation is narrow and, generally, it is difficult to mention one of them and forget the other concept.

According to [1], the training assessment is not only to measure, qualify or to grade the student answers. It is neither to sort nor to examine the students. Nevertheless, the assessment is usually related to many activities like qualify, measure, edit, sort, certify, review or pass the tests, etc. Both concepts share a semantic field, but it should not be any confusion between them. Both concepts are differentiated by the resources, its use and its serving purposes. The training assessment allows improving the practice. The non-training assessment, where you cannot learn from the assessment, should be excluded in the basic levels of education. The evaluation process should be a resource for training and a learning opportunity.

In [2], Rodriguez et al. recommend that a practical assessment has to be objective, comprehensive, brief and very practical. In [3], we can see that practical assessments carry some difficulties. There are some problems that often appear when a hands on skills session is given in the laboratory. These are me main ones:

- The lack of attention to the lecturer explanations. When the students have a computer connected almost always to Internet, while they are in the laboratory, they usually read the mail, see some Social Network like Facebook, Friendster or Hi, finish the hands on skills of previous sessions, etc.

- The lack of customized attention. The overcrowding of the laboratory classes force large groups of students, thus the individual attention is very limited. Not so much time can be devoted for each student.

- It is difficult to detect possible problems of understanding before the final correction of the practice is done. Questions like "do you understand?", "is there any question?" or "is there any doubt?" usually do not provide any feedback from the students.

- The lack of material resources and equipment is a problem that must be considered. Usually the laboratory equipment has to be shared by several students.

- Practical sessions imply a greater dedication by the lecturer in the stage of activities preparation and in their correction.

In contrast to the issues previously mentioned, and due to the technological advances, the learning process is being centered on the student figure (learning) and not so much on the lecturer figure (teaching) [4]. For this reason, problem-based learning (PBL) methods are used. According to [5], PBL can be defined as the learning method that ensues to work towards the knowledge of the problem resolutions. The PBL method is based on the following rules [6]:

- The students have to assume the responsibility of their own learning.

- The problems should be intentionally unstructured and it should allow free interpretations.

- The learning should be directed towards a wide range of possibilities, not towards a single knowledge specialization.

- The concepts learned in the study stages and in the independent learning must be applied to the proposed problem.

- On one hand, it is necessary a final synthesis of the learned information and, on the other hand, it is necessary to define what concepts have been learned, and which ones would be necessary to be reinforced before initiating the evaluation process.

- The evaluation and auto-evaluation must be done when a problem is finished and at the moment of ending the chapter.

- The individual student evaluation must be realized always bearing in mind the proposed aims.

- The topics and the activities should be focused always to real-life examples and these activities should contribute the values of the social and professional areas.

- The cooperative teamwork, the collaborative learning and the personal autonomy, have to be taken as the essential keys of the work.

- The PBL should constitute the pedagogic base of the curriculum and not only a part of the education.

The students assume major freedom of action and responsibility in PBL. Moreover, the lecturer takes a new role, that is, to direct the students through the learning process. The success of the PBL highly depends on the preparation, the background and the training of the lecturer. In general, PBL must allow developing the professional qualities that are demanded in the current world: constant learning, autonomy, teamwork, critical spirit, communication capacity and planning.

One of the main problems in the cooperative methodology assessment is to evaluate the individual marks of the student's knowledge about the content of the subject. To evaluate the cooperative competences learned during their cooperative tasks is also difficult. The lecturers must

also control shirk students and the students' cooperation [7] [8].

The rest of paper is structured as follows. Section 2 describes some works and gives some related experiences about the assessment process of the student's training. Section 3 explains our didactic methodology and cooperative assessment. The teaching process and a survey performed by the students to evaluate the method are explained in Section 4. Section 5 shows the students' opinion. The student's marks are presented in section 6. Finally, Section 7 gives the conclusions.

II. RELATED WORK

A special interest in the use of collaborative teaching methodologies in the teaching-learning process of student [9][10] and lecturers [11] is in the university training. This happens mainly due to the benefits provided by these methodologies to the students, in addition to the skills that they develop.

One of the first questions we must be asked before starting any collaborative methodology is what issues must the teachers bear in mind before designing a cooperative learning program?. It was discussed by E. G. Cohen et al. in [12]. They presented different pedagogical methods performed in the Toronto University that are related with the cooperative learning. There are other pedagogical methods for Classroom Practices that are based on cooperative learning such as the ones presented in [13]. These ones have inspired us to perform our methodology.

With the renewal of the study plans and the migration towards the Bologna Process, many schools and centers have included modifications in some of their subjects and have gathered the results at the end of the course to compare it with the previous experiences. An example is given by the EUETIB (Escuela Universitaria de Ingeniería Técnica Industrial de Barcelona) [14]. It has reviewed and improved the objectives and programs of different subjects applying the techniques of CL (Cooperative Learning). A. Perez et al. show in their paper the academic achievements in the first year of implementation of these subjects. The results were satisfactory and the cooperative learning experiences have proved to be a motivational tool to improve the academic outcomes compared to their performance in individual tests. In addition students appreciated the functioning of these subjects.

Another related work about practice training is shown in [3]. It is presented by M. Riesco et al. The authors analyze the consequences of implementing the system of electronic answer (Electronic Response Systems), also named Classroom Communication Systems. This system has been used from the ends of the 50s as a reinforcement to the teaching of different matters at different levels. These systems attempt to provide a technical element to each student and allow them to interact with the lecturer. The authors say that despite of its diffusion throughout the world, there is no record of an employment in Spanish universities.

Another example can be found in [15], where M. Marques et al. explain the experiments carried out with some students. Their main goal was to improve the students' motivation through different activities. These experiments are applied in a subject called "Design and management of databases". They change the training methodology and even the qualifications weighting, giving, for example, major weight to the practical activities than to the theoretical ones.

Since several years ago, several lecturers of the Higher Polytechnic School of Gandia, of the Polytechnic University of Valencia, are working with the introduction of different types of training methodologies. These skills are applied to different subjects of the Degree in Technical Engineering in Telecommunications [16]. Collaborative Learning is the method that is used in the subjects "Local Area Networks" and "Networks Integration". Both subjects are placed in the third course (last course of the degree), thus it is the best place where collaborative learning could be implemented because when the students finish they would collaborate with other partners in the enterprise.

III. COOPERATIVE EVALUATION

First of all we must define the meaning of cooperative learning. In general, it is a pedagogic skill where the students work together towards the attainment of a common target and every individual will reach the aforementioned target if – and only if – the rest of members of the cooperative group also reach it [17].

In order to evaluate the teaching-learning process, the following methodology of cooperative assessment has been designed. The activities that will be explained are focused on learning methods based on problems (PBL). These activities serve as a preparation for the student in order to meet several scenarios that emulate real world problems. When this stage is finished, several problems, similar the previous ones, will be followed as evaluation criteria in order to value the attainment of the proposed targets. This assessment system has been performed for several years in the third course in Degree in Technical Engineering in Telecommunications of the Higher Polytechnic School of Gandia, Valencia, Spain. The overall length is eight months divided into two parts. The first four-month period prepares the students to overcome problems in the field of local area networks (the subject is called "Local Area Networks"). In the second four-month period the complexity is higher because the students work with wide area networks and they should be able to integrate these networks (the subject is called "Networks Integration").

One of the best teaching methodologies to perform this procedure is through practical training. The lecturer accommodates the theoretical contents previously learned in the classroom to the practical training. In each practice there is a theoretical introduction to the practice that has to be done by the students. The students use a guide to follow the practice. The guide introduces the student to the different activities that have to be performed. Along the guide, there are various items that the students must fill up as process control in order to encourage their self-assessment and their learning. We must highlight the cooperative aspect of the practical activity, because even though the students have a guide that helps them to carry out the practice, they will not be able to finish it until the partners don't finish their part correctly. After it, they will be able to check the proper running of their configuration.

During the first four-month period the general concepts and objectives to be evaluated are the following ones:

- The knowledge of the basic elements of a local area network and the network configuration of Windows XP Operative System.
- Windows XP network commands and network troubleshooting.
- Setting up a Windows 2003 Server.
- Wire Cabling, crimping and test.
- Configuration of Linux Operative System.
- Network Configuration of Linux Operating System.
- Installing a WLAN network.
- Allied Telesyn switches configuration.
- Cisco Catalyst switches configuration.
- Routing between VLANs using Allied Telesyn devices.

Along the second four-month period the general concepts and objectives to be assessed are:

- Routing between VLANs using Cisco Systems switches and routers.
- NAT and PAT configuration in Cisco Systems Routers.
- NAT and PAT configuration in Allied Telesyn routers.
- Cisco router Command Line Interface.
- RIP routing protocol configuration with Cisco Systems routers.
- RIP routing protocol configuration with Allied Telesyn routers.
- OSPF routing protocol configuration with Cisco System routers.
- OSPF routing protocol configuration with Allied Telesyn routers.
- LANs interconnection using 3COM ISDN routers.
- LANs interconnection using HDLC and PPP in Cisco Systems Serial interfaces.
- Installation and configuration of a Frame Relay network using Cisco Systems routers.
- SNMP management.

We can observe that the practices touch a wide range of topics related with local area networks (in the first four-month period) and integration systems (in the second four-month period). They have been elected in order to cover all knowledge needed by a student to build a local area network of an enterprise in the first one and, in the second one, to interconnect data networks from different locations (headquarters with its branches, central office with remote or mobile workers, etc.)

The evaluation criterion is established according to the following objective: The student will pass the subject only if the lecturer will recommend that student to an enterprise when it looks for someone to carry out the same issues in the real world.

The main goal of the assessment system is to motivate student's continuous learning, promote the team working and to develop the student's communication and scheduling abilities. The evaluation is mainly divided into two stages in each four-month period.

In one stage the student applies the acquired theoretical knowledge to practice sessions. In order to do so, a guide with the steps to follow for each practice session is developed. Initially, the practice is performed individually, but in a certain stages, it can't be completed unless another student has finished his task, so it is needed collaboration. That is, the student needs a partner to carry out his/her task because if they perform their part correctly, all the system will function properly. On the other hand, if a student has any sort of doubt he/she may exchange his/her opinion with other students. This learning process will always be supervised by the lecturer. The supervision will be focused on the group dynamics when it is required or whenever he considers necessary for the optimum development of the activity. In order to pass to the next stage, the student has to complete the 80% of the practical activities at least.

In the assessment stage, a final practice assessment using students' collaboration is made. In order to complete the this stage, the student will have at his/her disposal all the devices and tools he/she may need (wire, crimping tools, routers, switches, Personal computers,…) in order to carry out the assessment. These devices and tools are the ones that have been used in the practical activities performed in the first stage. A laboratory is also available during several days for the students that want to repeat the practices or to practice with new situations. During the week before the practical assessment, the lecturer will answer the questions made by the students and will propose similar topologies in order to improve their practical knowledge. The participation and assistance during this week is optional.

In the final practice assessment a real situation is simulated. It is presented to the students 24 hours before the exam date. It lets the students to prepare it and to plan an appropriate organization to face the problem raised. During those 24 hours the students are able to consult the practices they have done before and go to the laboratory in order to test any configuration. They can also exchange information with other students in order to find the correct configuration.

When the final practice assessment takes place; the lecturer randomly assigns students to several groups (although it can be done letting them to organize the groups). The students must collaborate with their partners in order to perform their task. The tasks will also be assigned randomly, but the lecturer could introduce some new problems, even discrimination, because every task shows different level of difficulties.

The information given to the student is the following one:

- The lecturer is only an observer of the work. He/she will not give solutions or give any clues about the proper solution.

- The individual task has to be fully configured in 2 hours. There is also half an hour for helping other students.

- The assessment is evaluated as follows:

  1. Group task:
     - Cooperating and collaborating between the members of the group.
     - Total time needed to configure the network. If it has been done in less time, they will be awarded.
  2. Individual task.
     - The correct configuration of the individual task.
     - Level of difficulty of the task assigned (notice that it is more important to correctly terminate an easy task rather than not finish a harder one).

- Recommendations to do the exam:

  1. To make democratically a work plan among the group members to perform the activity.
  2. Assign the roles of the group members. But, with no student names assigned to them.
  3. Execute harder tasks with the help of other students (more solutions in case of not having the right result).
  4. Do not install or uninstall drivers unless it is necessary. These should be fully working.
  5. It is recommended to set hardware to default settings (switches, routers, access points,…)
  6. Support each other in order to solve the tasks and promote a good environment between the members of the group.
  7. Always be in calm in case of having any problem during the activity.
  8. Have an alternative plan in case undesired results.

- Test goals:

  1. The network should be finished in a given time.
  2. Obtain the proper results when the lecturer tests the network.

- Gather the network assessment data, solve the problems found during the assessment and answer the questions.

To conclude the description of this assessment system, we now shall talk about which is the criteria used to put the students' marks. The group mark will depend on the global results obtained by the group for the hands on skills assessment. The individual mark is obtained according to grade of correctness and the collaboration or the information exchange between the students during the exam. The final mark is obtained from both, the individual and the group mark. The lecturer assigns the mark based on his observation and supervision when the practice assessment is done. The lecturer checks that each task is performed correctly and that the dependences between tasks are well done. These dependences help the lecturer to know the collaboration between the students in both individual and between the members of the group.

Generally, if the student's task is not well done, his/her mark is bad. Moreover the group's mark will be affected. It happens because the lecturer considers that the group has not collaborated with this student enough to carry out that task. Thus, if there is not any collaboration between the students, it will affect negatively the final mark of the group.

IV. STUDENTS' OPINION

Once the final practice assessment and the test performed by the lecturer are finished, the student receives a questionnaire in order to know their opinion. The questions are shown in Table I. The questions give their opinions about the course, theoretical contents, if they enjoyed the practice classes and the improvement areas for a further course. The questionnaire was fully anonymous.

TABLE I.   QUESTIONNAIRE

Nº	Questions	Valuation			
		None	Little	Quite	Very Much
1	Was the theoretical knowledge enough for the practice classes?				
2	Was the material adequate?				
3	Did the facilities made easier the teamwork?				
4	Was the length of the practice classes adequate?				
5	Was the number of practice classes enough?				
6	Was the final practice assessment difficult compared to the practice classes?				
7	Does the collaborative work system make easier the learning process?				
8	Is the system used to assign marks adequate?				

A part of this questionnaire, the Polytechnic University of Valencia makes its own regular questionnaire for all subjects that are taught in every school and faculty of the university. This questionnaire is presented to the students few weeks before the course ends. They are also fully anonymous, to protect students towards any lecturer's reprisal. They evaluate aspects like didactic material, slides and books, the resource usage, quality of the master class, etc. The results are presented to the lecturer once the course has finished, thus he can self evaluate and improve his training method. But university questionnaire is different of the one presented by the lecturer at the end of the final assessment, which is more focused on the teaching method.

As a result of the questionnaire made along this work, a serial of graphs were obtained from the information gathered from all groups. The results are shown in the next section.

V. RESULTS AND DISCUSSION

The following graphs show the results of the questions. We show the answers obtained for each question. The average marks are rated over 100% of all answers obtained from the students.

Fig. 1 shows if the theoretical knowledge is enough for having the hands on skills. The 62% of them totally agree with this statement, around 38% believes that the theoretical knowledge should be wider. Assuming that students can extend their theoretical knowledge on their own, and with the huge amount of satisfied students, we conclude that theoretical knowledge and hands on skills are balanced.

The results for the second question are shown in Fig. 2. Half of the students have total grade of satisfaction with the used material, meanwhile the other half quite agree. This happens because the Higher Polytechnic School of Gandia has very well equipped laboratories in both quality and quantity. It makes the students to work very comfortable during their practical classes.

In fig. 3, the results show that almost 50% totally agree that the facilities make easier the teamwork. A 38% thinks it should be improved some how. Approximately 12% of them disagree this statement. We think that these results have not been higher because in the actual educational system the students do not work in groups. At the beginning is harder for the students and they do not notice its advantages.

Fig.4 shows that half of the group disagrees with the hands on skills length. This is mainly because if any problem appears, the time needed to finish practice increases significantly. It is important to notice that 35.50% quite agree and 13% totally agree. In further research, we will take into account if the student has previous experience. These results may give some new criteria for group formation.

Fig.5 shows that 63% of the students agree with the number of hands on skills made toward 37% that disagree. We should remember that this is a hands-on-skills-based learning method and the number of practices is quite high. The total amount of work is high, thus some students get carried better than others (which is reflected in their results).
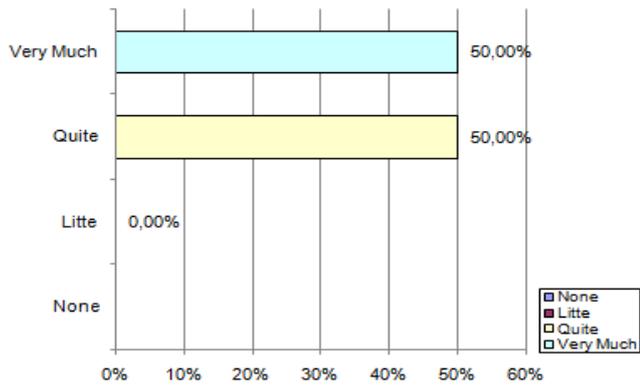
Figure 1.   Results Question 1
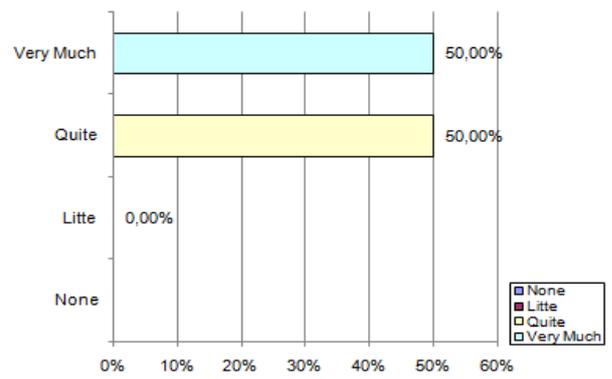
Figure 2.   Results Question 2
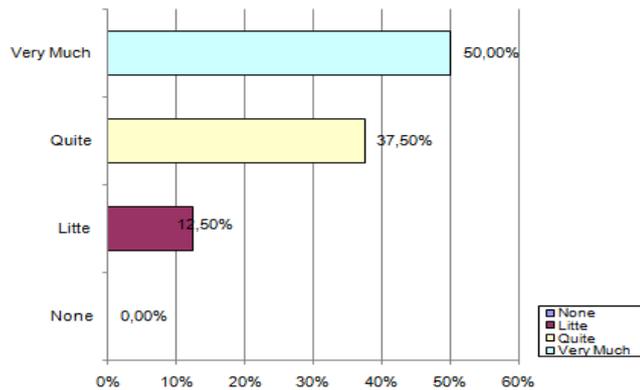
Figure 3.   Results Question 3
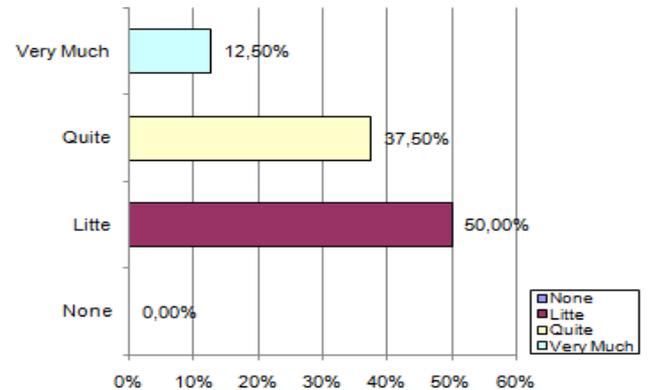
Figure 4.   Results Question 4
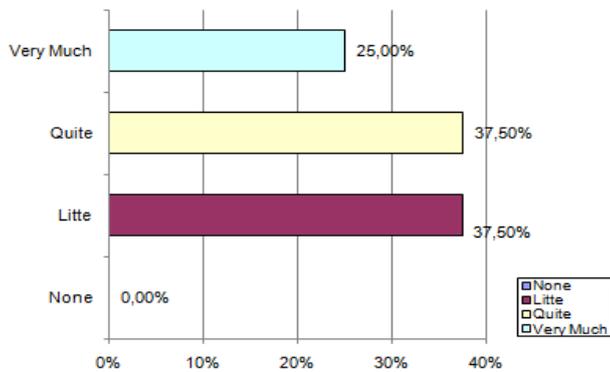
Figure 5.   Results Question 5
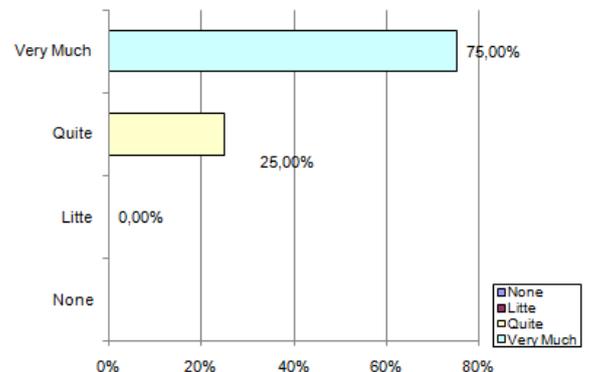
Figure 6.   Results Question 6
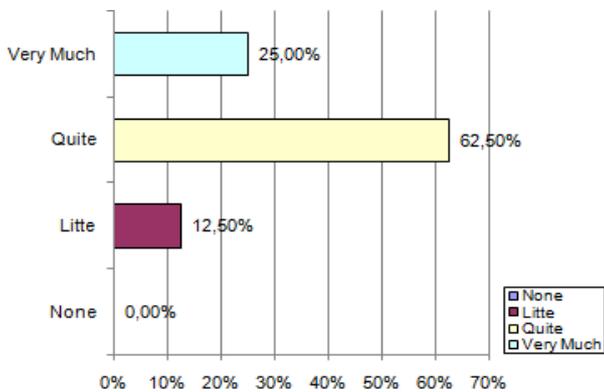
Figure 7.   Results Question 7
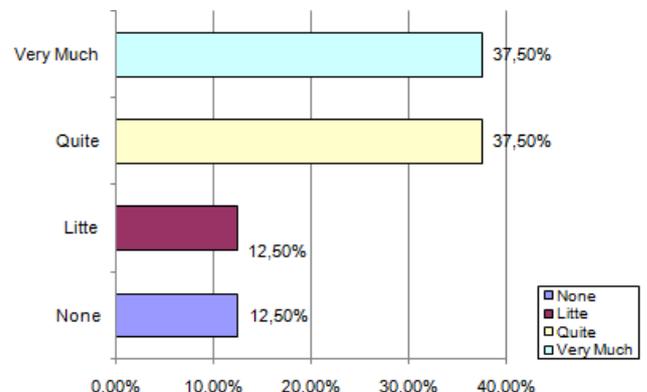
Figure 8.   Results Question 8
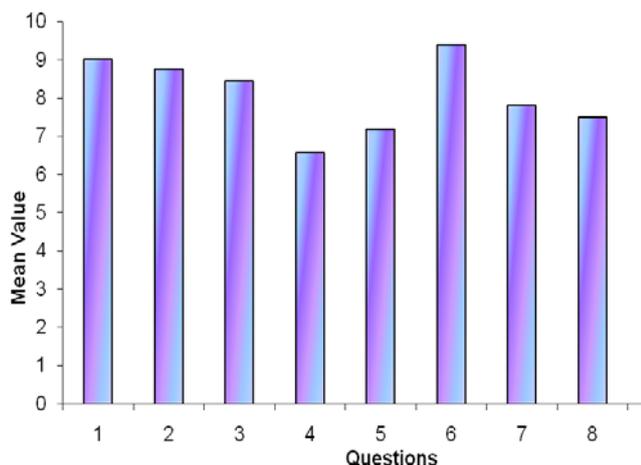
Figure 9. Mean Value about over 10 about the survey result.

When we asked the level of difficulty of the hands on skills, we see that students feel absolutely satisfied with them. Their answer is shown in fig. 6. Thus, we have achieved the goal of having the same level of difficulty in the hands on skills than in the final assessment practice.

In the question of the balance between degree of learning and team working, we obtained the results shown in Fig. 7. 87% of them agree or totally agree and very few disagree (13%). This question is quite related with question 3. The students that don't see the benefits of the teamwork will not appreciate its influence in the learning process in a collaborative work. Some students think that the collaborative work is an extra load added to the existing work instead of an exchange of experiences and knowledge. It mainly happens in those students which knowledge overcomes the others.

In the assessment system, there are different opinions. Fig.8 shows that 74% agree and 26% disagree. Notice that their mark is obtained from both, the individual and the group mark. On one side, this system let the students, which couldn't reach high marks individually, take advantage of the group marks. But, on the other side, the individual marks let us to reward the effort of the distinguished students.

In fig. 9, we see that, in a general way, students do appreciate the method used in these subjects. All questions have an average value higher than 8. Assuming that with these questions, to reach a vast number of variables is wanted, which are involved in the training-learning process, we understand that the global average of these questions are significant indicators of the degree of satisfaction and perception seen by the student.

VI.   STUDENTS' RESULTS

In this section we show the results and the global average marks obtained by the students that have undergone this training method. We highlight that the whole number of students that carried out this assessment was low because the classes are formed by reduced groups. In Local Area Networks subject there were 8 students in 2007-08 course and 14 students in 2008-09 course. In the Networks Integration subject there were 22 students in 2007-08 course and 11 students in 2008-09 course. As it has been aforementioned in this paper, we gathered data from the students of both subjects. Therefore this section shows the results obtained from both subjects during the academic years 2007-08 and 2008-09.

Table II shows the subject "Local Area Networks" during the course 07/08. There were 8 students. 6 of them made the final assessment. The average marks obtained by the students that pass the exam were 8.1 points. Figure 10 shows that the 75% of the students passed the exam, but the 12.5% did not pass it.

Figure 11 shows the global marks taken by the students of "Local Area Networks" subject during the course 2007-08. Most of them have a mark higher than 7. We can see that the students obtain high marks.

In the next year, the same subject was attended by 14 students and in this case, 11 of them made the exam. The global average mark obtained by the students that pass the assessment in this course was 7.85 points. This information can be seen in Table III.

Fig.12 shows that approximately 7% of students failed the exam, compared to 71.43% that it passed it. It demonstrates that the number of students that pass the subject is quite high.

Fig.13 shows the average marks of the students during the course 2008-09. We can see that almost all obtained marks between 6 and 10 (3 students obtained a mark between 6 and 7 and between 9 and 10, and 2 students obtained a mark between 7 and 8, and between 8 and 9).

The subject "Networks Integration" is taught in the second four-month period. During the course 2007-08, 22 students were enrolled in this subject, but 2 of them did not take the assessment. The global mean mark obtained by the students that pass the exam was 7.29 points. These values are shown in table IV.

Fig. 14 shows that only 9% of the students decided not do the final assessment. 18.18% of the students failed, but, on the other hand, the 70.72% passed it.

The average marks of the students that passed the assessment of the subject "Networks Integration", during 2007-08, remained close to 8. We can see in Fig.15 that most of the students had a mark between 7 and 8.

Network integration subject had 11 students during the year 2008-09. In this case 7 students made the exam. The average mark obtained by the students that passed the assessment of this course was 8.87 points. This information can be seen in Table V.

Fig.16 shows the percentage of the students that passed, failed and didn't do the assessment of the "Networks Integration" subject during the year 2008-09.

Finally, Fig.17 shows the students marks of the subject network integration in the year 2008-09. The mean value of the marks is between 7 and 8.

TABLE II.   LOCAL AREA NETWORKS IN 07/08

Course 07/08	Local Area Networks		
	Total Students	Students who have made the exam	Global Mean Mark
	8	6	8.1

TABLE III.   LOCAL AREA NETWORKS IN 08/09

Course 08/09	Local Area Networks		
	Total Students	Students who have made the exam	Global Mean Mark
	14	11	7.85

Local Area Network in 07/08
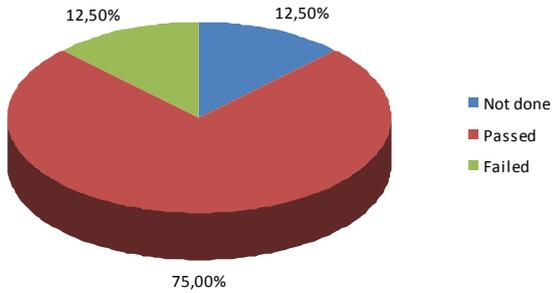
Figure 10.   Percentage of students in Local Area Networks in 07/08

Local Area Network in 07/08
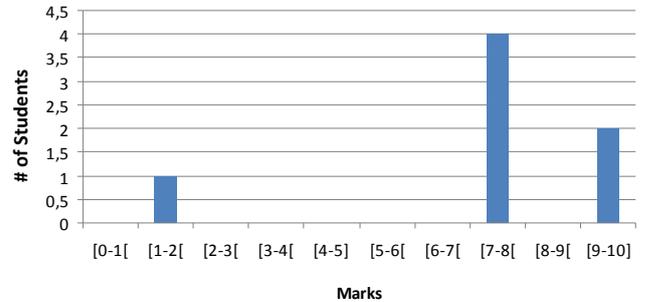
Figure 11.   Global Marks in 07/08

Local Area Network in 08/09
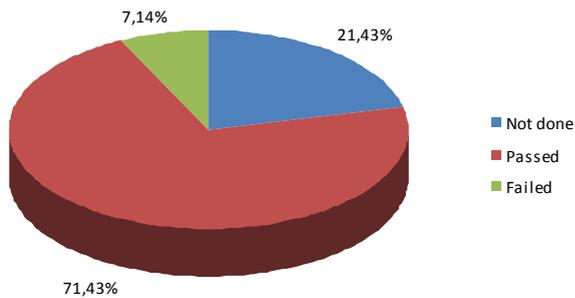
Figure 12.   Percentage of students in Local Area Networks in 08/09

Local Area Network in 08/09
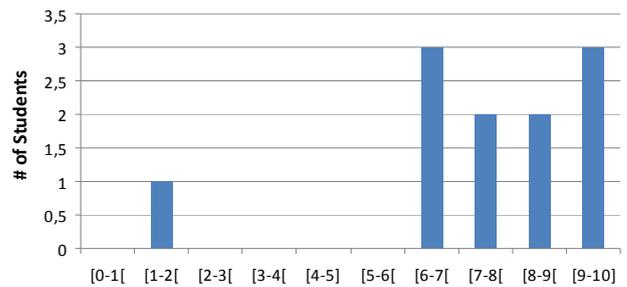
Figure 13.   Global Marks in 08/09

TABLE IV.   NETWORK INTEGRATION IN 07/08

Course 07/08	Network Integration		
	Total Students	Students who have made the exam	Global Mean Mark
	22	20	7,29

TABLE V.   NETWORK INTEGRATION IN 08/09

Course 08/09	Network Integration		
	Total Students	Students who have made the exam	Global Mean Mark
	11	7	8,87

Network Integration in 07/08
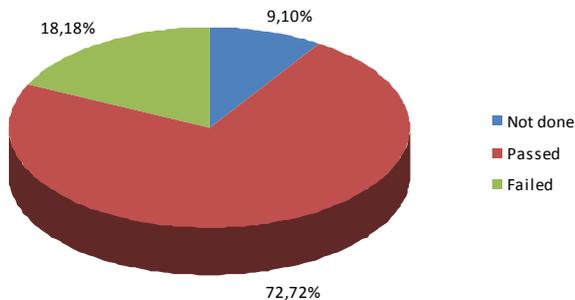
Figure 14.   Percentage of students in Network Integration in 07/08

Network Integration 07/08
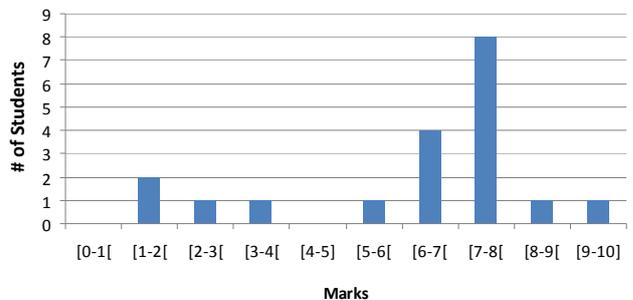
Figure 15.   Global Marks in 08/09

Network Integration in 08/09
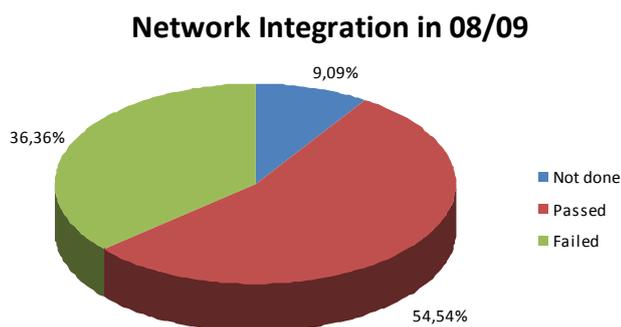
Figure 16.   Percentage of students in Network Integration in 08/09

Network Integration in 08/09
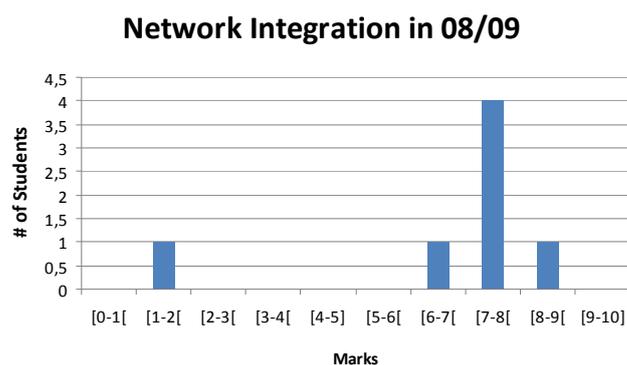
Figure 17.   Global Marks in 08/09

VII.   CONCLUSIONS

In this article a hands on skills collaborative assessment method has been presented. It is carried out in the subjects "Local Area Network" and "Networks Integration" of the Degree in Technical Engineering in Telecommunications of the Higher Polytechnic School of Gandia of the Polytechnic University of Valencia, Spain. This study shows that the method had a positive acceptance by the students. Compared to other subjects, students have higher final marks and there are more students that pass this subject than other subjects.

This study also gives us enough reasons to prove that the didactic method used in these two subjects is effective. The training-learning process has a positive feedback for the lecturers because the students are more motivated. The active learning style makes easier to acquire knowledge, which is the main goal for the lecturers and students. The hands on skills in the laboratory and the collaborative assessment push the students to learn from real situations and problems, and from the experience.

The main drawbacks or difficulties observed from the point of view of the teacher have been that the lecturer has to be a high expertise in the topics of the subject. He/she has to be able to solve any issue quickly and, always, giving an appropriate explanation. Moreover, he/she has to be updated about the new technologies in existence in the market. It is also recommendable to be in the enterprise for several years in order to learn from this environment its difficulties and problems. Then, it will be easy to transmit these skills to the students. Finally, we have to say that the first year is the one that more time is needed to implement it. The lecturer uses a lot of time designing the method and solving the holes derived from implementing a new idea. The second year is used to fix any issue observed and to systemize some parts in order to make an easy and quick implementation method.

We suppose that there is high number of students which are interested on these subjects, motivated and, finally, have passed the assessment because of the type of methodology used. Both subjects are practical and both have hands on skills assessment, which make the students to be initially interested in enrolling in it. At the end of the two subjects, students are positively surprised, because the practices that they carried out can serve them to enter a workplace and perform their duties without problems.

Now, we are working in several issues in order to improve the methodology. On one hand, we shall exhaustively analyze the way to form the assessment groups. It may be formed using any type of criteria (according to their knowledge, temper, special interests, etc.). On the other hand, we shall study the number of members in each group and their impact in the final mark.

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