

Girls' Day experience at the University of Zaragoza: attracting women to technology

Maria Villarroya-Gaudó
DIIS - EINA.
Universidad de Zaragoza
maria.villarroya@unizar.es

Raquel Trillo
DIIS - EINA.
Universidad de Zaragoza
raqueltl@unizar.es

Sandra Baldassarri
DIIS - EINA.
Universidad de Zaragoza
sandra@unizar.es

Ana C. Murillo
DIIS - EINA.
Universidad de Zaragoza
acm@unizar.es

Mayte Lozano
Centro Universitario de la
Defensa Zaragoza
maytelo@unizar.es

Piedad Garrido
Escuela Politécnica de Teruel.
Universidad de Zaragoza
piedad@unizar.es

ABSTRACT

The proportion of women in engineering and technology degrees does not reach 30%, and multiple activities are performed worldwide to change this situation. This paper presents the effects of the Girls' Day activities organized at University of Zaragoza (Aragón, Spain) yearly from 2008. It consists on a day where women who play important roles, both in business and research worlds, bring students of secondary education closer to engineering and technology. After five editions, Girls' Day has achieved an extraordinary impact: it has increased the visibility of female engineers in Aragón; more female students know what engineering is about and are willing to become one; the government and other institutions have pushed and supported the event and a collaboration network of female engineers in the region has been established.

Categories and Subject Descriptors

K.4 [Computers and Society]: Organizational Impacts: Employment

General Terms

Human Factors

Keywords

women in engineering, engineering perception, gender equality, engineering studies, girls' day, outreach activities.

1. INTRODUCTION

In many countries, including most of the European countries and US, women do not reach 30% of students in technical subjects (architecture and engineering), and their presence is even more reduced in the job market [[4], [3]]. It is known that on average women obtain better grades in their studies,

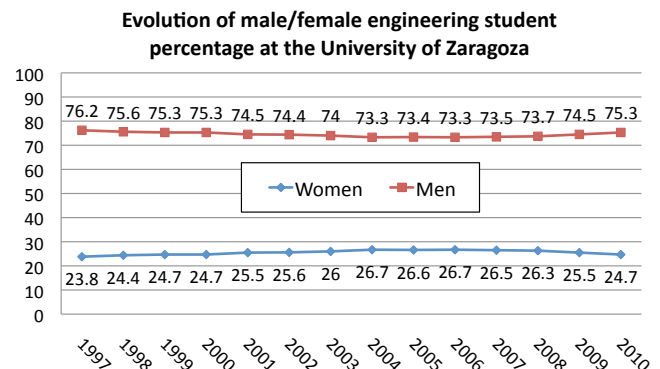


Figure 1: Evolution of students enrolled in engineering at the University of Zaragoza, between 1997 and 2010. Source: Data obtained from [[13]]

but when they are deciding their future career, they usually choose among a determined number of professions influenced by the role that society keeps assigning them.

As an example, we show the situation at the University of Zaragoza, although we have analyzed statistics from different regions and countries and the under-representation of women remains present. Small variations are found from one place to another and also within different technical disciplines, almost anecdotal. So, Aragón (the region where the University of Zaragoza is located in Spain) is not an exception. Querying the official gender statistics at University of Zaragoza [[13]], we note that during 1985-1986 women were 51% of the students finishing long-cycle studies (five year long degrees) and 70% in the case of short cycle studies (three year long degrees). By analyzing in detail engineering and architecture studies, which are the topics of interest for our case, in long-cycle only 7.8% of the students

It is necessary to encourage young people to view engineering studies as a feasible and rewarding option, which is exciting and a valuable contribution to the society. Gender diversity has demonstrated better results in plenty of fields, stronger development and higher market success. Many companies are already aware of these facts [[6]]. Governments, Univer-

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sities and industry can take important actions to encourage this trend.

Early positive experiences with technology are recognized as important to involve women in these fields, several success examples can be found worldwide [[7, 12]]. The Girls' Day event held in Germany, with more than ten years of experience, deserves special attention [[1]], since it has been the example and motivation we have followed to organize our event. Girls' Day is a one-day event that aims to introduce female students to science, technology and research. This activity is designed towards students in their final years of High School, and women holding relevant positions in either research or business show their professional activity.

The structure of the remainder of the paper is as follows: Section II describes the outreach Girls' Day activity, Section III presents the main quantitative results of the surveys done, Section IV analyzes the participants' perceptions and Section V shows the obtained conclusions.

2. GIRLS' DAY AT UNIV. OF ZARAGOZA

This section presents the Girls' Day performed at the University of Zaragoza [[2]], led by a group of female researchers. The aim of the activity has been to show examples of engineering products developed by teams that include women. The central part of the event consists of women engineer showing their own work and engineering female students guiding the tours around the different laboratories, groups and companies. During the different editions of the Girls' Day held in Zaragoza (November 11, 2008; October 28, 2009; March 23, 2011; March 28, 2012; November 6, 2013), we have lived different experiences and accumulated numerous anecdotes. These events have involved 2,700 students from multiple High Schools, 100 female researchers and senior engineers and more than 150 volunteers.

The event was aimed to students attending last years of High School, what corresponds in the Spanish Education System to the third and fourth year of Compulsory Secondary Education (ESO: *Educación Secundaria Obligatoria*) and bachelors.

In the first editions, whole classes from high school attended the event. We considered that we should get the information to every high-school student, and the information about the activity was sent to all the High Schools in the region and both girls and boys came to the event.

Student visits to the event were organized similarly in the different editions: attendance to plenary sessions, arrangement of small groups for the interactive activities and satisfaction surveys and farewell final activities. The main differences between the editions were mostly on how the students traveled to the venue (subsidized transport, public transport, on their own, etc.), the duration of visits (full day or not), the implication of companies and the size of the groups.

Plenary sessions, where all participants attended simultaneously, pursued to motivate the choice of a degree related to engineering and technology. This welcome speech was dedicated to explain a complementary vision of what engineering is and prepares the visitors for the activity. Whenever it is

possible, recently graduated female students explained their experience: they talked in detail why they chose their degree and where they currently worked. This quite informal talk was very helpful for future engineers.

The activities intended that participants in small groups get contact with different branches of engineering and technology, by performing small tasks that were appealing. During the five editions of the Girls' Day, there were multiple guided tours and workshops organized by research groups from different departments and centers of the University of Zaragoza or linked somehow with it (business chairs - university research institutes, spin-off companies, foundations, etc.). In addition, the Girls' Day journey has also had the participation of numerous industry-related engineering, technology and communication companies: well-known national and international companies have shown interest and participated in some of the events.

Before the farewell of the participating groups, they were requested to fill in an individual survey. The objective was to have mechanisms to assess the scope of the event and to improve the organization of future editions, taking into account the contributed ideas.

The variety of activities has been very broad, as well as the different ways researchers and companies communicated technology. In the first edition some companies came to the university to show that women had relevant positions and played important roles in their company final products. Sometimes, the company was responsible for the implementation of a practical activity, such as *BSH Balay*, showing an induction plate experiment.

In other activities, researchers showed their laboratories and explained their daily work, the objective of their research and how to handle complex machinery, for example, how to measure the performance of an air conditioning system. Other researchers organized interactive workshops, where the main action was performed by the students themselves. In those activities students could solder connections on a plate or program a robot, among others. It was not surprising and generally observed that interest and attention of the students grows when the activity requires a lot of interaction from the student.

In summary, our experience has included from guided tours at international company offices, to small local companies and spin-offs, as well as laboratories at the University where both fundamental and applied research is done. All the activities have been leaded always by female engineers. The main activities have been performed and organized at the Engineering and Architecture School, a large school with 5000 students, but also at Teruel Engineering School (EUP) 220 students, Centro Universitario de la Defensa (CUD), 800 students, within other Technical Schools at the University of Zaragoza. Although it was desirable to organize the same kind of activities in every location, the different realities on each school required us to customize them for each place. A short selection of the visits to companies, the characteristics of the laboratories and the experience of small Engineering Schools are presented next.



Figure 2: Visit to BitBrain Technologies: this company is a spin-off of the University of Zaragoza focused on the development and commercialization of neuro-technological applications.

2.1 Visiting Companies

Engineering is a big unknown discipline for teenagers, and even more, what an engineer can do at work. For this reason, it is also essential to invite companies to participate at our Girls' Day journeys. Big international companies detected some years ago the lack of women engineers as a problem. Some of them have even developed their own programs to attract and encourage women to apply for this kind of jobs. So, when we contacted some of these companies to join the Girls' Day initiative, it was easy to engage them.

When selecting the companies to participate, it was important the contact with universities and the transfer knowledge. Several spin-offs have been collaborating every year, and most of them have a young team, well-trained and highly motivated. The diversity of the team is a clear competitive advantage. For example, BitBrain Technologies (spin-off participating on several editions) is related to neuroscience, where it is essential the ability to focus in different ways on to the same problem. That was why BitBrain staff was composed of members with different degrees (mostly engineering but also mathematics, psychology or communications), different nationalities and is perfectly balanced in terms of number of men and women.

The spin-offs participating in the event were quite new and therefore small and innovative companies, but we considered also important the participation of big multinational companies, which have had big interest on the event. Some of them located in Zaragoza, and some other placed in Madrid or surrounding areas have also participated. These well known companies gave to the event an added value, as they were investing time in the activity, because they recognize the drawbacks of their lack of women and they were motivated to try to change that.

Therefore, despite some companies were not actively working for gender discrimination in the workplace and the reconciliation of work and personal life, they all wanted to participate, due that most of the companies valued and were keen to support initiatives that promote professional participation of women in technological fields.

2.2 Visiting Research Labs

Fortunately, more and more female professors and researchers got involved in the event each year. During the event, a lot

of different research groups showed the main goals of their research activities to the event attendees. From our point of view, it was quite important to remark that engineering is almost everywhere. So, engineering is important when building bridges or mining, but not more important than it is in medicine, health safety, comfort applications, assistance in daily tasks...

So, we have organized different types of activities with the research groups to introduce the visiting students to the engineering research world. Some of these activities have been designed as fun experiments, to demonstrate certain properties through some kind of game, while others showed the student real world research results and applications such as intelligent household appliances. Next, some of these experiments are shown, divided in these two groups.

2.2.1 Science and engineering through games

A PC as a fishbowl. An experiment to raise the curiosity of the students consisted in showing a PC in a fishbowl (as shown in Fig. 3), in order to explain the importance of components that help dissipate the heat in computing devices, and how some liquids are very good for that task.



Figure 3: Experiment performed at the computer architecture lab, a PC is used in a fishbowl to explain how heat dissipation plays an essential role in computing devices.

From Lemons to an electricity generator. One of the fun experiments designed was an exercise to generate electricity from everyday items that every student could find at home. In this experiment the students build a battery thanks to a chemical reaction, as detailed in Fig. 4.



Figure 4: Experiment performed by the High School students at Centro Universitario de la Defensa: Generating electricity with basic elements: a lemon, a nail and a coin.



Figure 5: Students analyzing the robot assigned.

A robotic workshop. Another fun activity designed to motivate while teaching engineering concepts to the students was a robotics workshop. This workshop was designed by researchers at the Robotics group (group details in next section), and it was based on previous experience in robotics courses taught in engineering degrees, adapted to the duration and previous knowledge of the students who attended the event.

The workshop was aimed at various ages, from first courses students of *ESO* until High School, in groups of about 20 participants. For the workshop different workstations in which participants made small robot programming tasks are organized. Each station had a PC and LEGO Mindstorms robot (see Fig. 5). Attendees were also provided with a script to perform the activity and prior to their group work, the researchers gave a short talk to introduce general concepts and the application of this kind of research in real world activities.

2.2.2 *Motivating applications of engineering research in daily activities*

Research on Robotics. One of the visits offered during our venues was to the Robotics, Perception and Real Time (RoPeRt) research group, at the Department of Informatics and Systems Engineering (DIIS). It is a well-known group in the field of robotics and artificial intelligence, that works on intelligent and autonomous systems to perform automatically tasks such as autonomous navigation or recognition of interest objects, such as signs or plates in a parking lot. As shown in Fig. 6, during the visit to this research lab, volunteering female Ph.D. students from the group explained advanced concepts through some demos with real robots available in the lab (such as the Pioneer robots, which are for instance used to research how to monitor the status of plants in crop-fields, or commercial systems such as vacuuming robot Roomba, used to research on additional every day tasks that could be automatically done by a robot for us). These activities tried to involve the students and be interactive, by letting the students manipulate and run demos with some smaller devices, such as various sensors and cameras. Besides the ideas and concepts explained, and probably more important for the even goals, this kind of visit allows the students to get to know how is the every day life of researchers and Ph.D. students in engineering groups.

Research on Induction Hobs. Another research visit that always got lots of attention, was the induction hob research lab, in collaboration with BSH, which showed how research



Figure 6: PhD students explaining the autonomous navigation algorithms in Pioneer robot.



Figure 7: Researcher showing the electronic circuitry of an induction hob.

activities in that laboratory, ended up improving the appliances that we use at home everyday. In this visit was explained how the induction hobs early prototypes work, how they evolved into the innovative products available today at the market, and even newer ones to come (see Fig. 7).

2.3 **Activities in Small University Schools**

Although most of the activities were organized by female professors at Engineering and Architecture School at the University of Zaragoza, also small Schools from the University are interested on the event, and joined the Girls' Day. Next, we explain how to attract women to technology in the environment of such technological centres. The organization of the activities in this small Engineering Schools became tricky due to their special circumstances.

2.3.1 *Visiting Centro Universitario de la Defensa*

The Centro Universitario de la Defensa (CUD) de Zaragoza (<http://cud.unizar.es/>) is a publicly-owned (Ministerio de Defensa) center of higher education, and is part of the University of Zaragoza. It first opened in the 2010-2011 academic year and offers a Degree in Management Engineering (Grado en Ingeniería de Organización Industrial), thereby providing students with a preparation in technology and business as is necessary in modern-day Europe and other international scopes. Students are trained to develop capabilities for business management in industry and services in all functional areas ie. production, logistics, quality control, maintenance, purchasing, sales, product management, innovation, project management, human resources, risk prevention, corporate social responsibility, etc.

Students at the CUD become Army officers and start a career that can take them to higher jobs in the Army. The degree the students follow will produce Army officers with the training required for their professional work with a view to meeting the needs of the military as an organization, preparing the units and when working in foreign operations.



Figure 8: Experiment performed by the High School students at CUD: Magnet effects in liquid crystals.

There are several reasons that could explain why women do not choose this degree. For example, traditionally, women are not associated with jobs in engineering or as directors, or as Army officers. Perhaps that is why the data presented above is even more dramatic for the CUD than for general engineering degrees. In particular, 1148 students have studied at the CUD since its opening, at which time only 60 were women: 5.22%. Now in the 2013-2014 academic year, the total number of students is 846 out of which only 38 are women: 4.49%.

The CUD endeavours to serve the society, and has actively collaborated with Girls' Day from the outset. Therefore, on Girls' Day, the CUD provided a bus to bring a group of high school students to the *Academia General Militar* (AGM) where the CUD is located, to familiarize them with the centre and its objectives. The visiting students were met by some of the directors of the CUD, faculty researchers and military staff, all of whom explained different aspects of the engineering degree within a professional military context.

A talk was given by civilian and military authorities and professors, and the visiting students were given the opportunity to clarify any questions they had about the degree and the military training, as well as to do some experiments in the laboratories with the help of professors and researchers who tried to demonstrate the relevance of such experiments to daily life (see Fig. 4 and Fig. 8).

2.3.2 Visiting Teruel Engineering School

In the 19 years of history of the Teruel Engineering School (EUP), only a 21.7% of its students were women. Nowadays, these numbers are even worse; in some classes there are no women.

In the academic year 2010-2011, when the first Girls' Day was organized in Teruel, there were only 3 women among the 66 students enrolled in both available degrees: Computer Engineering and Telecommunications Engineering. Therefore, initiatives such as the Girls' Day were completely necessary to overcome this problem.

So far, three editions of the Girls' Day have taken place in Teruel. The first one took place in March 2011. In that edition, 225 students of 5 High Schools of the province of Teruel attended to the activity. In particular, the following activities were organized.

A visit to the four laboratories of the research groups that work in the EUP:

- the laboratory of communications of the Intelligent Networks and Information Systems Group, which works on Vehicular Networks and Intelligent Transportation Systems,
- the Quality Lab of the Eduqtech group, which works (among other things) in improving the quality of life of people living in rural areas,
- the Radio-Frequency Identification laboratory, integrated by people working on archaeological identification and museums, and finally,
- the laboratory in which the members of the Engineering Discrete Event Systems Group (GISED) of Teruel are working on modeling and analyzing of concurrent systems applied to logistics, manufacturing, and automation processes.

A roundtable discussion entitled "Women, Science, and Engineering in Teruel", in which participants were former female students of the University of Zaragoza working in Teruel. A visit to the "Centro de Estudios de la Física del Cosmos de Aragón (CEFCA)", in which the students visited the facilities of CEFCA and attended to a keynote focused on the evolution of galaxies.

The second edition was held in March 2012 in conjunction with the EUP's Open Day. Although that edition could not be celebrated alone due to the lack of funding, it was a good opportunity to involve the Head and the rest of people of the management team of the School. In this edition, students visited the same laboratories of the first edition, and additionally, the Human-Centered Technologies Lab, where software for rehabilitation of stroke and cerebrovascular disease is developed. Also, a roundtable discussion entitled "Working on Engineering: Different experiences with female voice" was performed. In particular, professionals of industry, research, and social and services participated.

The latest edition themed "Come and see the future" was organized in November 2013, it included an innovative gamification activity that allowed us to attract High School students, and increased their motivation and interest towards engineering studies.

All these activities were possible thanks to the collaboration of a total of 27 volunteers (the majority of them were former students of the EUP), which accompanied the 225 students and their tutors of the different high schools. Additionally, they offered their support to the students sharing their experiences in our University.

3. EVALUATION OF FACTORS RELATED TO STUDENTS' MOTIVATION

Survey studies have been done in order to obtain information about the reasons of students' choice of engineering studies. This section discusses, in first place, the most important conclusions after analyzing the studies carried out in each Girls' Day event and, later, the results of a survey filled by the first year students of the engineering careers at the University of Zaragoza.

3.1 Survey to High School Students

In all editions of Girls' Day a survey study has been done to the attendees for evaluating the intention of High School students of pursuing engineering studies. The main objectives for the achievement of the survey studies were to find out: the different motivation of women and men towards engineering, the level of knowledge about the profession and the impact of the GD activity. In total 2468 questionnaires were answered from the students (58,9% from female students). In detail, 1227 were collected in 2008, 725 in 2010 and 516 in 2011. Anonymity has been always guaranteed. In year 2008 we proceed two questionnaires one before the activity, and another one after it, as it was impossible to correlate both results, no extra information was obtained, therefore next years just one at the end of the activity was done.

The students had to give their opinion (1-7 scale) about the social background, parents support, perception and knowledge of engineering field and work, perceived altruistic values, and gender bias. Besides, the impact of the activity itself was evaluated. In the Appendix, an example of the questionnaires is included. The results of the first edition survey have been published in [[10]]. The analysis and results of all the editions and the questions asked in each survey can be found in [[5]]. The confidence level of the sample is 95% for each questionnaire.

Small differences have been observed among the different editions in number, age and sex of the attendants, activities, etc. However, from the analysis of the data, there are some important conclusions that emerged and remained in all of them. The most relevant results are here explained.

On all the editions, a gender gap was detected. The proportion of women highly interested in studying engineering was only 8.3% compared with 22.5% of men. This difference was even more pronounced in subjects who clearly show a low interest in this area, 60% of whom were women as opposed to 35% (men). Extensive correlations between interest groups and other parameters studied were made to reflect significant differences and trends.

One of the most significant findings of this study was that parental support in choosing an engineering career had a huge impact on the different groups regardless of gender. In the case of women highly interested in engineering studies, the role of parental support in their choice has been proved to be very important. Another significant fact was that the group of women that had decided to follow an engineering career, had a high percentage of mothers with higher levels of education to parents. And additionally, girls of that group were more likely to have family members who were engineers.

The activity itself had a positive impact on informing high school students about engineering, improving their views of engineering in general, slightly motivating them to pursue engineering careers, and changing gender-biased views of the profession. Exposing the students to a social, scientific, multifaceted, and humanitarian view of engineering had many positive results.

Table 1: Women and Men perception of engineering. Level of agreement for each statement: 1-disagree; 4-totally agree.

Engineering Perception	Women	Men
Engineering is very interesting	3.14	3.23
Engineering is very difficult	3.45	3.31
Getting an engineering degree facilitates finding a job	2.70	2.79
Engineering is a demanding job, you have to spend lot of time	3.58	3.32
In engineering is difficult to get family and professional life balance	2.20	2.36
Engineers have a good social status	3.13	2.95
Engineering makes that humanity advances	3.21	3.18
Engineering work is more womanlike than manlike	1.45	1.46
Engineering work is more manlike than womanlike	2.43	2.43
University degrees are neither manlike nor womanlike	3.68	3.27
Engineering work is neither manlike nor womanlike	3.60	3.37
Some skills related to engineering are more developed in men than in women in general terms	1.30	2.00
In general, men have stronger technical skills than women	1.51	2.00
Men are more encouraged to choose engineering degrees than women	2.31	2.20
A male engineer has more possibility to promote at job than a female one	2.07	1.95
Promotion and professional success are not related with the gender	3.47	3.40

3.2 Survey to engineering students

A survey was carried out to the first year students in the Engineering and Architecture School at the University of Zaragoza in April 2011. This questionnaire was designed to know the reasons that lead to choose engineering degrees; also we wanted to know if there was a positive relation between socio-economic status and that election. 320 questionnaires were answered, 24,7% by women (95.5% confidence level). On this survey we evaluate the students environment, what has influenced them on the election and their perception of the engineering.

Table1 shows the statement related to the perception of engineering, they show the level of agreement in a 4 point scale (1: disagree; 4: totally agree). The most relevant results are those related with gender perspective: female and male students have different impressions about that. Fortunately, differences are not high enough to explain fully the gender biased. Considering the socio-economic environment of students and the features of their families, first difference lays on the origin: 56.8% male students have their residence in the city, while 65.8% of women live in the city. That is, there is a difference of 10 points between female and male engineering students coming from rural areas (in communities with fewer than 10,000 inhabitants). So, there is a negative relation between being a women that lives in a rural area and being an engineering student. Maybe because, in rural areas, the traditional gender roles still preserve more influence and make the proportion of women engineers remains lower.

Related with the studies of the parents, their greater prepa-



Figure 9: Volunteer Students in the 2011 Girls' Day.

ration, and particularly mothers' preparation, has a slightly positive relation to the fact that they study engineering. We note that the cases where father has primary education is 10 points higher in the case of boys than in the case of girls, and that there are more of that girls, which mother have an university degree (22.8% vs. 15.4%).

Existence of engineers in the family has a significantly positive relation to choose those studies (more than 50% of male had at least an engineer in his family and 55% of female). Parents employment situation, currently mother working percentages are 74.7% for females and 65.6% for males. These results show a positive relation between the training and dedication of mothers and the choice of engineering studies in the case of girls, but not in the case of boys. Both previous results confirmed the conclusions obtained in the Survey of High School Students (see Subsection 3.1).

When choosing the degree to study, the information used is picked from the Internet in most cases, followed by secondary school teachers and lectures in schools. Students have answered that the information from their High School is not good enough. This recommends designing actions addressed to teachers. 7% of the students surveyed, both male and female, had received information through the Girls' Day in previous editions, so the Girls' Day activity reaches its objectives.

4. PARTICIPANTS' PERCEPTIONS

In order to go beyond numerical and statistical analysis, as well as to obtain first-hand information, we decided to conduct some personal interviews with volunteers and high school students who have participated in the Girls' Day ever. After each edition, we proceed several informal interviews to students, volunteers and researchers or engineers. In year 2013, we ask specifically some of the participants on each category, a representative selection of the answers is summarized in this section.

First, the review of a computer engineer student who has participated as volunteer in all Zaragoza editions: "After the opening ceremony, a group of students to guide them in the visit was assigned to each of us. During the event, volunteers serve as a connection between the university and the students, telling our personal experience, encouraging them and creating an aspiration, especially for girls, to study engineering. In general, there are working areas where the

presence of women is testimonial, but especially in some university courses related to technologies, where students are a minority. Volunteering offers us as students a great opportunity to know deeply companies and research groups from the hand of women in leading positions in the sector. In most visits we realize that students generally have a misconception or even certain ignorance of the role that women can play in the field of science and technology. The feeling at the end of the day is a great admiration and printing, so all we get involved as volunteers and by the teachings and experiences that give us all the professionals involved."

Second, we write out the review of a PhD student. She has been a volunteer in several editions, and in the last two editions, she has shown a laboratory as a researcher: "I like to explain the PC in a fishbowl, because they find it funny and entertaining. There have been many groups that have done very well, have been attentive, participated, and made questions. There are also cases in which, perhaps going from one laboratory to another one, they have fewer questions related to the laboratory and the university: how were the classes and teachers, schedules, difficulty... Last year they came on a small group of girls that already went into science careers. It was great, since small groups make people to be more involved."

And finally, we transcribe a collection of comments from some High School students (HSS) that participated in the event:

HSS1: "A group of students of the high school were fortunate to take part in the Girls' Day hold at the University of Zaragoza. I found a very good way to approach to the university environment, to learn new sciences and technologies and to know about projects and studies we can do when we got the chance. I enjoyed the computer engineering building where we could study about renewable energies and energy efficiency. I was impressed with all the advances in technology we were taught. We met new people and I found very useful the provided guidance for my future studies."

HSS2: "Last year some students from different high schools had the fantastic opportunity to learn more about the world of engineering attending to the Girls' Day, hold at the University of Zaragoza. The purpose of this event is to encourage female students of the need to increase the number of graduates in this gender and to eradicate fame that engineering is only for boys. In small groups, accompanied by a female volunteer, we met more closely some of the different degrees. It was a very interesting experience; we enjoy finding out new things and knowing a little more about practical applications of engineering and science. We spent an instructive afternoon surrounded by a university environment which captivated and gave us many activities to know the laborious work done by teachers and students in this school perform. Following this there has grown a new interest in us for something we did not know before. As a high school student, I would like to thank all the people who have made this activity possible, especially the positive impact it has had on my environment. I encourage them to continue with it."

HSS3: "The Girls' Day last year was a pleasant experience,

in which I saw that there are more girls from other schools in Zaragoza, like me, who are interested in studying technical careers. Whilst it is true that there were a large number, I consider that year after year this number will be increased. The effort and interest of teachers was more than hopeful.”

HSS4: “Last year I attended Girls’ Day, a day in which, along with my colleagues, I had the opportunity to visit the University of Zaragoza. Once there, several engineers told us about their work. It was a nice day, because they showed us that certain technical professions, usually associated to be performed by men, are also achievable by women, and in my opinion, they are very interesting and they have practical, funny, intelligent and witty applications. They showed their day to day work, and how they adapted to new technologies, which is very attractive to young people. In addition, there are many different types of engineering, focused on many subjects such as chemistry, manufacturing, construction, information technology, transportation, science, ecology, research... I believe that encouraging girls to study regardless of gender and social status is very constructive. I think this day is a very good opportunity to make contact with the world of engineering. I liked it a lot because we have learned many new things and the event have brought us to the reality of what we study in the future. I hope to return again this year.”

After analyzing all the interviews, we realized that many students and researchers at the University of Zaragoza had never thought about gender unbalance in engineering before the celebration of the Girls’ Day. The event helped them to notice that it is necessary to provide female engineer models, to do professional networks and to encourage young girls to be interested in technical and engineering issues. Qualitative and quantitative results are according with similar studies that have been performed in other regions [[9], [11], [8]].

5. CONCLUSIONS

In Spain, as in many other countries and different cultures, women choose engineering as a career less frequently than men do. The gender distribution of engineering students varies according to countries and engineering specialties and it is unchanging in time, but underrepresentation of women is prevalent. This paper presents the Girls’ Day experience carried out at the University of Zaragoza from 2008 yearly. If this activity is not novel, it has been the first one proceeded in Spain during more than five years. The activity organization has been worried about the reasons of the lack of women in engineering. This successful experience has been completed with several surveys to analyze engineering perception of students.

The activity itself has had a positive impact on the High School students, as it has been confirmed by the survey to the first year engineering students. Also in the volunteers, researchers, University Professors, as has been developed during the interviews. Most of the people involved in the activities are now concerned about the situation of women in engineering.

Plenty of uncountable and diverse factors affect the election of studies. The role of parental support in the choice of studies has been proved to be very important. Therefore,

although in 2008, letters were sent to

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