IEM@ProjectNetworking: bringing first year students closer to professional practice

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Abstract

First year Industrial Engineering and Management (IEM) students have difficulties in establishing a clear picture of their future job as industrial engineers. Moreover, these students usually show a lack of proactivity and entrepreneurship attitude, as well as other transversal competences. To promote these competences among students, a team of teachers created a challenge for them which consisted in identifying and contacting two companies and interviewing one of their IEM professionals. This challenge was named IEM@ProjectNetworking. The main objectives of the IEM@ProjectNetworking were, amongst others, to bring students closer to their future professional practice. This paper aims to describe and evaluate the first edition of this challenge that took place in the first semester of the first year, during the 2012/2013 academic year. The evaluation was based on student's perceptions collected from individual reflections about the experience and data from a workshop held at the end of the semester. The main findings are also presented based on the more than 100 interviews made by the students in 78 companies visited.

Keywords: Transversal Competences, Networking, Professional Profile, Industrial Engineering and Management.

1 Introduction

First year students of the Industrial Engineering and Management (IEM) Integrated Master degree at the University of Minho generally know very little about their future professional life. In many cases, the picture about their professional job does not become enough clear as the IEM degree unfolds, and that clear picture is only created after some time as IEM professional in a company. Furthermore, engineering students are very often acculturated to adopt a very passive position regarding their interaction with future employers and colleges. They expect that by the end of their engineering degree there is a list of jobs for which they select the ones that best suit them and that the technical competences that they develop during the degree are the needed gateway to the labor market. Moreover, they expect that performing well the technical part is the only thing that may be required in organizations where they will work.

On the other hand, employers nowadays expect from young engineers not only the traditional technical competences but also, and not less important, transversal competencies such as communication competences, creativity, team working competences, initiative and proactivity (Lima, Mesquita, & Rocha, 2013). They expect the young engineers to make changes, to develop new projects, to introduce new challenges, to present proposals, to innovate, to try new things, to experiment, even to fail some times. Employers do not expect is that the new engineers only do what they are told to do. But the truth is that, in many engineering schools, students are taught to follow a defined path and do what they are told to do.

Most of such competences are not formally learnt in the university classes. Most of those competences are not even valued by most of their IEM professors. The Bologna process (Bologna_Declaration_CRE, 1999) brought discussion and awareness of the importance of valuing transversal competences and some changes are really happening in engineering schools (Alves et al., 2012; Aquere et al., 2012; Lima et al., 2012; Lima et al., 2012; Pinto et al. 2012). Even so, a long way is still to be travelled in the development of the right set of competences to match actual market needs.

In order to make a contribution to the development of transversal competences and to develop a better picture of Industrial Engineers future professional profile, a challenge was launched to first year IEM students, called IEM@ProjectNetworking in the context of a first year curricular unit Introduction to Industrial Engineering and Management (IIEM). Each student had to find a way to get two interviews with an industrial engineer or a production

director of a company in the region or with another professional with equivalent position. The objective of this paper is to present how the challenge was launched, planned and executed and to evaluate the results obtained by students.

2 IEM@ProjectNetworking objectives and plan

The IEM@ProjectNetworking is focused on the development of the following set of transversal competences: proactivity, communication, entrepreneurship, and perseverance. The main objectives were:

- To bring students closer to their future professional practice;
- To develop a proactive and entrepreneurial attitude, student initiative and communication competences;
- To develop a proactive attitude towards their own future as industrial engineering professionals;
- To develop awareness among the students on the importance of perseverance and proactive attitude;
- To create a network of contacts of IEM professionals and potential employers;
- To get familiar with IEM professionals point of view as well as with the role in the organizations.

In the first stage, the challenge was presented to students with the main goal of explaining these objectives and what was expected them will achieve with that task. To collect information from the IEM professionals, the interview was considered an appropriate method to give students a structured tool when approaching the companies.

Students participated in the development of the interview guide, deciding which questions to ask the IEM professionals according to their own motivations and curiosities. These questions were collected and analyzed, resulting in an interview guide made up of questions considering five main dimensions: 1) interviewee profile, in order to know the academic and professional background; 2) transition to workplace, in order to know the difficulties and expectations related to this issue; 3) activities held in the company, in order to understand what an industrial engineer is able to do; 4) importance and recognition of the IEM profession, in order to analyze the employability issues, the advantages and disadvantages related to being an industrial engineer; 5) personal satisfaction and professional achievement, in order to understand how professionals manage their time between personal and professional life Then students had to select a company and manage to schedule an interview with an IEM professional with a relevant position in terms of production management. At the scheduled moment the student had to perform the interview, probably make a small tour in the company and collect as much relevant data as possible. Finally each student had to write a report presenting the interview results as well as a personal reflection on the experience of carrying out the interview.

3 Methodology

With the overall aim to evaluate the implementation of the IEM@ProjectNetworking, according to its initial objectives, a content analysis of the interview transcriptions and personal reflections held by students was carried out. This analysis was further completed with data collected from a workshop held at the end of the semester involving the same students.

The process of data collection involved 53 students that performed more than 100 interviews - 43 students have done two interviews, 10 students have done one interview, and 3 students have done more than two. These interviews were made in a total of 78 companies.

For the purpose of this paper, the data considered in the findings will focus mainly on the reflections written by students concerning the overall process (before, during and after) the experience of interviewing an industry professional in their field, more than simply describing the content of the interview in itself. Furthermore, at the end of semester students were questioned, in a workshop where 15 students participated, about the main benefits and difficulties related to this experience and if they would like to repeat it in their final year. These topics allowed the paper authors to understand students' perceptions about the networking experience in a broad sense and to evaluate the success of this initiative for students.

Based on the data analysis, the following categories of findings and outcomes emerged: 1) database of companies; 2) students awareness of their professional practice; 3) students recognition of development of transversal competences; 4) lessons learnt by the students. These findings and outcomes are discussed in the following section.

4 Findings and outcomes

In spite of being a task within the course of IEM, the IEM@ProjectNetworking was not compulsory and its weight on student´s final grade was not very appealing for the challenge being asked. Even so, almost all the students (43) concluded the task, i.e., to carry out two interviews. Therefore, results from the interviews presented on the reports produced by students are summarized in the following paragraphs, using some transcriptions and reflections written by them.

4.1 Database of companies

The students interviewed more than 100 industrial engineers or a person developing this function in the company. Also, they collected data from 78 companies such as manufacturing or service activity, information contacts, webpage, and so on. Some took photos of the company and of the interviewed engineers, organizing the information and building a document signed by the interviewees certifying their interview. Of course some students were more careful than others in retrieving all the important information and doing the transcription of only the essential from the interviews. The objective to create a network of IEM professional and employers' contacts and a database of companies for potential projects has been achieved. These contacts will be supplied to the Industrial Engineering and Management students association to put in their website and to build a network of potential employers.

4.2 Students awareness of their professional practice

About students' awareness of their professional practice and future as well as the clarification of IEM professional profile it is important to translate what some students (identified as ST1-ST20) wrote in the interview report:

ST1 - "After the interviews, I had a better idea of what the IEM course is. I think this approach of getting closer to the engineers and even the observation of the production lines and what is done by a IEM professional have made my approach to the course and the profession gain more consideration and interest. (…) I can say that I learned a lot with this task, things that I could not learn in lectures and changed my idea about next year changing to another course."
Figure 1 is a picture of this student in the company where he made one of the interviews.

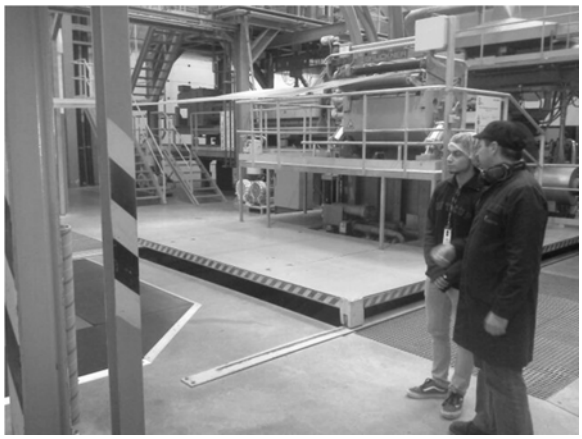

Figure 1. A student in the shop floor of a company

ST1 - "I felt, perhaps for the first time close to professional practice. I had the opportunity to observe the professional profile of a worker in the area. Further, I strengthened my sense of initiative as well as my communication skills, overcoming any fear of rejection. (…) By talking with specialists in the area, I set a little better what I want…"

Another student - *ST2* - said that: *"These two interviews gave me the opportunity to meet two completely different successful experiences in the labor market; it gave me the motivation to finish the course and enter the world of work."*

ST3 wrote: *"I think these interviews show that the work of an engineer is always demanding, but also motivating because of the constant newness of situations where we have to act quickly and efficiently. And yet, that professional Industrial Engineering and Management has high importance in various sectors, particularly in the industry sector."*

ST4 said that: *"With the interviews, I met the day-to-day management of two Industrial engineers, the difficulties of this profession, their advantages and disadvantages and also I realized the importance of this area in the development and innovation of enterprises."*

About the difficulties industrial engineers could experience in their professional future, ST5 wrote about the opinion of the two interviewees: *"Regarding major difficulties along the career path both (the engineers interviewed) reported that human relations were one of the most complicated. The two engineers were also in accordance to the fact that the course of Industrial Engineering and Management requires more disclosure from companies."*

With the same concern, another student – ST6 - heard from the engineer interviewed about the relationship with workers: *"The conclusions I draw from these interview are that responsibilities of this job working many times with lack of time and resources, and (…) it is extremely difficult to maintain a good relationship with the workers."*

Other student – ST7 - registered this important characteristic of an industrial engineer: *"Moreover, we can notice that the organization of an industrial engineer is difficult but crucial for achieving good performance at work. As you gain experience, grow a sense of professional pride."*

A student - ST8 - that interviewed people performing an industrial engineer job but not graduated on this area said: "*Despite having interviewed engineers who perform these functions and are not formally trained in this area, I realized that this course would be a surplus value without discarding, of course, the aspects and competences that you need to have to be a good professional. Certain expressions uttered by engineers interviewed were very important and aware me to the commitment and the difficulties that I have to overcome.* Examples of these were: *<<(...) many people feel difficulties at this time but if a person is devoted and has an open mind and spirit, things happen and there are plenty of job offers, do not miss it. If a person wants to restrict what you cannot do, that cannot happen (...)>>, issued by the engineer company X; <<(...) The university does not teach you to do anything, just gives you tools that allow you to think, how to think in regard to a problem / situation in order to get a result but not random thought (...)>> given by the engineer of the company Y."*

Another student – ST9 - reflection was: *"To conclude I think this project, Project Networking, must remain in the contents of the course of IIEM to enable students to new research and discovery about their future profession."*

From these nine students' reflections it was possible to conclude that the objective of getting IEM students closer to their future professional practice was achieved. With the interviews the students felt a little of the work environment and became more near of their future, getting a clearer picture of what to expect from the course they chose. Furthermore, for some of the students this contact gives them reasons to continue.

4.3 Students recognition of development of transversal competences

The students recognized the importance of this project to develop a set of transversal competences such as proactivity, communication, student initiative and entrepreneurship competences. This was confirmed in their conclusions, for example, ST10 wrote:

"This experience was positive because it allowed me to develop my proactive attitude and autonomy. This task allowed a first contact with the world of work, because generally allowed to know what awaits us in the future. In conclusion, from this experience I became motivated for the course, with a new attitude towards work and curious about the future that awaits me."

ST11 described the process to find out engineers as: *"My work began by researching companies in my city (Chaves) and Guimarães which employed an industrial management engineer or someone with the same functions. Then I sent emails requesting an interview to them and waited for responses. As I had not received feedback I had to telephone them. After several attempts I scheduled my interviews. (…). Both of them were very helpful and enlightening responses they gave. They showed availability immediately and one of the engineers received me more than once in his company."*

Other student – ST12 - also felt these difficulties: *"This process of contacting companies was not at all easy, since the standards of most of the companies are very strict and in most cases the direction does not allow its workers, in this case, engineers to expend their working time to give interviews. In this sense, to accomplish the interviews I sent a lot of emails to companies of all branches in the hope to receive a positive answer. That did not happen and then I decided to call some companies. The first company I contacted seemed receptive, however I waited to be contacted and this never happened. As I was aware that it would not be easy to get into contact with the companies, I did not give up until I got an appointment at the IEP (Portuguese Institute of Electronic)."*

Additionally, ST13 reflected about the same difficulties and the process of making interviews: *"The main difficulties in conducting the interviews was that there were few people specialized in the area of IEM in my neighborhood and management of the conversation in order to get the answers you want."*

This showed that student initiative and persistence are useful competences that they have to learn to face the work market. At the same time, this project promoted students' awareness of the importance of these transversal competences for their professional life. This is also one of the most important outcomes of this project. The next testimony from ST14, ST15 and ST16 shows evidence of this:

"Once accomplished this task I can conclude that it was not simple to get in touch with two engineers in the field of industrial engineering. I learnt to wait, learnt new realities, companies and established contacts. I was persistent and heard some "no´s." I have done research and I am prepared for interviews in the future."

"…I think all the proposed objectives were achieved mainly overcoming the fear of the unknown and capacity of independence and communication."

"…the development of awareness about the importance of entrepreneurial attitude along with good communication, provided by the contact with experienced and innovative professionals."

"I conclude that this project contributed very positively to my training. Besides this, I have approached the practice of an Industrial Engineer professional and became more enlightened about the tools and fundamental characteristics that have to be learnt and developed to be successful in this area." Figure 2 shows the shop-floor of the company visited by ST16.

Figure 2. Shop-floor of one of the companies visited

Excerpts from students' reports show that they realized the importance of being persistent, pro-active and entrepreneur among other transversal competences.

4.4 Lessons learnt by the students

Also, students realized that it is not easy for anyone to start in the labor market, as ST17 realized: *"In short, I consider this a very enriching experience, because in addition to the contact with professionals in engineering, I also heard negative responses by firms, which always helps us to grow and realize that the world of work, where one day we will enter, is not simple.".*

At the same time the students learnt from professionals important lessons that sometimes are not able to learn from the teachers, for example, ST19 recognized: *"The interview was very pleasant and what struck me most was the fact that this professional mentioned that it is very important for us, engineering students, to face the world as our labor market, not just our country."*

Another student – ST20 - registered: "*The interview was very interesting and productive. The engineer was fairly available, gave me some tips for my future and elucidated me about the labor market and the features that engineers must have to be successful in this area, for example, have initiative and desire to learn. She also inspired me with her story of entering the labor market, because due to their willingness to work, doing it for free for a few months and as part of a worker, she managed to find work at a time when job offers are not abounded."*

About the other interview the same student, ST20 said: *"The respondent was very clear in responding to questions and explored each one to the fullest and was, therefore, a very productive interview. I also liked, not only the fact that the engineer exemplified with concrete situations in which I am subject to pass in the future, but also because he had provided solutions to overcome them."*

This student also heard about the importance of time management: *"Sometimes the personal and professional lives intersect, but it was quite prominent throughout the interview that knowing how to manage time is very important."*

Finally, it was very interesting to notice what this student concluded: *"… for me the biggest advantage of this work and that I could prove to the engineers who I contacted is that one has to have a lot of passion for it, eager to learn new things every day and improve day after day."* And she ended the report with: *"To finish my work because I thought all IEM professionals have the task of driving the companies they work for the future, I will use the slogan of the company: "Walking to the Future.""*

Being capable of facing the world as a labor market, managing time wisely, having passion for work and for life long learning and looking for continuous improvement were some lessons learnt by the students in their contact with professional engineers.

4.5 Outcomes from the workshop and discussion

During the workshop held at the end of semester, students discussed in groups a set of issues that happened during the semester including the IEM@ProjectNetworking, as mentioned previously in the methodology section. They were asked to discuss what they felt before, during and after the interview process in the context of IEM@ProjectNetworking, their opinion about repeating this experience and what they learnt from this. A few points of this discussion are presented next.

Students pointed out some difficulties before the interview, such as how to find the industrial engineers, contact the companies, being afraid of taking the first step, arrange the schedule for the interview, the geographical distance, dealing with the unavailability of the engineers, dealing with the unavailability of the company in collaborating, dealing with unavailability of the engineer to share information and psychological preparation for the interview. During the interview, students felt that they needed to create empathy with the interviewee and also felt some difficulties in managing the interview to obtain the responses. After the interview was held, students pointed out the difficulty in selecting the relevant information to be analyzed and the need to improve oral and interpretation competences.

When questioned about the possibility of repeating this experience in a final stage of the course, the students that participated in the workshop (approximately 30% of the students that made the interviews) were divided: half felt that this is not necessary because they already had the information they needed about the course and half said yes, that they would have more knowledge to interact with the interviewee.

Finally, the last question about what they had learned from the experience and these answers were the ones intended with the project: to develop a pro-active and autonomous attitude, to meet the difficulties when entering the labor market, to learn that it is important to know how to listen and know the professional areas of an industrial engineer and know the work environment.

During the semester it was also possible, through the informal contact with them in the classes and others activities, to observe their engagement, motivation and recognition for the IEM@ProjectNetworking as an important and relevant activity in this first year, in spite their fear in doing the interviews. Moreover, this provides them with another important tool, i.e., knowing how to plan and do interviews. Freshman students do not realize such importance because, normally, they only need this in the final of course, when they have to develop their master dissertation in companies.

5 Conclusion

One of the main premises of this work is the importance of freshman students to develop spirit of initiative, autonomy, better perspectives of their future profession and build a network of professional contacts for their future. Based on this premises a challenge was put to IEM first year students: to select two professionals, contact them, and carry out an interview in the company.

From the students' testimonies presented above it is possible to conclude that this project was well accepted by the students. They grabbed this as an opportunity to get a better knowledge of the labor market where they will develop their profession. Despite the fear and anxious some of them felt, all of them accomplished this task with optimism and enthusiasm. This showed that students are capable of amazing things when challenged and that they are capable from the first day at the university.

Furthermore, these students developed initiative and communication competences because they were able to find professionals available to perform the interviews. These professionals are now part of their network of professional contacts. These interviews allowed the students to understand the process of planning and developing the competence to perform an interview. The overall process of finding companies and IEM professionals, followed by the

visit to the company where they made the interviews, and finally the critical analysis of the transcriptions contributed to the development of a better knowledge of the IEM professional profile.

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