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An empirical study on the effort required in the realization of Final Year Projects in Engineering Degrees

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1. Introduction

Final Year Projects (FYP) are, apart from a necessary step to obtain the degree in engineering studies, a hard work to do, not only for students but also for teachers. And usually, this work exceeds the temporary assignation of credits established in the curriculum for it.

In this chapter we want to stress the importance that for us, as university teachers, has the fact that, for the first time, some empirical measures have been elicited about a work that never before has been valued. We want also to share the study we have realized, based on our experience as university teachers and supervisors of numerous Final Year Projects at the Polytechnic University of Madrid, over data obtained during twelve of the last years.

This study is centred in Final Year Projects developed at University School of Computing (Polytechnic University of Madrid). FYPs are an important part of the 3-year degree studies in Computer Science. In fact, FYP is considered a special 10-credit subject that students must pass in order to obtain the degree.

A FYP is special because there are no classes, teachers only supervise the work of the students and there aren´t clear deadlines. A student, according with his or her supervisor, presents a blueprint describing the project he or she wants to make, blueprint that must be approved by a commission. This blueprint will be the "contract" between the faculty and the student. Once the blueprint is approved by the commission, the student has a period of 18 months to complete the project and present it to a new commission that will judge the work done and qualify it. The only limitation is a period of 18 months to present the project after the blueprint has been approved.

As you can see later in the study, this limitation seems to disappear because there are projects that last more than 18 months. The reason is that most of teachers don´t permit the

student to present the blueprint until an important part of the work has been done and the rest will be completed for sure in a period of time not excessively long. The main reason for that is that after a blueprint is approved, the FYP proposed is "a property" of the student and it can´t be done by any other student. Experience has shown us that an important percentage of students don´t finalize their FYPs and, even worst, teachers can´t propose the project to other student after the 18-month period (once the blueprint has been approved) has expired. In computer science it is enough time to make the project uninteresting and valueless. So, there is a "time of uncertainty", that lasts from the beginning, when the student starts working on the project, to the day he or she presents the blueprint, when it is not possible to assure whether the project will be completed or not (case in which the work done is lost).

The other limitation is about the impossibility of presenting the FYP before passing all the subjects in the curriculum. It is permitted to start making the FYP and present the blueprint without having passed some not compulsory subjects, but not present the FYP itself. Actually this is not a limitation because they usually don´t start making the project after having passed all the subjects.

It is not easy to make a FYP at our faculty, in fact it is a matter of will: there are no clear deadlines nor classes, the teacher is not on the student requiring him or she new parts to correct. A considerable number of students that have passed all the subjects never present their FYP. In this context, and through this paper, we try to clarify and quantify some aspects about the supervision of FYP at our faculty, hoping these results were able to be extrapolated to other faculties.

Supervising FYP is a work not usually recognized, mainly because the only one that knows about it is the teacher himself, and it is a hard work that sometimes is useless and sometimes not worthy enough to justify the hours spent doing it. Evidently, we, as teachers, have the obligation to do it as part of the curriculum of our degrees.

2. The empirical study

This study is based on information collected about 99 FYP from the end of 1995 to the end of 2007. This information is referred to only one of the authors but we think it can be extrapolated to other teachers, at least at our faculty and perhaps at others. Moreover, we have added data about the time spent in commissions for judging FYP presentations where the student has been supervised by one of the authors of this paper.

It is important to stress that we are not quantifying the student´s work but teacher´s work. It is clear that every hour of supervision supposes many more hours of work for the student.

Another thing to take into account is that, until now, all of our students, as soon as they pass the subjects, find a job immediately. Even, companies offer to students of 3rd year the possibility of working while ending their studies. It makes difficult the control and supervision of the student´s work on the project and, of course, "weakens" their will to finish the project and cause a usual lack of continuity in their work: it is very hard to work

and dedicate his spare time to make the project. It is also useless to form groups of several students working on different parts of a big project by the same reason.

The study has two parts: commissions and supervision. *Commissions* is referred to the time dedicated to commissions that judge a FYP: time for reading the documentation presented by the student and time spent on the presentation itself. *Supervision* is referred to the time spent supervising the making of the project, preparing the presentation of it and participating in the commission that judges the project supervised.

In any case, the data on which is based the study are: number of meetings, the meeting date, and time dedicated to it by the teacher. The different kind of meetings are: commissions, preparation of a presentation, meetings at the office with the student and time dedicated to read and correct documentation generated by the student.

The total number of meetings during this period of twelve years is 1200, and the time spent on them is 772 hours. We want to point out that we have considered 10 months of supervision for every year. In the following points we explain these data in detail.

2.1 Commissions

We have included the time dedicated to "external commissions" in the study, but they suppose a less important part of the work done. Table 3 shows the data related to this work. As it has been stated before, external commissions are those in which the teacher takes part without having directed the project, i.e. when he or she is a member of the commission that judges the work done by a student that have been supervised by other teacher.

Commissions	Meetings	Hours	Av Hours/commiss.
56	83	72.8	0.9

Table 1. Commissions

As Table 1 shows, there have been 56 commissions and have been spent 72.8 hours on them, but we consider this effort is not as important related to the time spent supervising FYPs, as it can be seen later. The number of meetings is greater than the number of commissions because for some of them there have been a time to read the documentation presented to the commission.

2.2 Supervision

Supervision supposes the main workload for teachers related to FYPs. Supervising a FYP means to dedicate a lot of time to meetings with students and to read the documentation they write and that, finally and conveniently formatted according the rules established at our faculty for it, will constitute the final document that will show the work done by the student and the basis for the qualification. For this study, projects are divided into two groups: those which have been finished and those that not. Table 2 shows the data obtained in the study:

Mnths	Proj.	Finish.	Not finish.	Meet.	Hrs	Av hrs/mth	Av mt/mth	Av pr/mth
120	99	63	36	1117	699.2	5.8	9.3	0.83

Table 2. Supervision

where

- **Mnths** are the total months of the study
- **Proj** is the total number of projects started during the period of the study
- **Finish** is the total number of projects finished
- **Not finish** is the total number of projects not finished
- **Meet** is the total number of meetings
- **Hrs** is the total number of hours dedicated to the different meetings
- **Av hrs/mth** is the average number of hours per month
- **Av mt/mth** is the average number of meetings per month
- **Av pr/mth** is the average number of projects presented per month

It is important to notice that only 63.6% of the started projects have concluded. More than a third of them have not produced any result, and logically they are considered a loss of time and effort, both for students and teachers, usually without the possibility of obtaining some profit of the little work done.

In the following points we show the analysis of the two different groups of projects.

2.2.1 Not finished
In this group are included those projects definitely abandoned and those that are still active but not finished (these are a reduced number of them). Table 3 shows the set of data related to this category:

Projects	Meetings	Hours	% hrs	Av meet	Av hrs/proj
36	172	84.8	12.1	4.8	2.4

Table 3. Projects not finished

where

- **% hrs** represents the percentage of hours devoted to this group of projects relative to the total number of hours
- **Av meet** is the average number or meetings dedicated to these projects
- **Av hrs/proj** is the average number of hours dedicated to a project of this type

Evidently, the time dedicated to these projects is less than that dedicated to those finished, and so is the number of meetings. These projects are abandoned after an average of 4.8 meetings.
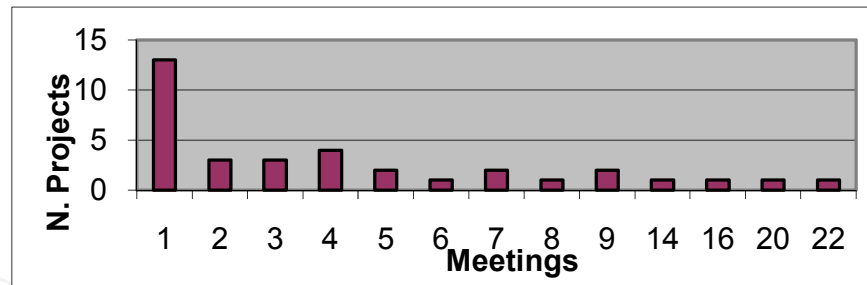
Fig. 1. Diagram Meeting/Project (not finished)

Fig. 1 shows the number of meetings per project before abandoning them. Notice that a big number of projects are abandoned after the first meeting, and only a few after more than ten. Probably it is because students, after passing the subjects, have the interest and will to finish the project, but as soon as they find a job (that usually is immediately after passing the subjects) they are incapable of dedicating the necessary time and effort to make the project. Moreover, they don´t sign a contract with us by which they commit to deliver every week some documentation or partial achievements. We tell them what to do and, normally, the way of doing it, but we usually don´t have enough authority for establishing deadlines.

There are some students that consider a goal in itself to find a teacher who directed their projects, considering that the work to do is easier because the teacher will solve their problems, without taking into account that one thing is helping to solve problems and another totally different is to make the project.

2.2.2 Finished
This group supposes the main effort for teachers but, at least, it is not a loss of time: students get their degree and teachers conclude a work that lasts several months. Table 4 shows the data elicited for this category. Headings mean the same as in table 3.

Projects	Meetings	Hours	% hrs	Av meet	Av hrs/proj
63	945	614.3	87.9	15	9.8

Table 4. Finished Projects

Clearly, it can be seen that in every concept, this group of projects require more effort but it is a profitable work.
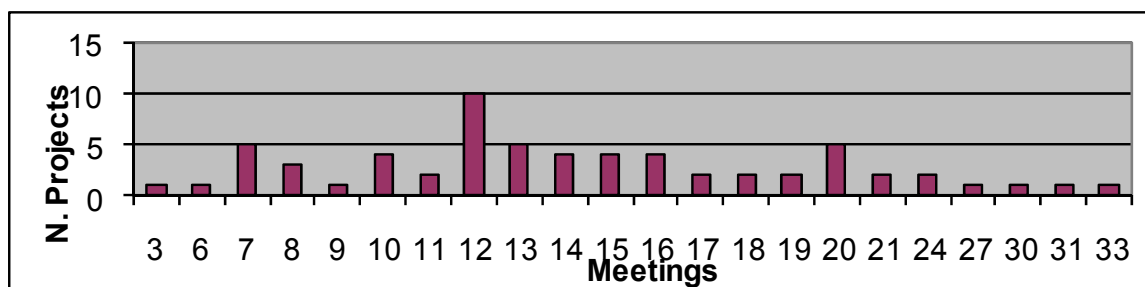

Fig. 2. Diagram Meeting/Project (finished)

There have been a few projects that have needed more than 20 meetings, and only 2 that have needed less than 7, but the average is 15 meetings per project.
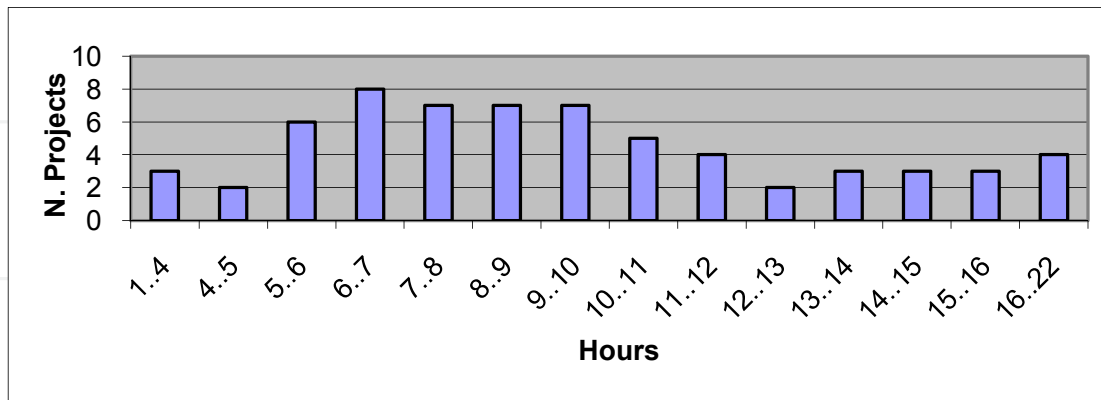

Fig. 3. Hours/Project

Concerning the hours per project, as shown in Fig. 3, the average is 9.8 hours per project. It is not usual to dedicate less than five hours nor more than sixteen. When a project needs less than 5 hours of dedication it is because the student needs the degree to continue studying a superior degree and is concerned very much. In these cases, they make the project in three months, from June to September, immediately after passing the subjects and before the new course begins. If a project needs more than 16 hours it is due to a lack of continuity on the work or because the student has been trying different approximations to the project before choosing the definitive one.
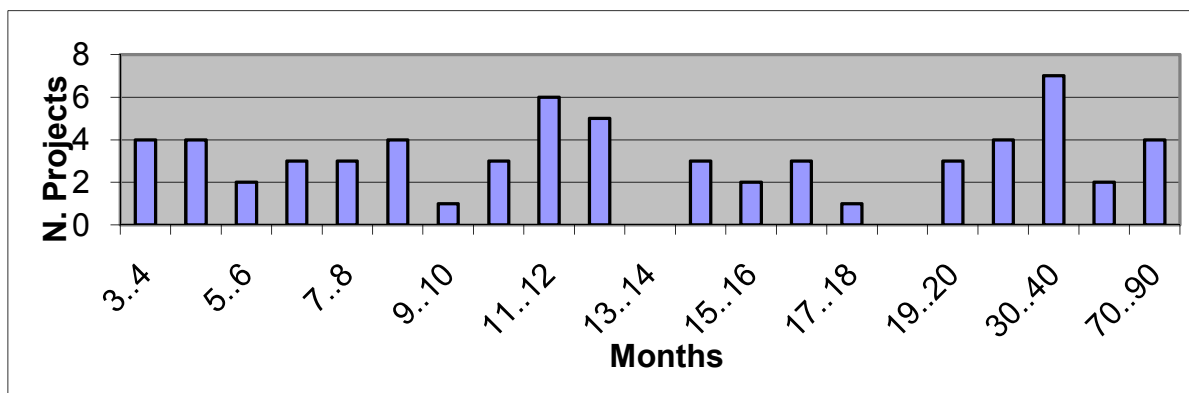

Fig. 4. Months/Project

In Fig. 4 it can be seen that the number of months needed to make a project varies a lot. There are projects that need only a few months and other that last several years. In any case, it is difficult to foresee the lasting of a project and it is clear that there is a lack of control by the teacher over the student´s work and a total dependence on the student´s will.

3. FYP and the EHEA

European Community has established the European High Education Area (EHEA) as the new frame for university studies. But ¿how do this environment will affect the FYP realization? ¿Bologna´s proposal will make things easier? It is very difficult to say now, but there are some aspects that permit to hope it was that way: a different way of teaching, more control over the student, less students by class, … although it will introduce another factor: it will be easier for a student to go to a different university for making the project. In any case, it is the moment to think about all the problems related to FYPs and try to solve them.

4. Conclusion

Supervising FYP is usually a hard work for teachers as well as making a FYP is a very hard work for students. Apart from that, we can state some interesting conclusions after the study that are commented in the next paragraphs.

Making a project, definitely, is a matter of will for the student. It causes big differences in the time needed to finish a project, depending on the student: his concern, whether he has a job or not, his personal life...

Consequence of the idea exposed above, there is a lack of control over student´s work and the impossibility of establishing an adequate rate of work from the beginning to the end of the project, that it would be something fundamental to reduce the time necessary to finish it.

A high percentage of projects are abandoned, causing the teachers an important loss in time and effort.

Another consequence of the lack of control and excessive time required to finish a project is the difficulty, or even impossibility, to use the results in other teacher´s work: papers, thesis, other projects... So, it is not easy to take advantage of a project although it had been finished.

Is there any solution to these problems? We think it on must be based on taking control over the student´s work and forcing him to deliver partial results every period of time established according both the teacher and the student. But, is it possible? It could be two ways of facilitating this:

- Take advantage of the work done by the student at the company if he or she has a job, being controlled by both the teacher and a responsible person at the company. This solution implies setting up agreements between faculty departments and companies, where the responsibilities for everyone were clear and the work the student do in the company were adapted to the FYP format.

- Establish dynamic work groups, working in laboratories of the faculty departments on projects of interest for the department itself. This would imply the collaboration among teachers of the department.

Maybe we should think on accepting the experience (if demonstrated) acquired by the student while working in a company as a substitute of the FYP. In this case, certain rules must be set to establish a clear correspondence between a way or another of making the project.

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