

## Science Fairs as an Annual Students Project

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### Introduction

In School Education the teacher, the classes, the study' organization, the school, the social environment... everything is important and will condition the effectiveness of student's learning process. However if we want our students to learn and care about science, we have to stimulate and offer them the opportunity to put in practice what they are learning or have learned, because for the vast majority of students the better way to "learn is by doing" [1].

Young students had to be stimulated to science and one of the fine ways to do it is by developing scientific projects, like in science fairs, because they offer a better comprehension of science and nature developing skills, fundamental in science but also in the everyday life, and promote a more critical opinion in face of problems [2]. Despite the importance of this kind of activities, in Portugal events like these are still rare, and there is almost no specific literature that could help us in this organization process. There for it was decided to study and organize a science fair in Externato Maria Auxiliadora. The final objective was to promote, in the last week of school' classes, a science fair were students present their work at the school and community.

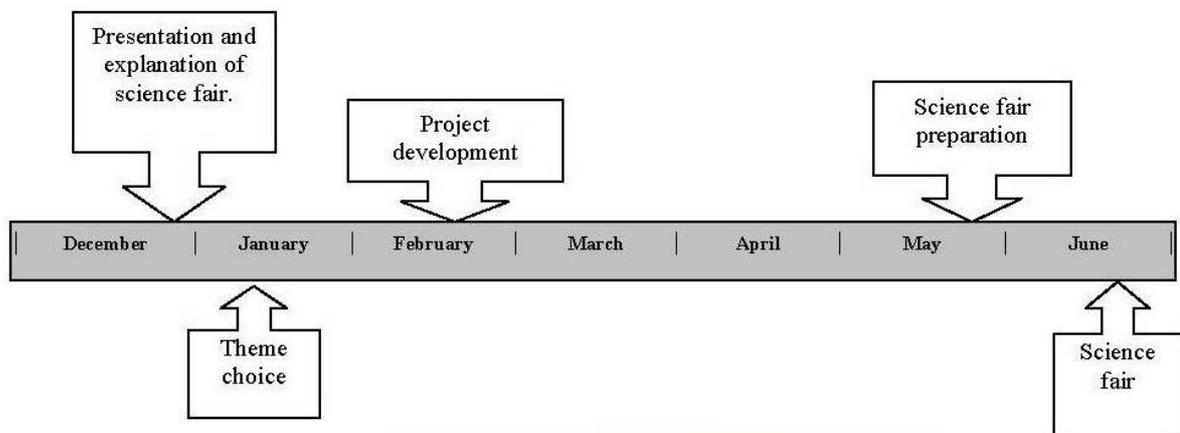


Figure 1. Chronogram of science fair project stages during the school year

## Annual Project Phases

The science fair organization was divided in five different stages. The deadlines in Figure 1 aren't strict, and not every student developed their project in the same period of time.

The first step, at the end of December 2006, was to present the idea of doing a science fair project to the students, so they can be able to think about a project during Christmas vacations. When we explained to the students what a science fair is all about and proposed them to participate, curiously most of them already knew the meaning of science fairs in spite they never participate or attended one. Most of them show interest in participate, despite the fact that they will have to work in their spare time.



Figure 2. Students working (laboratory)

At the beginning, the science fair projects were only expected to be performed by students with ages between twelve and fifteen years old, due to the fact that they had already a certain background level of knowledge of science at the extent we expected to be needed or advisable for the type of activity we envisaged. However, some younger students show interest in the science fair project, having some good ideas, and it was decided to let them participate.

At the restart of classes, early January, it was defined in the school to schedule three hours per week, during lunch time, for the participating students to work on the project at school. The students had access to the school computers and laboratory, to do their research and test their projects, like we can see in Figure 2. However, most of the students prefer to develop their project at home, only working at school when they needed some guidance.

The first weeks were dedicating to research, allowing the students to gather some information about previous ideas, to finding new ones, to “know” more about their subjects.

Since middle of February the project development phase begun. The time available in the schedule were only dedicated to the development of the project. In this stage, students assumed the role of a scientist: they search, observe, experiment and explore and try to prove different hypotheses [1]. The student enthusiasm on

working in this kind of projects has led some of them to develop more than one science fair project.

The last stage before the science fair is the preparation of the presentation they should deliver at the science fair. Most of the students started to prepare their presentation at the end of May. They create posters to post on the science fair day, like we can see in Figure 3. The structure of the poster was optional, but all of them should contain the identification and a general idea of the experiment. Obviously it should be attractive and the ideas should be presented clearly and correct scientifically [5].



Figure 3. Students preparing the science fair presentation

### **The Teacher's Role**

The first guidance that the teacher needs to develop this type of activities to lead the students to a science field interesting to them [3], in which they can select an everyday life phenomenon that they don't understand but would like to know more about, or select a previously known experimentation, yet without repeating a previously done work [1].

Despite the enthusiasm shown by the students, it's important to refute them, frequent, previous idea that developing a science fair project is to replicate an experiment previously seen on television or on the internet.

The first obstacle is when or if the students realize that is not simple to reproduce an experiment. Also when it is necessary to improve the work most of the students don't know what to do. So, it's necessary to follow and encourage the students, especially when their project don't work, or when it doesn't happen what they expected.

The role of the teacher is thus to help students to work and reason and don't let them give up. Whenever possible the professor should guide the students to perform better and improve their projects even more [4]

Another important aspect is not forgetting to remind the students that they have to finish their project before the deadline, because most of them think that they have... always... enough time.

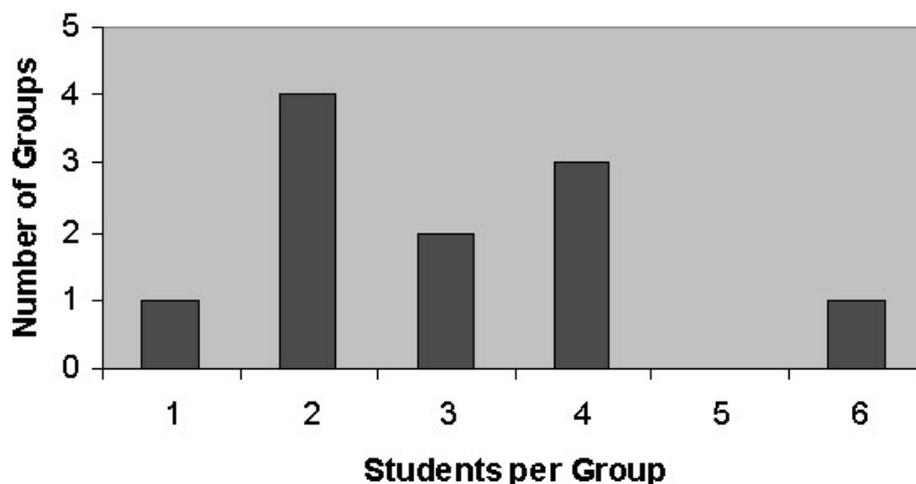


Figure 4. Distribution of students per group

The teacher needs to be “always” asking the students how the work is doing, so they don’t forget that they have to finish it and feel supported... but not “pushed”. This attitude is to prevent that, when it appears some aspects that the students don’t expect or if they can’t finish the project on time, they don’t lose their motivation interest and goals. The teacher encourages the students, so they can see that we care about their projects and their efforts [3].

It’s very important to help the students preparing the science fair presentations too, because they can learn more when they have to teach the others, and if the explanation is attractive and clear everyone can learn with it... and the students will feel it!

### **The Science Fair**

At the science fair, there were fifteen experiments presented by eleven groups of students organized as we can see in Figure 4.

The difference between the number of groups and the number of projects were due to the fact that some groups developed more than one project, as is possible to see in Table 1. This fact diverted the students from the initial objective of the science fair, which is the understanding the science behind the experiment, leading them to a somehow under-development of each individual project.

Not all groups that participated in the process through the year lead the work until end, and were not present at the fair, mainly because they had no enough time, for instance, due to the fact that they started later than other groups. Some of them were actually obtaining some results but didn’t want to participate because the project wasn’t entirely concluded. This fact in one hand could show their levels of exigency on themselves but also, eventually for some students, that their main worry is to reproduce the experiment, disregarding the fact that the most important thing was their learning process.

The projects presented at the fair were distributed between chemistry and physics subjects, as it can be seen in the graph of Figure 5.

One important aspect of this science fair was the participation of one student with special needs. He decided to develop the project individually (yet with some help from other students, on their own initiative), and presented it at the science fair, quite successfully, in spite the low expectations of everyone. This student needed to be helped in a lot of matters during the year but it was possible to verify his increasing interest and a large evolution along the way.

Group	N° of elements per group	Project
1	1	Volcano
2	2	"Fluver"
3	6	Imploding can Volcano Resonance frequency
4	4	Coca-cola effects
5	2	Lamp
6	3	Curie effect Solar watch
7	4	"Glass of champagne"
8	2	Perfumes Changing colour solution
9	3	Compass
10	4	Bearing car
11	2	An egg in a bottle

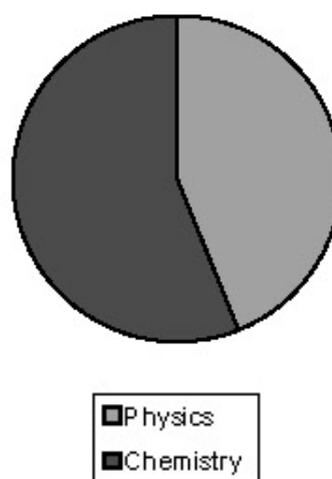


Table 1. Name and number of projects per group Figure 5. Distribution of the projects between the science fields

The science fair projects needed, finally, to be evaluated. A jury was formed the included school' teachers in different subjects, and they were unanimous on choosing the winning group. Despite of having a lot of well done projects the two winning groups demonstrate a larger interest in their project: the perfumes and the Bearing car, Figure 6. They didn't worry only on to replicate experiments but researched their topics, investigated, innovated and were even able to talk about fails and discoveries (unlike some others that mainly worry about the final result). One of the most important aspects was that they were able to explain their project in an exceptionally clear way and with scientific accuracy.

## Conclusion

It was clearly proven with our experiment that a science fair project develop different positive attitudes in the students involved. Even students that didn't participated had shown interest and curiosity about science and science fairs. One difficulty detected is the fact that students mainly value the "experiment itself" and valued not enough the research they had to perform and the doubts and ideas they

came up with and explored, often not realizing the fact that they acted like scientists. The students acquire with this type of activities a greater interest and knowledge on Science. They developed also a positive curiosity about the science fair projects made by other students, about daily life phenomenon and other themes discussed at classes.



**Figure 6. The winning groups (perfumes at left and the bearing car at the right)**

Student's participation in the regular classes improved clearly, in general, after they started to develop their science fair project. This happened not only because the relationship between student and teacher changed by working in an informal way, but also because students started to develop more interest about class' issues. Science fairs' activities promote creativity, autonomy, research capabilities, and scientific knowledge. Students understand better what science is and that it is present in everything that surrounds them.

## References

- [1] [www.feiradeciencias.com.br](http://www.feiradeciencias.com.br)
- [2] <http://portal.mec.gov.br>
- [3] Young T, Science Fair Projects bring it all together, Book Report, 2000.
- [4] [www.content.bvsd.org/tag/elemscifair.html](http://www.content.bvsd.org/tag/elemscifair.html)
- [5] <http://www.scifair.org/articles/steps.shtml>

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