

Informal Learning at School. Science Fairs in Basic Schools

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Abstract. *The work herein reports on the implementation of science fairs in a systematic way in basic schools. In particular we will present the second edition of the annual Science Fair at basic school Externato Maria Auxiliadora, in Viana do Castelo, Portugal, focusing on the evolution advised by the evaluation of the previous edition of the science fair. We will stress that it was intended to give continuity to the research project on science fairs of the previous year improving, based on past conclusions, some aspects like: the age group of the participants was enlarged to ages 10 to 15; there was a major effort to engage parents and the whole school community in the process and in the development/construction of the projects to the science fair; to the teachers involved in the project was assigned an increased set of weekly hours to give support to the works realization. The participation of the students was not mandatory and it had no weight in the student's formal evaluation.*

The results suggested that the whole school benefited from the enlargement of the age group of the participants in the event, from the involvement of parents and from the systematic involvement of schoolteachers.. We concluded again that the Science Fair contributed effectively to an increase of the student's interest on scientific subjects.

Keywords. Basic Schools, Informal learning, Science Fairs.

1. Introduction

Science Fairs are generally classified as cultural and pedagogical activities that involves all school communities, allowing public presentation of the scientific projects [1] developed by the students, the dialogue, the

sharing and discussion of knowledge among students teachers and, hopefully, parents and the community. Work methodologies are developed, research performed, and the creativity of students but also teachers and visitors during the exposition, is explored [2,3]. Science fairs stimulate the construction of the scientific knowledge along the years, the exchange of ideas, work habits and knowledge [4].

However, the success of this kind of event didn't depend only on the effort of students but it is also necessary that they feel the support given by their teachers and parents. The help given by professionals of the scientific area in study might be very important during the development of the project and the preparation of the presentation [4]. However is important that this kind of support begins at home. Therefore, parents should be notified about the realization of the science fair as early as possible [5] and enrolled actively.

A good organization of the science fair is also necessary to make it a success. Therefore organizers should select the appropriate space for the number of participants and visitants that they expect [6], select dates and opening hours carefully [7] and make available materials and services if necessary [6]. If parents are notified sooner, certainly they don't mind to help in the organization, helping the organizing teachers [5,7] and so leave them with more time to support students with benefits also in terms of security and working rules [4].

2. Development of the project

On previous year project, the first science fair organized at school Externato Maria Auxiliadora limited the participation to students with ages between 12 and 15 years old (7th to 9th grades) and the scientific areas involved on projects were

restricted to Physics and Chemistry. The participants and organizers' lack of experience led to some faults that one tried to remove in this second edition of the science fair.



Figure 1 – Poster with the science fair' mascot.

The fair was, this year, advertised sooner by middle October 2007, and the deadline for submission of proposals of ideas for projects was set toward the end of the school' 1st trimester, on the 29th November. However, we concluded this deadline was too short and more time was given in order to allow the setting of workgroups, choice of subjects and the preparation of the project' proposals. The final deadline was set to the end of the 2nd term (March). The fair was scheduled for the beginning of the 3rd school term (in April) as during that period the students are not overloaded with works and tests, like it happened last year, and the students were able to give oneself up to the realization of the projects. The two weeks school' break that preceded the fair was very useful to the finishing of the projects and to prepare the presentations. The proposed date for the fair seems to have been a good choice since the student/teacher interaction could be done in a daily base, and the students could practice their presentations and reinforce their scientific knowledge on the subject of their project. The time gap between the choice of the projects and the realization of the fair, was enough to allow teachers to check if the projects were feasible or not in terms of presentation at the available space, as well as checking the security conditions, making the students aware of

the constraints. The gathering of information in this phase was essential for the subsequent distribution of the physical spaces in the fair.

Another factor that contributed to the success of the science fair was the fact that, in the beginning of the year, parents were informed in a general meeting about the realization of this event, and of the importance the activity may have for the students in their learning/"growing" as well as of their active participation in the process. By the end of the 2nd term all parents were informed in writing about the fair date and were invited to attend and participate.

Although this initiative was originated at the school's science departments, the Arts and Technological education department was also actively involved for some support on the construction of the fair mascot (

Figure 1 – Poster with the science fair' mascot) and also helped in some projects.

Another pleasant surprise was the enthusiastic participation of the pre-school students, not only in the visit to the fair, but also in the preparation and presentation of two experiments.

3. Results and discussion

101 students (around 67 % of the students of the school) participated in the fair. It is possible to see in

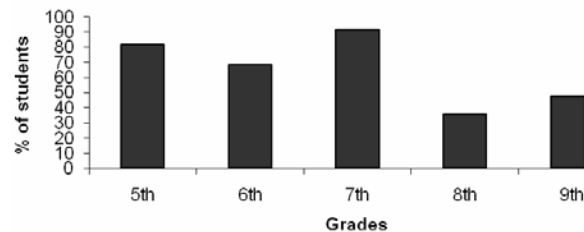


Figure 2 – Percentage of students of different grades that participate on the science fair

that there was a larger participation of the students of the 7th grade and bellow (ages between 10 and 13 years old).

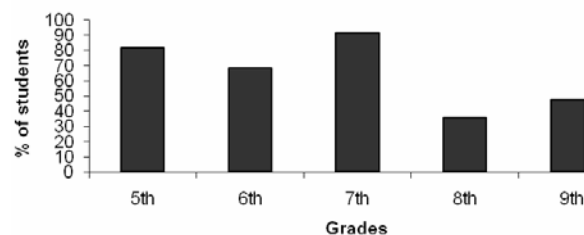


Figure 2 – Percentage of students of different grades that participate on the science fair

The enthusiasm and great level of involvement of the new-coming students (last year fair only students from 7th to 9th grades participated) was obvious. It was remarkable the participation of more than 80 % of the students of the 5th year, for whom this activity was completely new and that have a still limited contact with science subjects. We may conclude that it seems to be a good age to initiate them into projects of this extent. The enthusiasm in the participation in the process is very important. However it is of great importance the constant surveillance of the evolution of the students' participation in this type of events across the year (and in the subsequent years), creating work habits in the preparation and development of scientific projects, making sustainable this increased interest in science.

One important aspect that we take into account is the fact that some elder students deliver their projects after the deadline or that disregarded the standards of security imposed. In some cases this lead to the non acceptance of some projects, as a way to emphasize the importance of responsibility, including in what concerns deadlines and security rules. This imposition also led to an improvement of the final products in comparison to last years' fair.

Also important is the continuity of previous year projects, which is recommended in the literature [4]. Two of last year' projects were further developed and presented by the same groups this year. As the planned improvements were not only aesthetic but scientific and clearly justified the works were accepted as proposed. In fact it was clear the care and effort taken by these and all other students in order to prepare better projects than last year fair' ones.

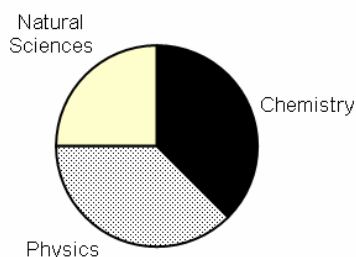


Figure 3 – Distribution of the projects between the science fields

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, it is possible to see that the distribution of students by subject was homogeneous. These projects were classified in the respective areas take into account the theoretical basis. Among the 32 projects presented, 12 were approached in the Physics perspective, 12 of the Chemistry and 8 in the broader classification of Natural Sciences. This last area was a novelty regarding the previous year, when there were only projects of the areas of physics and chemistry. It seems that this difference can be related to two quite obvious reasons: the biggest involvement and support given by the teachers of natural sciences discipline, and the participation of students from 5th and 6th grades (authors of 5 from 8 projects on this natural sciences group). It is important to stress that, in spite of the homogeneity described previously, the students treated the subjects under rather varied perspectives, i.e., related to the environment, technology, everyday phenomenon explanation, ... A wide variety of resources was used to improve the quality of presentations that appeared in different formats: from common posters and dossiers, to reports, powerpoint presentations, ...

In terms of the number of students' which constituted each work group (Figure 4 – **Distribution of students per group**), it was verified that around 47 % of the projects were developed in groups of 4 students. On larger groups was found no major disparity in what concerns students' knowledge, and it can even be considered beneficial in some way since the students could take turns in the presentations, allowing them to visit other stands and see, and discuss, other projects.

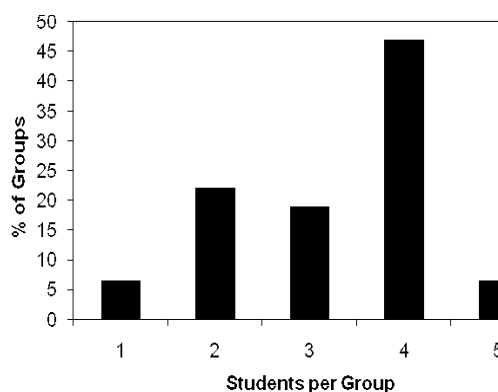


Figure 4 – Distribution of students per group

Taking in account the projects development stage, the presentation clearness and the creativity, the jury had chosen five winning

projects and, by vote, the students have chosen another. It was interesting to notice that the five selected works were developed by groups of students of the 5th, 6th and 7th grades. This demonstrates the high quality of the projects of these students when compared to those elder students.

One example of a winner's projects is the "Ecocar" (). A group of 7th graders built a solar energy driven car using apart form a solar cell recycled materials with parts of old destroyed cars, paper, rubber, electric spare parts, etc.

Another group of four students of the 6th grade explained why and how the quicksand behaves, simulating the process with a mixture based on flower and water. Visitants could test the different behaviour of quicksand according to the way they push their hands and other objects in the mixture (Figure 2).



Figure 1. - The "Ecocar"



Figure 2 - Simulating quicksand.

A group of 5th graders studied and successfully explained the main proprieties of the air, making some testes to identify some of their constituents.

4. Future work

This project was awed to be of all school community interest. The continuity of the

realization of science fairs is a way of curricular enrichment, and a way to increase not only the success in terms of student' learning of scientific subjects but also as the motivation, at larger, for learning. In addition science fairs are a way to enhance students' responsibility and autonomy. In the following academic year the project will be developed within "Area de Projecto" classes (project classes), which will allow teachers to have a larger control of the whole process. It will be done an attempt to articulate the projects with other fields of study in interdisciplinary approaches.

Another aspect to be improved in the following science fair will be a previous definition of the jury which will choose the winners of the initiative.

There is an intention to open the event to elementary school students of the same institution but organizing this "junior" fair in a different room. This initiative will allow studying the degree of involvement of these students, the quality of projects, the time spent and the number of participations, attitudinal and learning gains.

We considered, and will work accordingly, very important to check if this quality of the work done in this project will be maintain in the following years.

5. Conclusions

Science fairs are of great interest to schools and their students since it gives the opportunity to students to improve their skill and scientific knowledge working hands-on in an autonomous way. In order to ensure an enduring improvement of school' science fairs: the activities should be developed for several years with an active continuity; ensure the participation and involvement of whole school parents and of the local community; and, a continuous sharing of knowledge and experiences on this subject between teachers.

6. References

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