

Science Fairs as Learning Tools

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Abstract. *Science fairs are activities well known, in different countries, for their pedagogical relevance. For that reason a 4 years study was developed to evaluate the advantages of this informal teaching method in the context of a basic school in the northwestern Portuguese seaside town of Viana do Castelo. The study included the analysis of the evolution of students that have participated in previous fairs, and also students participating in the present science fair. The motivation of the students was monitored and also the knowledge and skills' gains achieved. This way, the relevance of this teaching modality is once more demonstrated, not only in what concern the short term, right after student participation, but also the students future attitude towards the school and their motivation to the study of science, as well as in long term knowledge and skills acquisition.*

Keywords. Science Fair, hands-on, Basic schools, Physics, Chemistry

1. Introduction

Science fairs are defined as a cultural and pedagogical activity where students display and discuss scientific projects they developed, being thereafter normally evaluated by adult judges [1, 2]. We think the focus should be at first instance to the pedagogic value of the scientific research developed by the students in an active committed investigative hands-on way.

To participate at a fair, students have first to overcome many problems and past different phases: subject search, project development, experiment design and problem solving, preparation of the presentation, and the science fair final presentation [2,3,4].

This activity has an added advantage of promoting students enthusiasm toward science, while in each phase they develop important skills like research capability, decision making, reasoning and communication skills, while

having the opportunity to interact with other science interested students [1,2,5,4].

2. Science Fair Participation

A study about the importance of science fairs on students learning as been developed on a school, in the city of Viana do Castelo, Portugal, during the last four years and is reported elsewhere [3,5,6]. This school, Externato Maria Auxiliadora, is a private catholic school with 135 students from the 5th to the 9th grades (ages between 10 to 15 years old).

We organized a science fair for the 4th consecutive year. Students, with the support of the school and teachers developed, in a voluntary basis, scientific projects extra classroom and presented them at the end of the year to all school community and abroad.

On the first edition 42,9% of school' students have participated (only from 7th to 9th grades); on the second edition 65,6% of the students participated, on the third edition 77,9% and on the fourth edition we reached the 82,6% mark.

With the main objective of knowing students' opinion about science fairs, and the impact it might had on their education, a questionnaire was distributed to 121 students at the beginning of the year of this 4th science fair.

When students were asked about what a science fair is for them, different answers were given as is possible to see on Table 1.

When questioned about their participation of the 4th Science Fair, the reasons why, were varied.

The Figure 1 shows the student answers. The majority of students refer the fact that it was an opportunity to learn something new (31,7%). Others said their participation in this edition happened because they already participated in previous year' editions and enjoyed the experience (25,1%), 9% said it was due to previous visit to the science fair, 23,4% of the students said they wanted to participate as they like science, 6,6% of the students participated due to the fun of the experience and 4,2%

because they were required to.

Table 1 – Definition from students of science fairs.

	N° of answers
Place where you show curiosity about science and / or technology.	35
Place where you have experience and / or projects.	33
Place where are sharing of experiences of learning, fun and live.	18
Place where we see projects developed by children / students.	12
Place where we show what we know and where to get the best experience	8
Others answers	8
Didn't know	7

This answer, the reference of being mandatory, was due to the fact that some school time was available at the subject of “Area de Proyecto” for students to develop their projects, and their commitment and participation was evaluated qualitatively. However, it is important to notice that 4 over the 7 that mandatory participated, said that, despite being mandatory, they participate because they already visited and/or participated in previous years and that they were also fan of science.

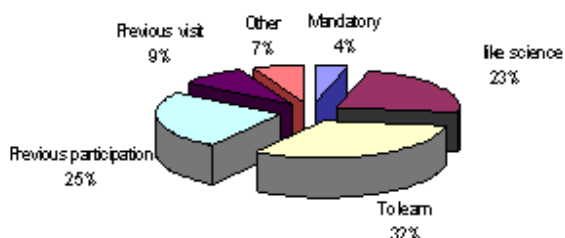


Figure 1 - Reasons for students participated on the 4th science fair.

Concerning the number of participants we would like to stress that all the 17,4% of the students that do not participated at the fair have ages between 12 and 15 years old. This reinforces the tendency, already verified in previous years, fortunately decreasing, that the youngest students are more participative in these activities. The Figure 2 shows the reasons that these students gave for not participating in the fair.

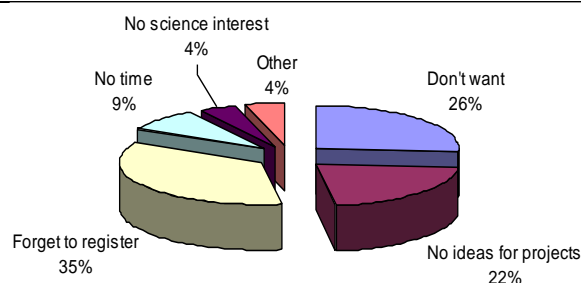


Figure 2 - Reasons pointed for the students to not participated on the 4th science fair.

The fair, as in previous years, was announced at the beginning of the school year. Students had deadlines to select a subject and register themselves at the fair. The majority of these “missing” students (34,8%) forgot to register, 26,1% did not want to participate and 21,7% said that didn't had ideas for their participation. The rest of the answers was that they already have too many activities and cannot conciliate one more (8,7%), they don't like science (4,3%) or 4,3% give other responses.

3. Knowledge Evolution

To evaluate student's knowledge, a theoretical inquest was made at the beginning of the school year and at the end, after the science fair. The question presented was about why boats of 45 ton are capable to float. This question was based on a project developed by 2 girls from the 5th grade (10 years old) on this edition of the science fair.

Figure 3 demonstrates the evolution of the students answers. It is possible to see that the number of students that did not respond decreased from 40,5% to 19,1%. On what

concerns the incorrect answers, most of the students did not know why this fact happen and say that it is because of the characteristics of the materials boats are made of, or give illogical answers. Although not dramatic it was possible to notice that the misconception decreased from 42,1% to 34,7% after the science fair process (yet not directly related to the subject it self).

On the other side, the number of answers partially correct increased from 8,3% to 23,1%. Here, students refer essentially the fact that a large part of the boat is hollow, allowing the fluctuation. Finally the number of correct answers increased from 9,1% to 23,1%.

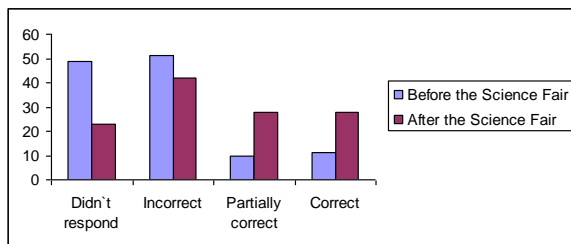


Figure 3 - Answers from students to the theoretical question

4. Conclusions

With this study we can conclude that science fairs are an activity that motivates and approaches students to science. A positive steady evolution on the number of participants along the last four years was noticed as well as in what concerns the reasons given to participate on this activity. Positive results were obtained. A certain tendency of losing interest while growing older was unfortunately also noticed.

5. References

[1] Grote, M. Teacher Opinions Concerning Science Projects and Science Fairs. Department of Education, Ohio Wesleyan University.

[2] www.feiradeciencias.com.br

[3] Esteves, Z. e Costa, M.F.M.. Science Fairs as an Annual Students Project. Proceedings of the 4th Internacional Conference on Hands On Science. 2007.

[4] T. Young: Science Fair Projects bring it all together. Book Report; 2000.

[5] Zita Esteves, Andreia Cabral, Manuel F. M. Costa, "Informal Learning in Basic Schools.

Science Fairs", Int. J. Hands-on Science; vol. 1, n°. 2, pp. 23-27 (2008).

[6] Esteves, Z., Costa, M.F.M. Science Fairs in Non-Disciplinary Curricular Areas. Proceedings of the 6th International Conference on Hands-on Science, October 2009. Índia.