

**The science fairs and the science and technology diffusion. The case of the FECTI -
Fair of Science, Technology and Innovation of the Rio de Janeiro State**

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Abstract

Since 2005 the CECIERJ Foundation, a Rio de Janeiro State government agency, promotes science fairs by the FECTI program, with the goal to engaging the participation of students of basic and high schools.

The FECTI science fair has become more popular, with an increase participation of schools, teachers and students of more and more counties of Rio de Janeiro State. Despite this, little is known about perception of participants about the FECTI.

The present study attempted to evaluate how the participation in this project has influenced students and teachers. The teachers answered a survey and reported their perceptions about effects on students, school participation, their motivation and the impact on their teaching practice.

The data has been collected by the answers of thirty-one participants, sixteen males and fifteen females, eighty-seven percent (87%) of them from public schools, about thirty-seven percent (37%) of the teachers' total. Emerging from the answers of these teachers is the following evidence: 1) ninety percent (90%) of teachers claimed that students improved their learning; 2) ninety-seven percent (97%) answered that students developed many skills including communication, empathy, engage in collaborative work and responsibility, besides improved their self-confidence and the interest in science content;

and 3) all teachers emphasized that doing research projects with their students contributed in some way to their teaching practice. The majority of respondents felt that participation in the FECTI shows there are another ways to teaching and learning science. These testimonials enhance the relevance of science fairs in science and technology diffusion.

Introduction

Science fairs in Brazil have originated in the 1960's with the concern about improvement of science learning and divulgation. This was linked to worldwide valorization of role of science as a tool for national development after the end of Second World War.

The Brazilian Institute for Education, Science, and Culture (IBECC) was created in 1946 as National Commission of United Nations Educational, Scientific and Cultural Organization (UNESCO) with the purpose to promote projects in science popularization and education.

The nomination of Isaias Raw scientist, in 1952, to the IBECC's São Paulo State office, enabled him to organize fairs, science clubs and museums, and to set out curriculums, teacher training courses and the production of laboratory kits.

In 1960, the first representative science fair was promoted in São Paulo city by Raw and Maria Julieta Ormastroni, with the collaboration of José Reis, who presented lectures every night for the young expositors and the visiting public.

In 1968, the IBECC (GB) and CECIGUA (Science Centre of the State of Guanabara, current CECIERJ Foundation) promoted the State Fair of Sciences of the State of Guanabara, in the Rio de Janeiro city .

The city of Rio de Janeiro also hosted in September 1969 the first National Science Fair (I FENACI) for middle school students, by an initiative of Arnaldo Niskier, then State Secretary of Science and Technology of Guanabara State, realized in the São Cristóvão Pavilion simultaneously with the 2th Student Science Exhibition of the Guanabara State, promoted by IBECC (GB) and CECIGUA.

In 1973, the First Science Fair State of Rio de Janeiro takes place in Niterói city. From 1970's until the early 1980's, schools of Rio de Janeiro State promoted science exhibits with a final presentation of works at the Maracanãzinho sports gymnasium.

Nowadays in Brazil this kind of initiative has the support of government policies, which allowed to create a network of national, regional and local science fairs.

Since 2005 the CECIERJ Foundation, a Rio de Janeiro State government agency, promotes science fairs by the FECTI program, with the goal of engaging the participation of basic cycle and high school students.

During the development of this program, due to the huge impact of this fair and the need to broaden this initiative, it was created the FEMuCTI, a network of institutional, municipal or regional science fairs, which through membership participate to the FECTI's final exhibit.

The FEMuCTI came due to what we observe with the organization of the FECTI: the interest of students, teachers and schools of the state to participate, but little practice of development of research projects.

The FECTI receive the inscriptions of basic cycle (around ages 11-14) and high school (ages 15-18) students, who send their projects by the web site or via the membership fairs. These papers are evaluated by the scientific committee, composed by researchers and professors.

In the last version, in 2013, 111 schools of 40 counties (43.5 % of the total ones of the Rio de Janeiro State) had inscribed 224 projects in the FECTI. Of these, 160 projects were selected, 135 of them developed in public schools.

The FECTI science fair has become more popular, with an increase participation of schools, teachers and students of more and more counties of Rio de Janeiro State. Despite this, little is known about perception of participants about the FECTI.

The present study attempted to evaluate how the participation in this project has influenced students and teachers.

Methodology

With the goal to know teachers' opinions about their participation at FECTI, a survey questionnaire containing open- and closed-ended questions was elaborated and sent, by email, to 85 guiding teachers that attended the 2012's FECTI.

These teachers were invited to answer the survey about their perceptions of the effects on students, school participation, their motivation and the impact on their teaching

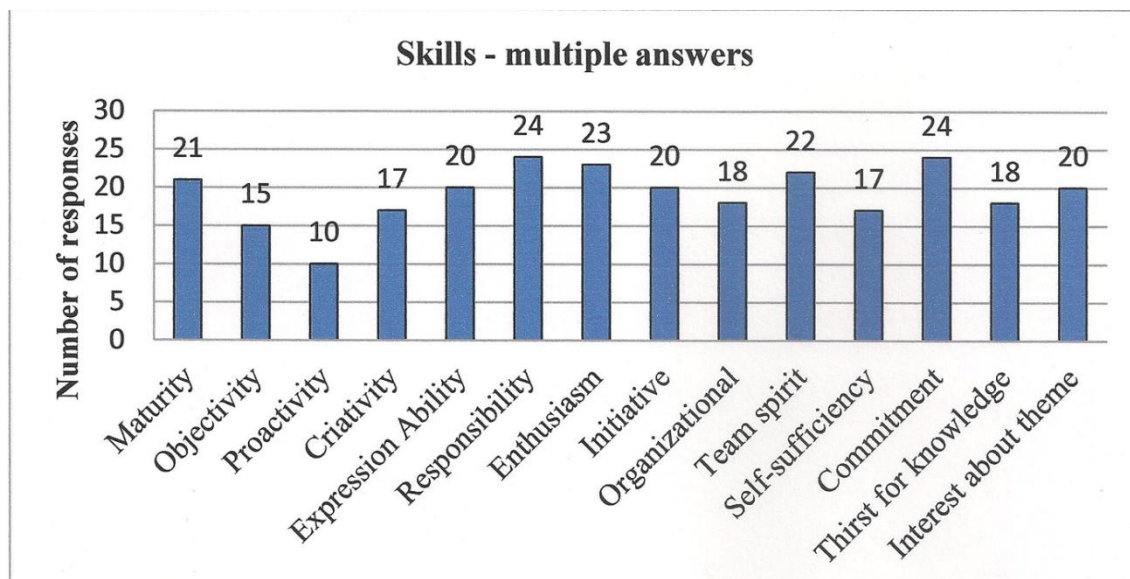
practice, and to evaluate some organizational aspects. Besides this, they were asked to describe their experience of develop a research project with their students.

The answers of closed-ended question were quantified and the open-ended ones analyzed, looking for patterns among them, in order to create categories in which they could be inserted.

The data has been collected by the answers of thirty-one participants, sixteen males and fifteen females, eighty-seven percent (87%) of them from public schools, about thirty-seven percent (37%) of the teachers' total.

Results and Discussion

The answers given in the first question show that the majority of respondents (28/31) believes that those students involved in activities at the FECTI had an improvement in their performance in classroom. In addition, 93% of guiding teachers had observed positive changes in interpersonal relationship skills of their students. This behavior was noticed in their relation with colleagues and school personnel.



Graph 1: Skills enhanced by students participation in activities at FECTI

According to third question, teachers indicated abilities enhanced due to student participation in the project presented in the fair: maturity, responsibility, enthusiasm and commitment were the most frequent capabilities highlighted by the majority of teachers according to the Graph 1.

Furthermore, 97% of teachers indicated an increase in self-confidence of their students.

Question 10 indicates that teachers had used the following criteria to choose students to present projects in the fair: in first place, commitment, with 65% of the responses, followed by performance at school, with 13% of them. Others reasons count with 23% of the answers, such as students already have government grant, willing to be a volunteer, willing to go further in education.

When asked about who took the choice of project scope, 11 teachers answered that it was a joint decision between them and their students, 6 said students had suggested it and 11 of them asserted that was teacher decision.

The majority of respondents, 80%, described that during the fair was quite common to see an exchange of knowledge among students from different schools. According to teachers present in the event, the experience during the fair brought new ideas to next projects, indicating a willing to participate in FECTI'S next editions.

This exciting feeling was confirmed when 97% of teachers declared an increasing in motivation after participating in the fair. Moreover, almost every respondent (97%) affirmed, if were available a science fair in their district, that they would participate. When asked to evaluate how FECTI was organized, teachers indicated their impression in excellent or good.

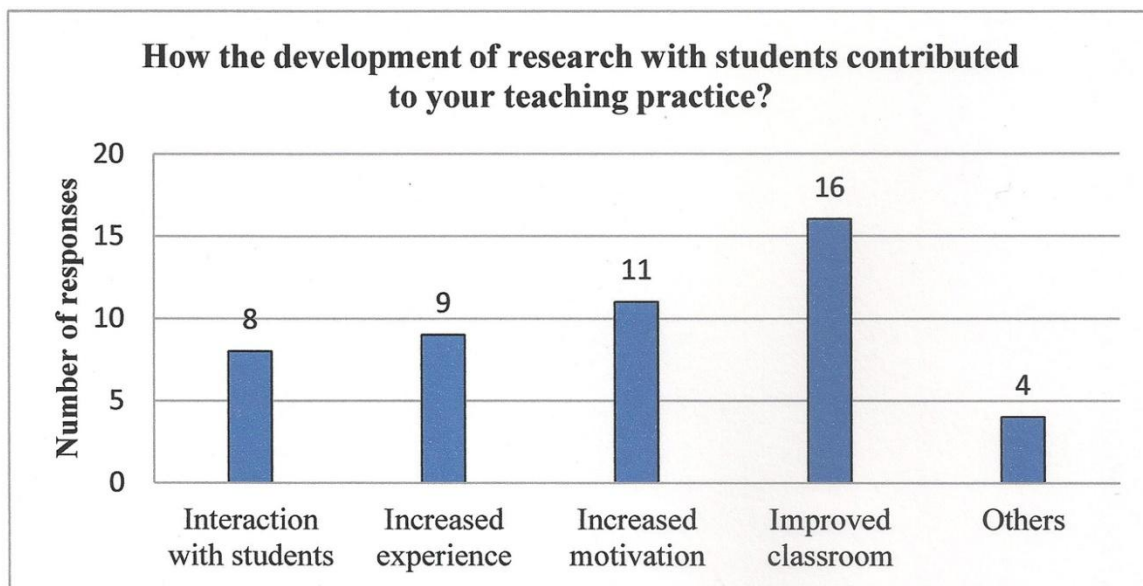
In this research there were also open questions that allowed the teachers write answers in a free manner. Thus, all the responses were analyzed, looking for patterns, in order to create categories to insert them. The results of this categorization are described below.

The question six asked if the school, somehow, valued the orientation activities of the research project, and were obtained 27 responses from 31 questionnaires. Among the responses was possible to find the following forms of support given by the school: dissemination (6 answers), material (5), financial (5), transportation (3), logistics (3),

contact with parents (3), support / encouragement (6) and others (3 answers). We can realize that schools supported teachers in disseminating the research project and contact the parents (so they could authorize the participation in the event) and, moreover, gave financial and material support.

The question seven was about if the school, in some way, supported the implementation of the project. There were obtained the categories of dissemination, material, financial, transportation and others, like in the previous question, and despite the similarities, different categories appeared when the answers were analyzed, such as: moral and/or pedagogical and space. So, 11 answers fit in Material category, 6 in Financial, 10 in Transportation, 8 in Moral and/or Pedagogical, 3 in Space, 2 in Dissemination and 4 in Others.

By analyzing the questions six and seven, it was possible realize that the supply of material, by the school, is essential for the progress of research. In addition, transportation is also essential for schools to participate in the final show of the fair.

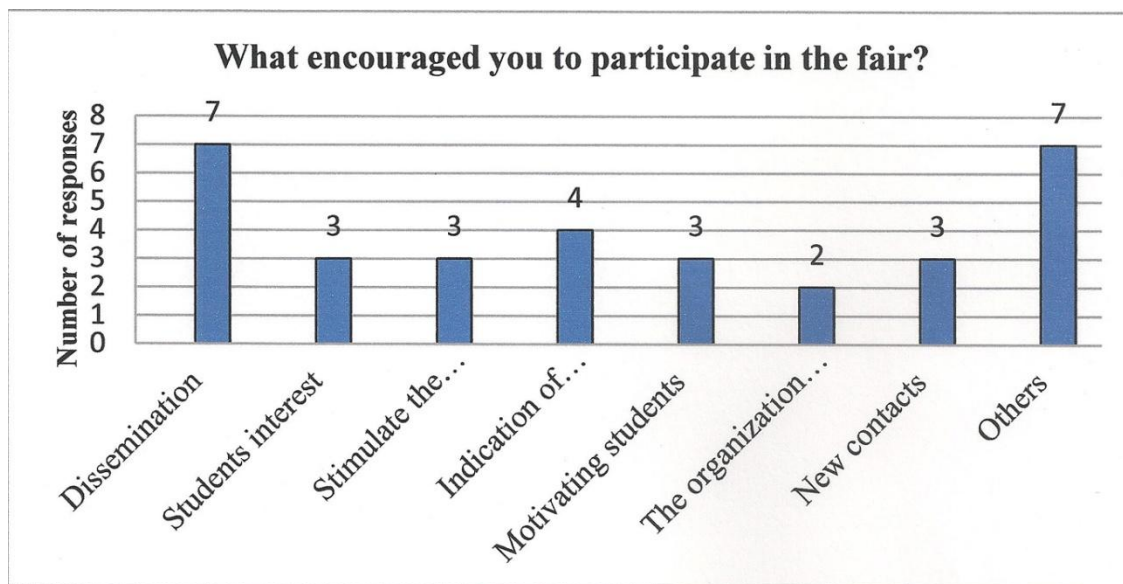


Graph 2: Perception of the teachers about as the development of research with students contributed to their teaching practice

All respondents indicated the development of research with students brought some contribution to their teaching practice. When asked how, the answers obtained

allowed the creation of the following categories: interaction with students, increased experience, increased motivation, improved classroom and others. The result can be seen in the Graph 2.

Also seek to know what has prompted teachers to participate in FECTI. The responses obtained in question nine allowed the creation of the following categories: dissemination, students' interest, stimulate research, indication of affiliate science fair, motivating students, organization of the fair, new contacts and others. The Graph 3 shows the number of responses in each category (the same answer can sometimes be found in more than one category).



Graph 3: The reasons that encouraged the teachers to participate in the fair science

Curious to note that the greatest stimulus that teachers has to attend the FECTI is the dissemination of their research. This points to a deficiency that our schools have to show to the public the work done within its walls.

The last question how productive was, to the research, the contact between the public and the students, indicated the following categories: contributions to research (4 responses), development of students (5), exchange of experiences (7), dissemination (6) and others (4). It was noticed that the contact with the public can bring many contributions to research and students.

Analysis of these answers allowed to realize that one of the goals of FECTI program, which is to stimulate teaching practices that can help improve the lectures and increase the motivation of teachers and students, is being reached.

In one of the questions, teachers were asked to describe the experience of having conducted a research project with students, focusing on the process of elaboration, development and presentation of results, pointing out the positive and negative aspects of this process. Categories were not created to this question, since the responses were very different from each other. However, one of the answers is present below.

“Since the drawing up development, presentation and project finish, which occurred earlier this month, everything went into the most perfect tranquility that I have no negative aspects to report. The positives were many, the participants' motivation, the desire to be right, the kind of "anger" that they showed at the beginning of the work, produced the soap did not work and happiness when the "mix" was correct, the involvement of entire school We intend subscribe both on next FECTI. We appreciate the opportunity to have participated in this event and we wish great success to the organizers in the next work. Thanks for everything.”

The results of this survey highlight the impact that FECTI has been doing in schools. And we are very confident that FECTI will grow year after year, reaching more and more schools.

Conclusion

Emerging from the answers of these teachers is the following evidence: 1) ninety percent (90%) of teachers claimed that students improved their learning; 2) ninety-seven percent (97%) answered that students developed many skills including communication, empathy, engage in collaborative work and responsibility, besides improved their self-confidence and the interest in science content; and 3) all teachers emphasized that doing research projects with their students contributed in some way to their teaching practice. The majority of respondents felt that participation experience in the FECTI shows there

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