

OPINIONS OF BRAZILIAN YOUNG STUDENTS ABOUT THEIR SCIENCE CLASSES AND EVOLUTION: RESULTS OF A NATIONWIDE STUDY

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ABSTRACT: This paper presents the results of the application of the international project “The Relevance of Science Education” (ROSE) on a nationwide scale in Brazil. The project in Brazil seeks to meet youngster’s interest in science, technology, environmental problems, science classes and biological evolution. The data, drawn from 84 schools and 2365 students from all Brazilian states, indicated Brazilian youth’s views about science classes and biological evolution. Brazilians consider school science interesting, although they do not consider it easy. In relation to a future job, Brazilian youth doesn’t have interest in scientific career and with regards to the positioning about the theory of biological evolution, Brazilian students do accept the evidence of natural evolution mechanisms, but still have doubts about the common ancestry.

KEY WORDS: relevance of science, science classes, biological evolution.

INTRODUCTION

Objectives

This paper presents the results of application of the international project “The Relevance of Science Education” (ROSE)¹ on a nationwide scale in Brazil. The project seeks to meet youngster’s interest in science, technology, environmental problems, science classes and biological evolution (only Brazilian version). About 40 countries have participated in the ROSE project around the world.

Theoretical Framework

The ROSE project arose as an attempt to respond to the various dilemmas faced by researchers in the field of science education and the society itself: the declining interest of young people to follow careers in science, the decreasing interest in science through basic schooling, the need to listen to students in educational proposals and position of science education in the face of cultural diversity in society.

1. The ROSE website is <<http://www.roseproject.no/>>.

The ROSE material may illuminate a range of important discussions in the science education community, for example issues such as curricular content versus student's interests, students' disenchantment with their science classes and other (Sjøberg; Schreiner, 2005; Schreiner; Sjøberg, 2004). To listen to what young people have to say about their science classes becomes imperative considering the fact that "traditional science education played a meager to insignificant role in most of the students' personal lives." School science will only engage students when the curriculum has personal value to students (Aikenhead, 2004, p. 6).

Vázquez and Manassero (2008) point studies that consider that students lose interest in science during adolescence, in the transition from primary to secondary school. The authors comment that during this period, natural curiosity and interest of children in science begins to turn into boring and disinterest, and experiences with the school discipline turn into failures, culminating in the abandonment of young people in careers in science.

In Brazil, were included sections on the theme Biological Evolution in the ROSE questionnaire due to the fact that this is one of the most controversial contents understood in science teaching, leading to several Brazilian researches on the subject (Bizzo, 1994; Santos; Bizzo, 2000; Mello, 2008; Pereira, 2009; Oleques, 2010).

So, in order to understand this framework within the Brazilian reality, the ROSE project was implemented within the nationwide context. The data, drawn from 84 schools and 2365 students from all Brazilian states, indicates Brazilian youth's views about science classes and biological evolution.

METHODOLOGY

The present research is situated within the field of educational assessment, since it tries to assess non-cognitive aspects of students, such as "attitudes and interests" (Vianna (1992, p. 100). The survey took advantage of statistical sampling following PISA-OECD database in Brazil in 2009. A subsample was designed, selecting randomly a reduced number of schools, which kept a nationwide significance (160 schools where drawn throughout the 26 Brazilian States plus the Federal District with a proportional allocation).

The schools were contacted through letters and phone calls and the questionnaires were sent and returned by mail. Teachers and / or school managers were asked to apply the questionnaire to a 1st year high school group, in classrooms with greater numbers of young people of 15 years old.

The ROSE questionnaire consists of statements in which students are asked to report what their interests are, using a four item Likert scale. Responses range from "strongly disagree" to "strongly agree", with no neutral option. The questionnaire was printed with optical laser personalization of the answering fields, allowing digital capture of the answers. This allows low level (if any) of misleading data (633,820 itens answered).

RESULTS

Received questionnaires were 2,365 from 84 schools located in all Brazilian states, and among the respondents, 56.6% were girls and 41.5% were boys. Participants ranged from 1st year classes of high school, with expected ages of 14-15 years. Young people aged between 13 and 25 years old took part in the survey and the average age was 15.39 years (1.10 SD).

The ROSE questionnaire has 16 questions specifically about science classes. The table 01 presents the results from the original ROSE questions, through the boys and girls averages.

Table 1.
Averages and Mann-Whitney test for gender differences
in relation to students' questions in "My science classes."

My science classes	General Average	Average		Difference (B-G)	CI 95% (Dif)	P-value
		Boys (B)	Girls(G)			
School science is interesting	3,17	3,06	3,26	-0,2	[-0.28; -0.12]	0,01
I like school science better than most other subjects	2,1	2,08	2,12	-0,04	[-0.13; 0.05]	0,688
I think everybody should learn science at school	2,68	2,56	2,78	-0,22	[-0.31; -0.13]	0,01
The things that I learn in science at school will be helpful in my everyday life	3	2,83	3,13	-0,3	[-0.38; -0.21]	0,01
School science has shown me the importance of science for our way of living	2,8	2,69	2,87	-0,18	[-0.27; -0.1]	0,01
I would like to become a scientist	1,98	2,1	1,89	0,21	[0.11; 0.3]	0,01
I would like to get a job in technology	2,71	2,89	2,58	0,31	[0.22; 0.4]	0,01

Young Brazilians consider sciences discipline interesting and do not agree that it tackles difficult content. On the other hand, they do not consider it easy to learn. Regarding gender differences, girls consider the discipline more interesting and useful in daily life than boys. Moreover, they consider the discipline useful with regard to future employment opportunities and that sciences study stimulates curiosity, love for nature and health care, more than boys do.

We noted through the application of the Rose Project in a nationwide scale that neither girls nor boys demonstrate interest in entering a scientific career. However, boys would like more to have a job that deals with advanced technology than girls.

The questions grouping revealed that the boys see more relationship between science and future career than girls do. But girls have more interest in science and see more direct advantages of learning the discipline than boys do.

With regards to school science, international studies indicate that although male and female students have different perceptions about scientific issues, in general Europeans youths are aligned with the lack of interest in the discipline of science (averages between 2,5 and 3,0). Brazilians do not fit this profile, both boys and girls consider the discipline of science interesting (see figure 01).



Fig. 1. Opinions about the question “Is School science interesting?” (adapted from Matthews, 2007)

Table 2 presents the results of the biological evolution part of the questionnaire ROSE. The issues selected are related to evolutionary mechanisms of natural selection and common ancestry.

Table 2.

Averages and Mann-Whitney test for gender differences in relation to students’ questions in “evolutionary mechanisms of natural selection and common ancestry.”

Categories (Evolutionary mechanisms of natural selection and common ancestry)	General Average	Average		Difference (B-G)	CI 95% (Dif)	P-value
		Boys (B)	Girls (G)			
The current species of animals and plants of other species were originated from the past.	3,03	3,05	3,02	-0,03	[-0.06; 0.12]	0,474
Individuals who have many descendants transmit their advantageous traits to new generations.	2,86	2,87	2,86	-0,01	[-0.08; 0.09]	0,88
Evolution occurs both in plants and animals.	3,14	3,07	3,19	0,12	[-0.21; 0.03]	0,006
Different species current may have a common ancestral.	2,66	2,75	2,59	0,16	[0.07; 0.26]	0,001

The results report that Brazilian students accept evidence of mechanisms of natural evolution, but have doubts as to common ancestry (Bizzo et al, 2013). Regarding to gender differences, the results show that girls have a more accepting attitude than boys regarding the evolution of both plants and animals. In relation to different species with the same ancestry, males showed a broader acceptance attitude than girls. There was no statistically significant difference between boys and girls in items “The current species of animals and plants were originated from other species of the past” and “Individuals who have many descendants transmit their advantageous characteristics to future generation”.

CONCLUSIONS

International studies indicate, in relation to school science, that although male and female students have different perceptions about scientific issues, in general they show low interest towards school science. Brazilians do not fit in this profile, both boys and girls consider school science interesting, although they do not consider it easy. Despite the interest in school science, there can be observed a lack of interest for the scientific career. The interest in school science is one of the paths to achieve academic science. Future studies to comprehend the existing gap between the interest in the discipline and the lack of interest for the career may come in handfull for the understanding of the data here presented and may be able to bring contributions to stimulate the entry of the Brazilian in the scientific and technological careers.

Regarding the positioning about the theory of biological evolution, Brazilian students accept evidence of mechanisms of natural evolution, but have doubts about the common ancestry. The doubts presented for common ancestry can be related to an anthropocentric view of the evolutionary processes that isolates *Homo sapiens* from other biological species. Using a historical and philosophical approach in the classroom in the construction of scientific knowledge would aid the understanding of biological evolutionary theory by the students.

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