

Biological evolution and religious beliefs: attitudes of young brazilian students

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Abstract

Teaching biological evolution has as object the understanding of concepts constructed along the history of evolutionary biology, but treating evolution as just another common subject being taught is not appropriate. The reason lies in the fact that the evolutionary ideas play a central role in the organization of biological thought. Despite its relevance, many investigations about the teaching of evolution have considered the limited public understanding about the subject a problem, showing that there is still much to advance the investigation about learning in this field of knowledge. This study was to verify the acceptance of the theory of biological evolution of 2,365 High School students from 84 public and private schools from all regions of Brazil and map possible relationships between the attitudes of students about evolutionary theory and their religious beliefs. Results' reporting that religion is valued by young people participating in the survey say

that people are religious and have faith and understanding and believe in religious doctrines. With regard to the acceptance of the evolutionary theory, the data indicates that there seems to be a relationship between religiosity and acceptance of biological evolution. This is an important result, because it signals a break with the absolutist view that the acceptance of evolution is incompatible with religious faith and religious beliefs prevent the acceptance of the evolutionary theory. These results suggest that in the future we can have more flexible population interpretations of religious doctrines and most sensitive scientific issues.

Introduction

Evolutionary biology occupies a prominent role among the Biological Sciences and has as its object of study the history of life and the processes that have led to its unity and diversity (Futuyma, 2002).

Teaching biological evolution has as object the understanding of concepts constructed along the history of evolutionary biology, but treating evolution as just another common subject being taught is not appropriate. The reason lies in the fact that the evolutionary ideas play a central role in the organization of biological thought, and are indispensable for understanding most of the concepts and theories found in the biological sciences.

Despite its relevance, many investigations about the teaching of evolution have considered the limited public understanding about the subject a problem, showing that there is still much to advance the investigation about learning in this field of knowledge (Bizzo, 1994; Dagher and Boujaoude, 1997; Bianchini and Colburn, 2000; Alters and Nelson, 2002).

In Brazil, researches have been performed aimed at mapping teachers' and students' conceptions about evolutionary theory in relation to religious beliefs. However, some investigations have unveiled misconceptions in the teaching and learning of process, having found some links to the way that personal teachers' and students' values and beliefs are considered in classrooms.

Goedert (2004) conducted an investigation where a survey was done of teacher positioning involving the teaching of evolution. Comprehension of ancestry and

conflicts involving religious beliefs were highlighted as a factor of difficulty in the teaching process and learning of evolutionary theory. According to the author, many students perceive evolution as incompatible with their religious beliefs, especially regarding the nature and origin of man.

Coimbra and Silva (2007) conducted a study on high school teachers' conceptions of biological evolution. Results showed a strong influence of religious beliefs on teachers' attitude in the classroom; most teachers report having avoided teaching evolution fearing the conflict between religion and science on students' values and beliefs.

Almeida (2012) conducted an investigation using questionnaires aimed at analyzing the conceptions of Brazilian high school students of a public school. Students were able to discuss their conceptions of the origin of the human and other species of living beings and basic concepts of evolution. Results showed a predominance of creationist beliefs based on the Bible, in literal interpretations.

Biological evolution is often presented as antagonistic to the personal beliefs on religion. The process of teaching and learning evolutionary biology demand a high attention to the dimensions of students' beliefs and values, which constitute their life style and their behavior.

Thus, formal and non-formal science education settings should address the comprehension of biological evolutionary theory considering personal values and beliefs, including issues on religion. However almost no research was carried out in order to assess the level of acceptance of biological evolution amongst Brazilian students, which is the aim of the present piece of research.

Methodology

Data collection was part of the research project "Study of the relevance of the teaching of science and technology for young Brazilians and their implications for education and dissemination of science" linked to the international project The Relevance of Science Education (ROSE), designed and implemented world wide by a team of the Oslo University, under the coordination of Professor Svein Sjøberg. The project invites local research teams to add questions to the standard instrument.

Data collection involved 2,365 students in the first year of high school from 84 public and private schools located in all Brazilian states and regions. OECD/PISA sample databank was used in order to have a nationwide representation, following an agreement with the Brazilian Ministry of education. ROSE questionnaire invites students to point out their interests, considering a four level Likert Scale [(1) "Strongly Disagree" (2) "Disagree", (3) "I agree" and 4) "Strongly Agree"].

Results

The questions in the questionnaire seek to map the students' approach to religion. J01 items (Attend often to church, temple or other religious services; J02 (attend church for family influence) and L3 (frequency of meetings I participate with my religion) are related to the frequency and student participation in religious services (figure 1).

Figure 1: Frequency and percentages of questions J01, J02 and L03.

Question	Answer	Frequency	Percentage
J01 Attend often to church, temple or other religious services.	Never	194	8.2
	Rarely	507	21.4
	Sometimes	545	23.0
	Many times	912	38.6
	No Answer	207	8.8
	Total	2,365	100.0
J02 Attend church for family influence.	Never	675	28.5
	Rarely	527	22.3
	Sometimes	360	15.2
	Many times	426	18.0
	No Answer	377	15.9
	Total	2,365	100.0
L03 Frequency of meetings I participate with my religion.	Never	464	19.6
	Rarely	615	26.0
	Sometimes	497	21.0
	Many times	637	26.9
	No Answer	152	6.4
	Total	2,365	100.0

The data demonstrate that 1,457 students (61.6%) were attending religious services for their beliefs. The results in relation to religiosity, understanding and belief in the doctrine and religious teachings are arranged in figure 2.

Figure 2: Frequency and percentages of questions L01, L02 and L05.

<u>Question</u>	<u>Answer</u>	<u>Frequency</u>	<u>Percentage</u>
L01 I am a religious person or a person of faith.	Strongly disagree	158	6.7
	Disagree	353	14.9
	Agree	544	23.0
	Strongly agree	1,172	49.6
	No Answer	138	5.8
	Total	2,365	100.0
L02 I understand and believe in the doctrine or religious teaching.	Strongly disagree	176	7.4
	Disagree	341	14.4
	Agree	532	22.5
	Strongly agree	1,166	49.3
	No Answer	150	6.3
	Total	2,365	100.0
L05 My faith and / or moral affect my choice of a career.	Strongly disagree	1,357	57.4
	Disagree	295	12.5
	Agree	263	11.1
	Strongly agree	286	12.1
	No Answer	164	6.9
	Total	2,365	100.0

There was a strong concordance of 1,716 (72.6%) students regarding their active religiosity. They agree that they can be defined as people with religiosity and faith.

Results revealed that 1,698 (71.8%) students state that they understand and believe in religious doctrines. These data are important to analyze whether the personal religious beliefs influence the acceptance of biological evolution. L05 item outlines the influence of religion in decision making, the result can be seen in figure 2.

The majority of students (1,652 or 69.9%) disagree that their religion will lead them out of a scientific career in the future. It is important to consider this result taking

into account what was seen in the previous question (L05), which shows that students are well aware of their own religious doctrines. There was a negative attitude of students when exposed to item L06 (figure 3).

Figure 3: Frequency and percentages of questions L06 and L04.

Question	Answer	Frequency	Percentage
L06 I feel that my faith contradicts current scientific theories.	Strongly disagree	883	37.3
	Disagree	481	20.3
	Agree	356	15.1
	Strongly agree	451	19.1
	No Answer	194	8.2
	Total	2,365	100.0
L04 My religion prevents me from believing in biological evolution.	Strongly disagree	1,385	58.6
	Disagree	332	14.0
	Agree	251	10.6
	Strongly agree	211	8.9
	No Answer	186	7.9
	Total	2,365	100.0

The data revealed that 1,364 (57.6%) students disagreed that their faith may contradict scientific theories. This result is surprising considering previous work carried out in the field in other parts of the world (Alters and Nelson, 2002).

The item L04 is an important issue to map the influence of the religious beliefs of students and the teaching and learning of biological evolution (figure 3).

Results showed a high degree of disagreement (72.6%) over the influence of religion on their acceptance of biological evolution. 1,717 students responded that their religion do not prevent them to believe in biological evolution.

Conclusion

Results demonstrated a high degree of disagreement (72.6%) about the influence of religion towards acceptance of biological evolution. 1,717 students responded that their religion do not prevent them to believe in biological evolution. Importantly, this was the issue with the greatest discordance amongst other issues. Brazilian students claim to

be religious and people of faith and had a positive attitude towards understanding and believing in religious doctrines.

The high degree of positive attitude of students regarding the active religiosity demonstrated that religion is valued by young people surveyed, who affirmed that religious and faith people and have understanding and belief in the doctrines expressed religiosas. A religiosity of young Brazilian students participating in the research does not prevent them from believing in biological evolution. This acceptance, especially for a share of young evangelical Christians, was a surprising result, since many of problems encountered in the teaching of biological evolution refers to the influence of religious beliefs on the acceptance of evolutionary ideas, particularly the evangelical segment, which tends to a more fundamentalist stance.

We believe that our results open the door to other kinds of research, trying to understand how the young Brazilian students can conciliate their faith and religious beliefs with their views on the scientific theory of biological evolution.

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