



Dissemination of information on nuclear sciences and public acceptance of irradiated foods in Basic Education

Benedetti, Viviane F. ^{1*}; Barros, João Pedro AA ¹; Levy D.S. ¹ and;
Villavicencio, Anna Lucia CH ¹;

¹ Energy and Nuclear Research Institute, Radiation Technology Center, São Paulo, Brazil

* vivenebenedetti@usp.br

1. Introduction

Technological advances, such as the use of irradiated foods, aim to improve the sustainability, health and well-being of society. However, the lack of adequate information about nuclear sciences can lead to resistance and distrust in its acceptability. One example is food irradiation.

Food irradiation is a consolidated and effective technology for preserving and disinfecting food, which provides quality and preservation of organoleptic and nutritional properties. It is applied in several areas, including agriculture and the food industry, to increase the shelf life and safety of food. It is approved by international organizations, such as the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the Codex Alimentarius and the Scientific Committee on Food of the European Commission. In Brazil, it is regulated by the National Health Surveillance Agency (ANVISA) and the Ministry of Agriculture, Livestock and Supply (MAPA). Even so, a large part of society still resists its consumption and commercialization. [2], [4]

Food irradiation meets essential demands of society, such as health, food safety and combating waste. The dissemination of information about irradiated foods is crucial for national development. Brazilian laws and guidelines cover the teaching of nuclear sciences and their applications in elementary and high school. However, teachers often develop the topic superficially, as they are not prepared to delve deeper into this science. [1], [5]

This study aims to analyze knowledge about nuclear science and irradiated food among elementary school students, identifying current gaps and future actions to combat misinformation.

2. Methodology

The present study follows a qualitative exploratory research methodology using a face-to-face questionnaire to identify the perception and knowledge related to nuclear sciences, especially the acceptability of food irradiation, among Elementary School II students. The research was developed at a renowned private educational institution in the city of São Paulo and included 48 students between the 6th and 9th grades.

3. Results and Discussion

To carry out the research, a 2-page form was distributed and students had the same time to answer 5 questions. However, before the last question, a short informative text of 137 words was delivered, informing them about the food irradiation process, mentioning its advantages, applications and safety. After the research, the questionnaires were collected and the data was processed for further analysis. Figure 1 and Table II present the results obtained with data collection.

Table I : Profile of students who participated in the research.

Education	Average age	Participants	Male gender	Feminine gender
6th year	11.3	18	9	9
7th year	12.1	13	9	4
8th year	12.9	7	4	3
9th year	14.0	10	5	5
Total	12.6	48	27	21

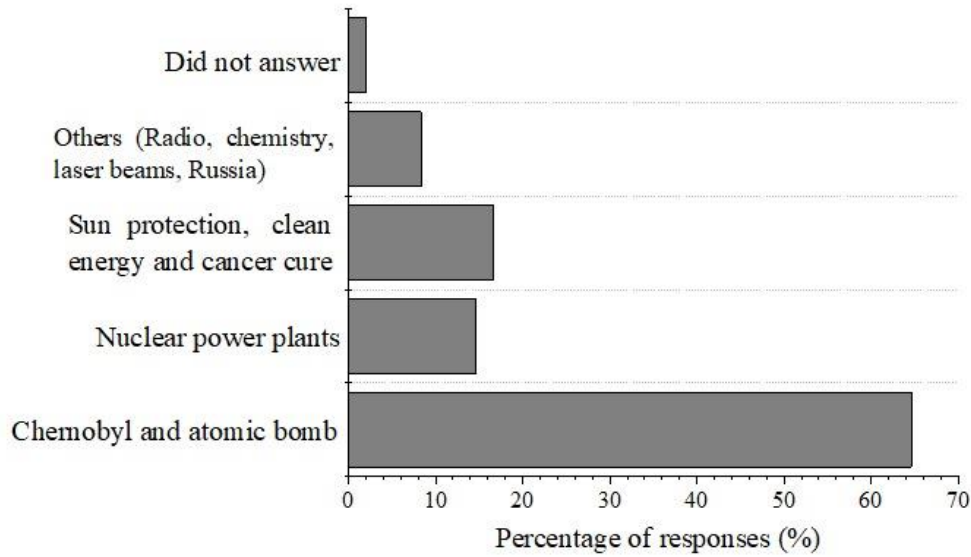


Figure 1 : When asked what they thought about radiation, 65% of students associated ionizing radiation with atomic bombs and Chernobyl.

Table II : Questions and percentage of student responses.

Questions	Response	Amount (%)
Have you ever eaten irradiated food? Why?	Yes	54.2
	No	18.8
	Do not know	27.1
*This is the RADURA symbol. Do you know this symbol?	Yes	31.3
	I've seen it but I don't know what it means	8.3
	I've never seen it before	58.3
*This symbol or writing is used on the packaging of some processed foods to inform the public that the food in question has been irradiated. If you saw this symbol on the packaging of some food, would you choose to buy it? Why?	Yes	64.6
	No	29.2
	Do not know	4.2
*Now that you know a little more about the food irradiation process, would you buy food with the irradiation symbol? Why?	Yes	77.1
	No	14.6
	Do not know	6.3

*One student did not answer questions 6, 7 and 8.

Figure 1 demonstrates that, in an open-ended question, without being induced by pre-established answers, most interviewees relate nuclear technology to weapons of mass destruction and nuclear accidents. Table II presents the results for the question: "have you ever eaten irradiated food?". 54.2% of students answered yes, associating it with processed foods, such as "chips" (processed snacks) and foods prepared in the microwave; 18.8% of students answered no and 27.1% did not know if they had tried it or did not know what irradiated food was.

As for the Radura symbol, 31.3% of students claimed to know it, while 8.3% had already seen it, but were unaware of its meaning; and 58.3% have never seen it. Students were informed that the Radura symbol is used internationally to identify irradiated food products. When asked whether they would buy food with the symbol, 29.2% responded no, as it contains radiation and is harmful to health; 4.2% did not know, as they had doubts about the symbol; and 64.6% said yes, they would buy it, associating food with quality and health benefits.

Before answering the last question, students were instructed on the technique of food irradiation, for preservation, to eliminate insects and reduce disease-causing microorganisms. The difference between irradiated and contaminated food was also explained. After the explanation, students were asked about their intentions to purchase irradiated food. 77.1% associated irradiation with a healthy diet; 14.6% would not buy them because they are dangerous; and 6.3% were unable to give their opinion.

4. Conclusions

Important concepts of nuclear sciences and their applications remain superficial, leading to the perpetuation of prejudices and misinformation, leading society to associate nuclear techniques with dangers, negative health effects or environmental contamination. Schools are responsible for providing students with quality information to develop skills and competencies for a fair understanding of nuclear technologies. However, most educators are not prepared to discuss the topic and often approach it in a reduced way to meet the minimum required content. Promoting scientific knowledge and preparing students for more comprehensive critical thinking is essential for discussing nuclear science as it relates to societal issues. [1]

The results presented in the present work present a mistaken perception of elementary school students regarding nuclear sciences and their applications, as expected. The initial responses reflect the information and guidance that students receive from teaching intuitions, their families and society as a whole. However, research demonstrates that students are receptive to new learning and with little quality information, the acceptability of this application of nuclear technology increases.

Given the inadequate and mistaken widespread dissemination of nuclear sciences by the media and especially social networks, it is necessary to invest in adequate communication to educators and teachers from the first school years. It is essential to invest in the knowledge of new generations to form a society informed about the peaceful applications of ionizing radiation and its contributions to society.

Acknowledgments

Thanks to the Coordination for the Improvement of Higher Education Personnel (CAPES), Institute of Energy and Nuclear Research, São Paulo, Brazil (IPEN-CNEN/SP), for the financial support.

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