

THE VALUE OF COMMUNICATION IN CHANGING PUBLIC PERCEPTION ON NUCLEAR TECHNOLOGY: AN EXPERIENCE WITH COLLEGE STUDENTS

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ABSTRACT

Nowadays public acceptance is the most frequent keyword used in the Brazilian nuclear scenario with the revival of the nuclear program, in which the construction of more nuclear power plants and a national radioactive waste repository are expected. The acceptance of such activities is tightly linked to a strategic communication plan, the effective tool to be implemented if success is intended. Isolated communication actions are being done in the nuclear area and this paper presents one example of them, describing the experience with college students from two educational institutions, who attended the lecture “Nuclear technology: prejudice, fundamentals, applications and challenges”. Opinion surveys were done before and after each event, to know the opinions towards nuclear technology. The surveys were based on the choice of three words from about 10 not ordered stimulating keywords and each participant was invited to choose the first three ones that could represent the image he/she had when faced with the theme “nuclear technology”. The lecture included topics covering positive and negative points of the nuclear technology. The measured results after the lectures shown positive perspective in the first images associated with the nuclear technology, despite focus on accidents was given in the final part of the event. The results show that some effectiveness on the target public was achieved in terms of bringing new perceptions on this technology. It is expected that this article can contribute somehow to the discussion of public acceptance of nuclear technology in Brazil.

1. INTRODUCTION

Nowadays public acceptance is the most frequent keyword used in the Brazilian nuclear scenario with the revival of the nuclear program in which the construction of more nuclear power plants is expected and a national radioactive waste repository is also required. However, nuclear energy to the general public is many times associated with the production of nuclear weapons or with nuclear and radiological accidents. Organizations against nuclear activities always reinforce negative aspects when this issue appears in the media. Isolated public communication actions are being done by some nuclear actors and have contributed somehow to disseminate the social and peaceful applications of the nuclear technology. However, if success with the acceptance of such facilities is intended, only these actions are not enough - a strategic communication plan has to be implemented. This paper presents results of communication tasks that could be part of such plan.

This article reports the experience in evaluating the perception of college students on nuclear technology before and after giving them a lecture titled “Nuclear technology: prejudice, fundamentals, applications and challenges” using opinion surveys as measuring tool. Two educational institutions from two cities of Minas Gerais took part in this activity. One lecture was given in a five hours mini-course in the Chemical Academic Week of the Federal

University of Lavras (UFLA). The other was given at “José do Rosário Velano” University (UNIFENAS) in Divinópolis city as part of the 3rd UNIFENAS Multidisciplinary Congress.

Both of these events occurred in 2008, when the author was still the head of the communication sector of the Nuclear Technology Development Centre (CDTN). Acting in this function since 2000, the author had the chance to gain experience with the dissemination of nuclear technology to the general public, working together with journalists. Activities involved not only management tasks but also operational ones like presenting lectures to students and also to high school teachers. A two-day scientific journalism workshop with participation of researchers and journalists from the Brazilian nuclear area was also coordinated by the author, as a training tool to improve the interaction with the public in the nuclear technology dissemination.

Measuring results from scientific dissemination of nuclear technology has been always pursued by the author in events like those one treated in this paper. The first concern on measuring the effectiveness on such dissemination occurred in the “Nuclear energy: itinerant exposition”, a nuclear popularization project that reached about 11,000 high school students from public educational institutions in which similar lectures were also given [1,2,3]. However, at that occasion, the measuring was done only after the event. This paper describes events in which opinion surveys were done before and after each event, as a way to know the opinions towards nuclear technology and also to measure the effectiveness of the lectures.

2. METHODOLOGY

2.1 Strategy of presentation and lecture content

Several animated images and very short duration films were used, in order not to bore the lectures and also to stimulate attention to the presented issues. All these materials were developed to be used in the cited “Nuclear energy: itinerant expositions” project and also for training about 1,000 public high school teachers from Minas Gerais state.

In both events, no informative material was distributed before the lectures in order not to deviate the attention of the students. It was done only after the lecture and the final event evaluation, as well.

At UFLA, chances to questions were open after main topic presentations since there was more time available. At UNIFENAS, discussions were done only at the end of the lecture.

Topics presented in the lecture covered social applications of the nuclear technology and also themes that could be considered negative by the general public. The following main topics composed the lecture presentation: lack of information and prejudice against nuclear technology; fundamentals on the nuclear technology; nuclear fuel cycle; uses of the nuclear technology; nuclear and radiological accidents and nuclear challenges and opportunities.

The nuclear Chernobyl and Three Mile Island accidents and also the Goiânia radiological accident were presented in detail in the lecture.

2.2 Opinion survey questionnaires

The stimulating keywords listed in Table 1, for each institution, were used in order to know the opinions towards nuclear technology. It can be seen that they were not the same in the two events. In the phase of compiling results from the lecture at UFLA, it was observed that some keywords could be grouped, because they could address to a same meaning, as for example “electric light” and “electric power”. Therefore, some improvements were done in the keywords used in the UNIFENAS survey. In fact, the experience gained at UFLA helped in the improvement of the opinion survey used at UNIFENAS.

Each keyword received positive or negative attributes in order to capture visions pro and against the nuclear technology.

Table 1. Stimulating keywords used in both opinion surveys.

UFLA		UNIFENAS	
Stimulating keyword	Message	Stimulating keyword	Message
Chernobyl accident	Negative	Chernobyl accident	Negative
Goiânia radiological accident		Goiânia radiological accident	
Nuclear weapon		Nuclear weapon	
Radioactive waste		Radioactive waste	
Management of water uses	Positive	Management of water uses	Positive
Medicine		Application in health	
Health		Electric Power	
Electric Power			
Electric light		Food preservation	
Nuclear power plant		Application in agriculture	
Food preservation		Application in industry	
-			
-			

The same group of keywords was used before and after the lecture in each institution. The difference was only in the spatial distribution of them as illustrated in Figures 1 and 2.

Before beginning the event, each participant was invited to choose the first three keywords that could represent the image he/she had when faced with the theme “nuclear technology”. After each event the students were asked to do the same.

The students were also asked to inform the period, course and gender in each survey.

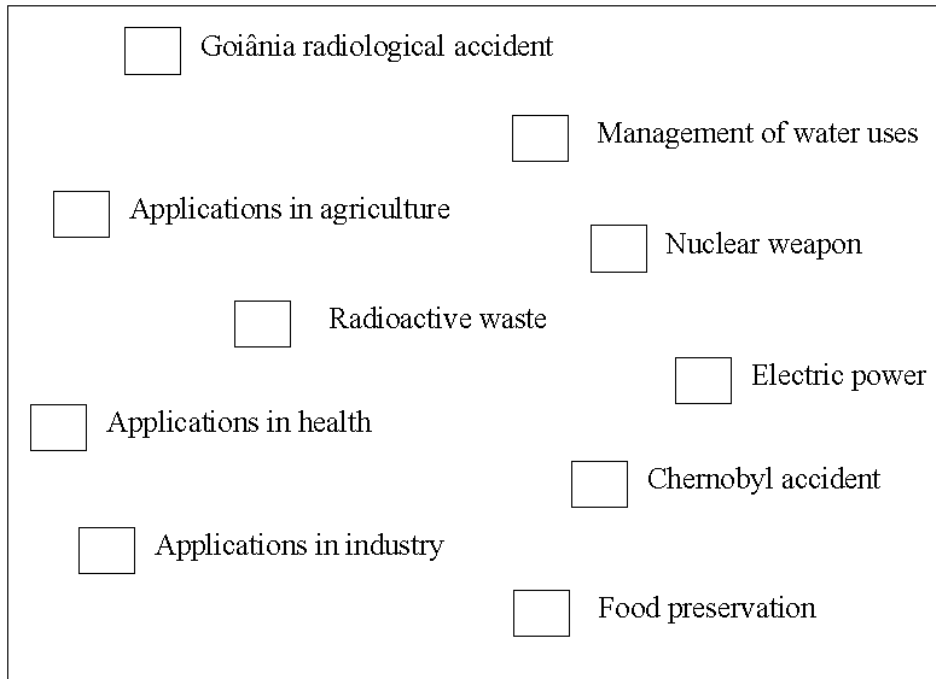


Figure 1. Keywords and its spatial distribution in the opinion survey used before the lecture at UFLA.

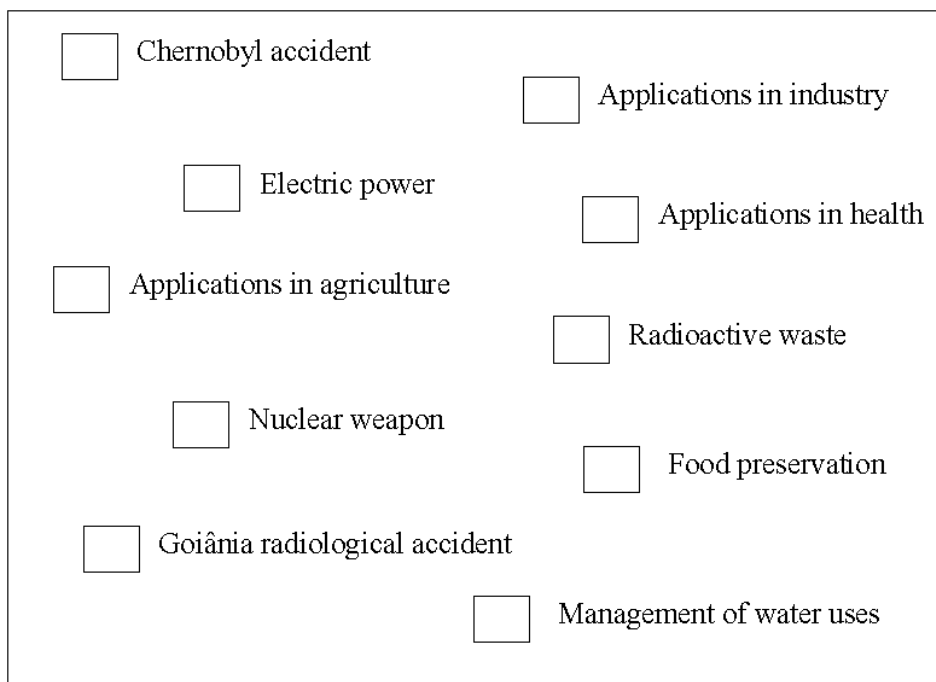


Figure 2. Keywords and its spatial distribution in the opinion survey used after the lecture at UNIFENAS.

2.3 Event effectiveness evaluation items

Lecture and lecturer performances were evaluated after the events. The grades “very satisfied”, “satisfied”; nor satisfied neither unsatisfied”; “unsatisfied” and “very unsatisfied” were used for such evaluations, considering each sub items shown in Table 2.

Table 2. Items used for evaluating the event effectiveness in both institutions.

Evaluation items	
Lecture	Lecture content
	Audiovisual resources
Lecturer	Theme domain
	Ability to stimulate interest
Overall assessment	

2.4 Indicators used for measuring the results

Two main indicators were used, one for capturing the opinion of the students towards nuclear technology and other for measuring the event effectiveness.

The indicator named as “citation index” is defined as the number of citations attributed to each stimulating keyword divided by the total number of citations attributed to all keywords.

The second indicator named as “acceptance index” is defined as the sum of the evaluation percentages given to the grades “very satisfied” and “satisfied”.

3 RESULTS

About a hundred of students attended the lectures in both institutions. Most of the students of UFLA were from the Chemistry Course. Some others from the courses like Food Sciences, Industrial Chemistry and Biologic Sciences also took part in the mini-course. The students at UNIFENAS were from the radiological area. The total number of students from each institution is presented in Table 3, where genders percentages are also shown.

Table 3. Data on target public reached by the lectures.

Institution	Main participant origin	Number of participants		
		Gender (%)		Total
		Male	Female	
UFLA	Chemical course	32.2	67.8	59
UNIFENAS	Radiological course	30.2	69.9	43

3.1 Opinion survey results

Bars marked in green colour in Figures 1 to 6 refer to positive perceptions while the red one to negative in the author’s opinion. Survey results from UFLA are presented in Figures 3 and 4. The results from UNIFENAS are shown in Figures 5 and 6.

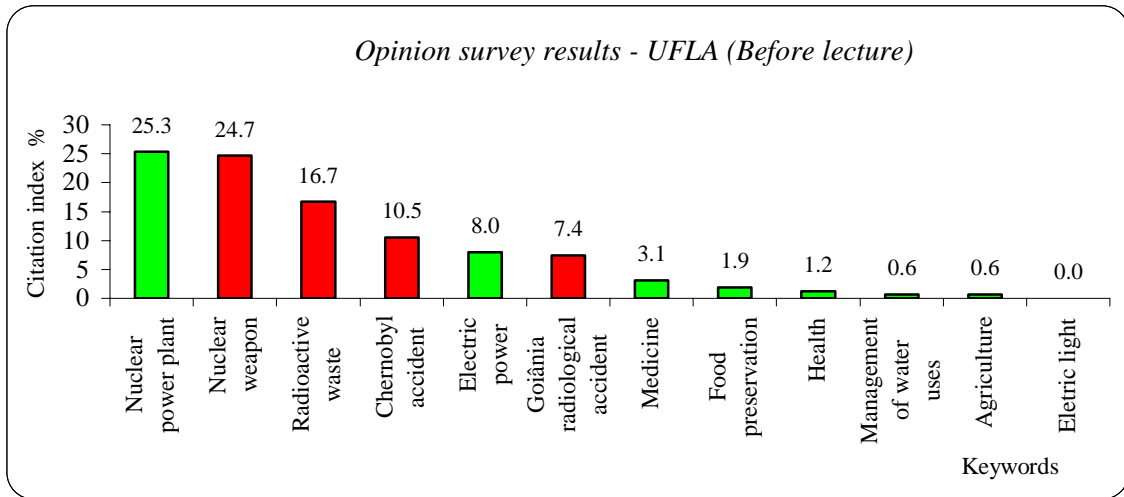


Figure 3. Ordered opinion survey results - UFLA (before the lecture).

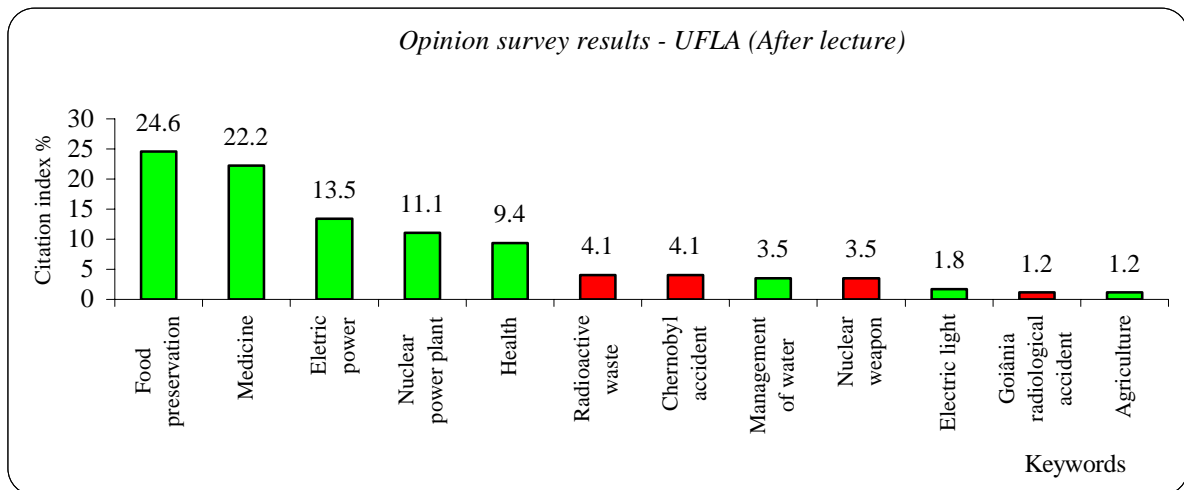


Figure 4. Ordered opinion survey results - UFLA (after the lecture).

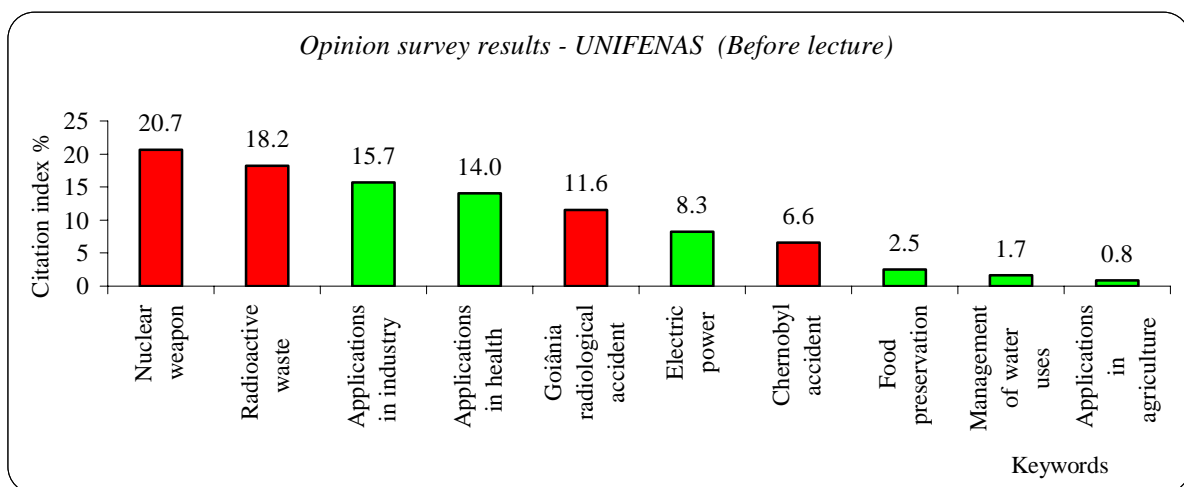


Figure 5. Ordered opinion survey results - UNIFENAS (before the lecture).

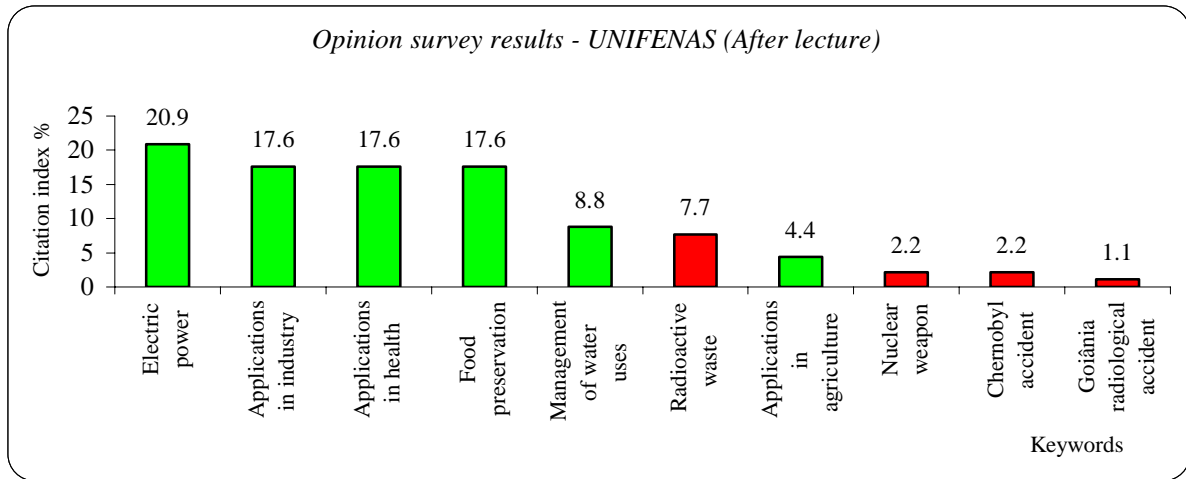


Figure 6. Ordered opinion survey results - UNIFENAS (after the lecture).

Figures 7 to 10 summarize opinion survey results from UFLA considering gender visions before and after the lectures. UFLA results are presented in descending order for each gender. Gender results from UNIFENAS are not presented because many survey questionnaires did not have the gender field fulfilled.

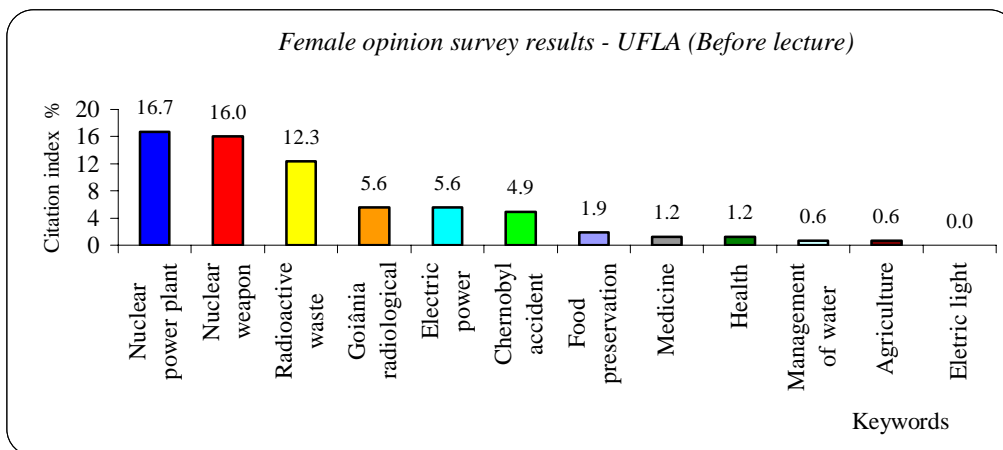


Figure 7. Female opinion survey results - UFLA (before lecture).

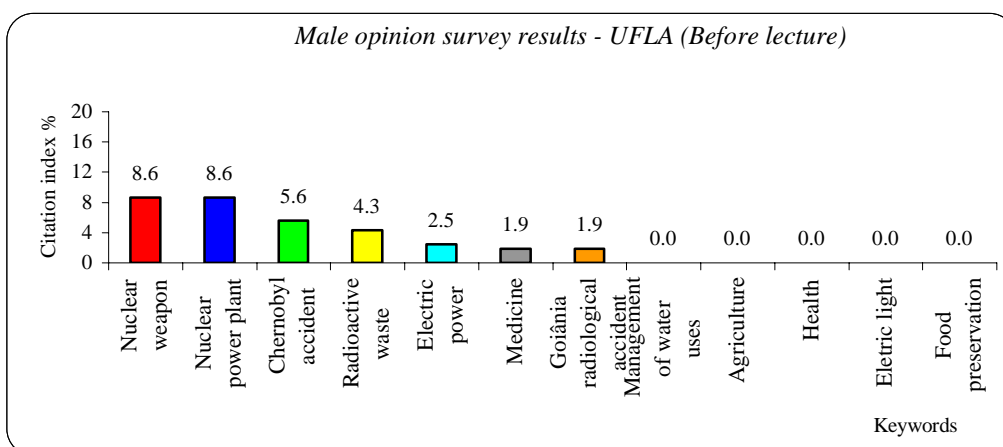


Figure 8. Male opinion survey results - UFLA (before lecture).

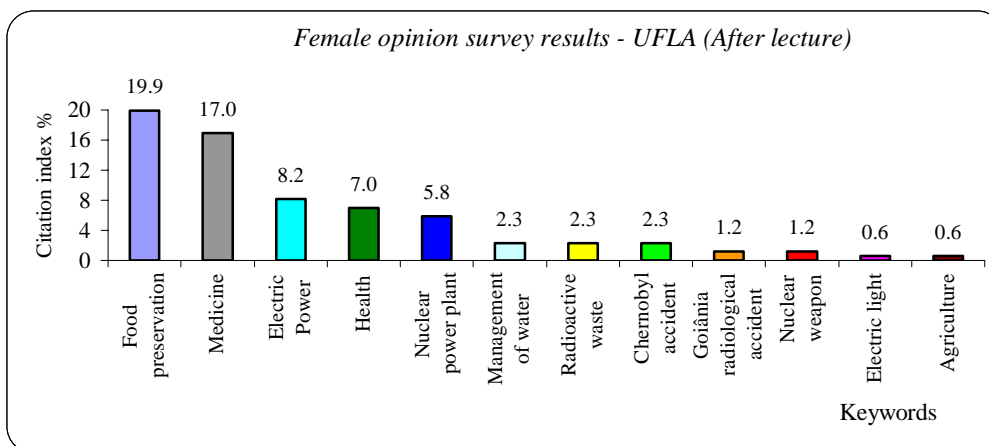


Figure 9. Female opinion survey results - UFLA (after lecture).

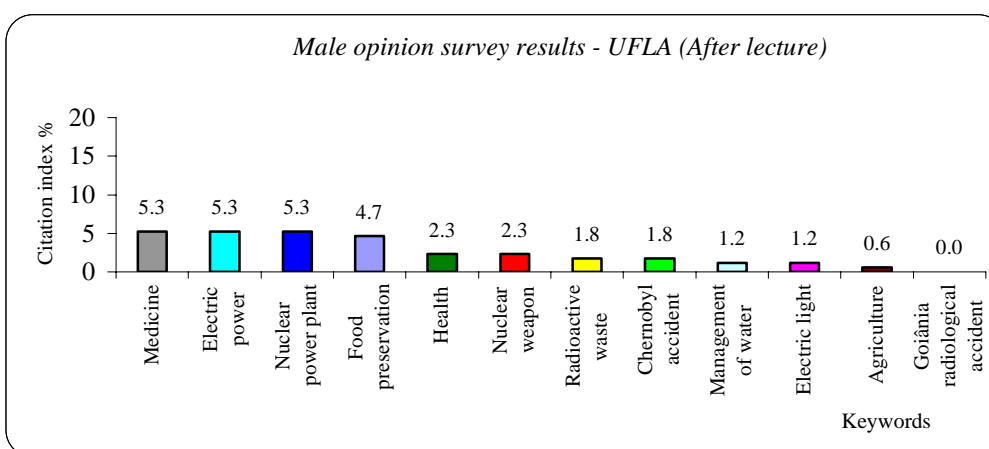


Figure 10. Male opinion survey results - UFLA (after lecture).

Summary on opinion survey results and evaluation of both events

Tables 4 and 5 present the three more voted keywords in both institutions before and after each event.

Table 4. The three more voted keywords before and after the lectures at UFLA.

Before		After	
Keyword	Rank (%)	Keyword	Rank (%)
Nuclear power plant	25.3	Food preservation	24.6
Nuclear weapon	24.7	Medicine	22.2
Radioactive waste	16.7	Electric Power	13.5

Table 5. The three more voted keywords before and after the lectures at UNIFENAS.

Before		After	
Keyword	Rank (%)	Keyword	Rank (%)
Nuclear weapon	20.7	Electric Power	20.9
Radioactive waste	18.2	Applications in industry	17.6
		Applications in health	17.6
		Food preservation	17.6
Applications in industry	15.7	Management of water uses	8.8

The survey results were arranged into two groups, one representing the positive view and the other, the negative one in order to have an overall view, contrasting visions pro and against the nuclear technology. Figures 11 and 12 are based on these two keyword groups, considering the surveys done before and after the lecture. These Figures show how the perception on the nuclear technology changed.

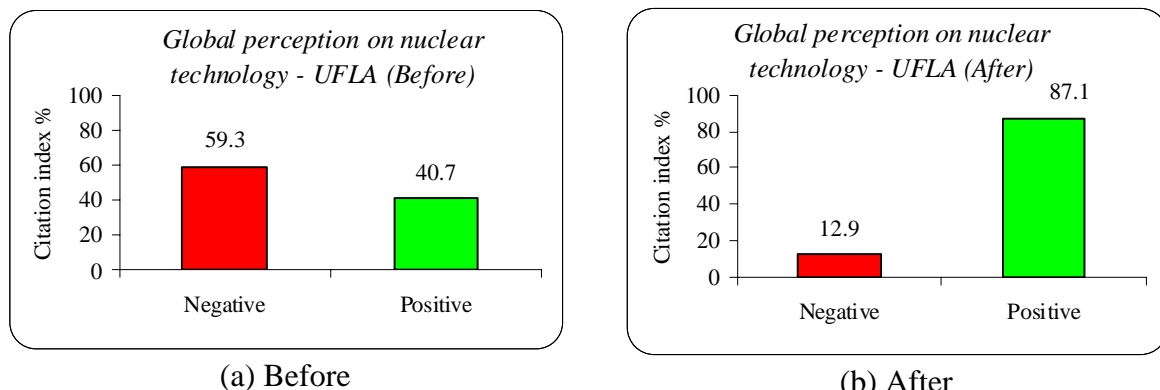


Figure 11. Contrasting negative and positive perception on nuclear technology – UFLA.

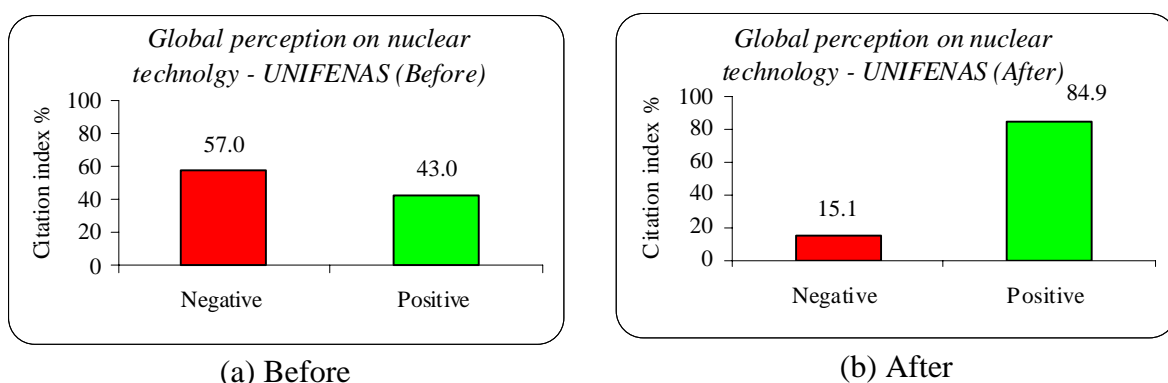


Figure 12. Contrasting negative and positive perception on nuclear technology - UNIFENAS.

3.2 Event effectiveness evaluation

Numbers of respondents corresponding to each event effectiveness evaluation item from both institutions are shown in Table 6.

Table 6. Number of respondents that evaluated the event effectiveness.

Evaluation items		Number of responses	
		UFLA	UNIFENAS
Lecture	Lecture content	59	42
	Audiovisual resources	59	40
Lecturer performance	Theme domain	59	42
	Ability to stimulate	59	41
Overall assessment		55	29

The percentages shown in Figures 13 and 14 were calculated having as reference the total number of responses given to each evaluation item.

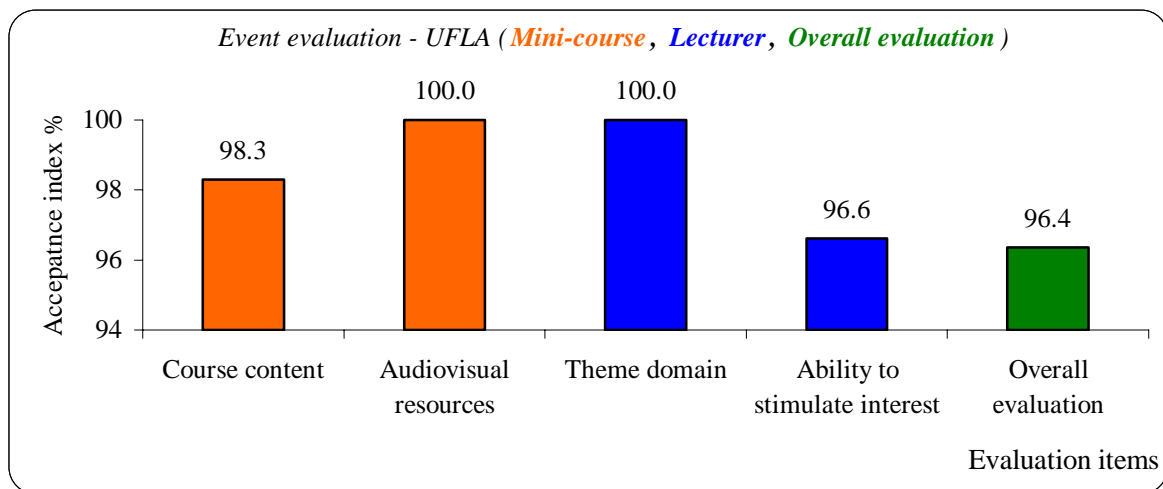


Figure 13. Event performance evaluation at UFLA (mini-course, lecturer and overall evaluation).

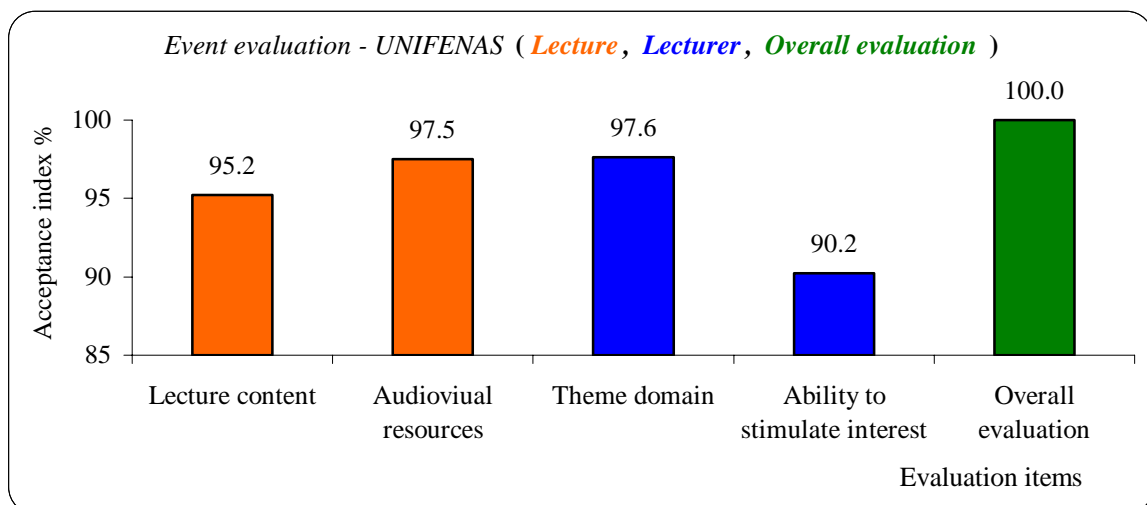


Figure 14. Event performance evaluation at UNIFENAS (lecture, lecturer and overall evaluation).

4. CONCLUSIONS

The target public to which the survey was applied would be in principle a very well informed group of students on nuclear technology themes. However, the results from the survey done before the lectures in each institution show that the same common idea of the general public is presented also on the minds of such students, in relation to the first impressions on nuclear technology.

The opinion surveys results show that a significant change occurred in the first images associated with the nuclear technology. When grouping the results into positive and negative perspectives, very big changes in the percentages pro nuclear technology after the events in both educational institutions can be seen. It can be interpreted that the lectures were effective on the target public in changing perceptions on such technology.

It was also noticed, at UFLA, that female and male visions of the students on nuclear technology are different when comparing surveys results before and after the event.

Evaluations of the lecture effectiveness and of the lecturer performance received only high approval by the participants.

The obtained results show the value of communication in changing public perception on nuclear technology. It is expected that this article can contribute somehow in the discussion of public acceptance of nuclear technology in Brazil and also to reinforce the necessity of implementing a strategic communication plan that could contemplate activities like the one presented in this paper.

ACKNOWLEDGMENTS

Thanks to all colleagues from the Communication Area of the Nuclear Technology Development Centre (CDTN), where the author got the experience with high schools and college students in the dissemination of nuclear technology. Thanks also to Wellington Antonio Soares Júnior and Guilherme Correa Soares, who helped very much in the development of the multimedia material used in the lectures. The presentation of this paper was supported by the Minas Gerais State FAPEMIG (Fundação de Amparo à Pesquisa do Estado de Minas Gerais).

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