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EVALUATION OF AN AWARENESS WORK REGARDING THE INCORRECT DISPOSAL OF CHEWING GUMS AS UPDATE OF SELECTIVE WASTE COLLECTION CAMPAIGN IN THE INSTITUTE OF EXACT SCIENCES AND GEOSCIENCES OF PASSO FUNDO UNIVERSITY

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ABSTRACT

The environmental problem regarding the undue disposal of solid waste is the subject of current discussions. Chewing gums are a daily and common waste, incorrectly disposed of in 90% of situations. The decomposition of chewing gum may take up to five years, by light and oxygen from the air - however, because it contains both artificial and natural resins, the process may be longer. For convenience and the class of residue it is, an elastic resin with the characteristic of sticking easily in several places, many people glue the chewing gum under classes and chairs. To raise awareness and encompass this problematic the selective waste collection campaign of the Institute Of Exact Sciences And Geosciences (Iceg) of Passo Fundo University (UPF) was updated. **Methods**: The study was conducted through the application of search forms, production of alternative media and personalized disposal bins, exclusive for chewed gum. **Conclusion**: It was possible to verify that most students didn't know about the incorrectly disposal of gums problematic, the media created was positively accepted by the students and there was a diminishment of gums disposed under desks and tables of the institution after the campaign.

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INTRODUCTION

The commercially available chewing gum currently consists of a group of substances, represented by sugar, dyes, flavourings and preservatives, which can be digested by the stomach. However, there is in its composition latex, the metabolization of which is infeasible for any enzyme in the human body and therefore nondigestible. The origin of the habit of chewing gum is quite controversial. According to Imfeld (1999), Mayans, Greeks, Europeans and Native Americans already had the habit of chewing tree sap. Different findings have been described by archaeologists, but no consensus has been reached (Colosso *et al*., 2012). As any resin, gum has a high decomposition time and is characterized as a non-recyclable solid residue. It is considered as solid waste any material, substance or object disposed of as a result of human activities, in which the final destination is carried out or is required to proceed in the solid or even semi-solid physical state.

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All urban solid waste generated must have an appropriate final destination that includes reuse, recycling, recovery and energy use or other destinations admitted by bodies that are competent in this sector, including the final packaging, observing specific operating regulations so which may prevent public health and safety risks, minimizing the adverse environmental impacts that can be generated (Brazil, 2010). Between 80 to 90% of chewing gums are not discarded correctly, being the second major form of solid waste discarded incorrectly after cigarette butts (Custommade personal comunication, 2015). Probably, the amount of chewing gum produced and disposed of around the world is not enough to create a serious environmental problem, but the volume discarded is not insignificant. Around 560,000 tons of gum are annually chewed worldwide. In comparison, Americans discarded 30 million tons of plastic in 2009 and are discarding around 290 million car tires each year (Palmer personal comunication, 2011). Some companies have developed ways of recycling gum, allowing the extrusion of the material obtained in the form of trash bins and toys. However, for recycling, chewing gum is demanded to be discarded in gum-exclusive solid waste containers (Gumdrop

Ltda, http://gumdropltd.com/, 2019). Convincing people to discard gums in proper recycling containers can be considered asking too much, given the number of people that already refuse to use congregate solid waste before disposal. As a consequence, a large quantity of chewed gums end up being discarded on the floor and underneath classes and chairs. The cleaning of incorrectly discarded gums is a costly process: it is estimated that in 2012 the city of London spent around 16 cents to $ 3 to remove each gum disposed on the floor (a total of 300,000 gums) (Palmer personal comunication, 2011). The decomposition of chewing gum can take up to five years: it is degraded by light and oxygen from the air. However, because it contains artificial and natural resins, the process may be longer (EDGAR, 1998). In order to raise awareness about the incorrect disposal of chewing gums, the Selective Collection Campaign (CCS) of the Institute of Exact Sciences and Geosciences (Iceg) of the University of Passo Fundo (UPF) was updated.

MATERIALS AND METHODS

The goal of updating CCS in Iceg in the year 2017 was to design and implement an sensibilization campaign for environmental preservation. Several joint actions were carried out: meetings and planning, diagnosis of chewing gum residues incorrectly disposed of in two rooms in the building B2 of the UPF (chosen according to the number and daily flow of students), visual recording of the situation of the classrooms, production of promotional and educational material, application of questionnaires to obtain qualitative and quantitative data on chewing gum consumers in Iceg and elaboration of data evaluation instruments. The CCS update on Iceg involved students from the Sustainable Communities program: Doing the Homework Project (from portuguese programa Comunidades Sustentáveis: projeto Fazendo a Lição de Casa). The main objective of the project is to sensitize the active participation of the academic community in the correct segregation and in the appropriate packaging and destination of solid waste produced within the university. In addition, it aims to involve the most diverse actors to contribute to the actions and policies of socio-environmental responsibility that the institution develops (TEDESCO *et al*., 2015).

RESULTS AND DISCUSSION

Discussion, Planning and Diagnosis: Iceg B2 has 82 disposal containers appropriated for disposal of recyclable and non recyclable waste, sinalized by color (green and black, respectively). In Figure 1 it can be observed the results of the monitoring of the containers for a period of fifteen days. The SCC has been employed since the year of 2013, instructing the segregation, and the disposal of most solid wastes in Iceg has been diagnosed as correct. A médium of 17 containers per day were diagnosed with incorrect disposal of solid waste, mostly plastic cups and food packaging. In day 8 the institution received students from public schools, which justifies the highest number of incorrect disposals (48). However, chewing gum, object of this study, was not contemplated in the SCC and was the residue of greater observation of incorrect disposal, followed by cigarette butts (Figura X).

Selecting and cleaning monitored classrooms: All Iceg B2 rooms were inspected by the group, and two classrooms with greater flow and diversity of students were chosen for monitoring. In order to verify the presence of recently placed chewing gums, all the gum in the classrooms was removed from the classes and chairs, resulting in expressive 3,109 kg. The cleaning process can be observed in Figures 2 and 3, and in Figure 4 it can be seen a high number of chewed gums disposed under two class tables.

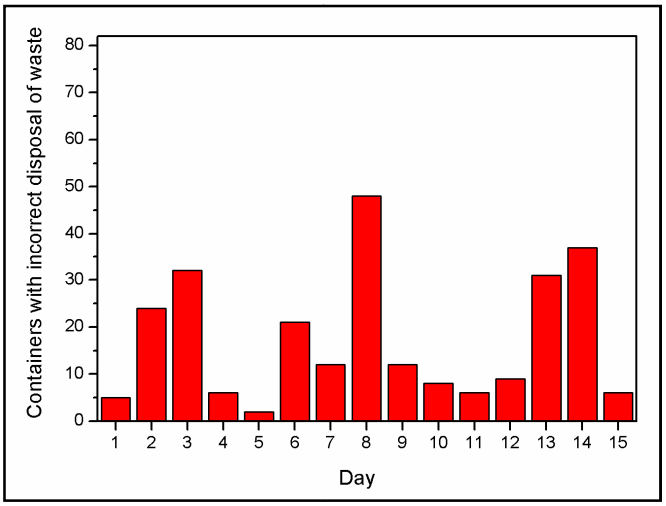
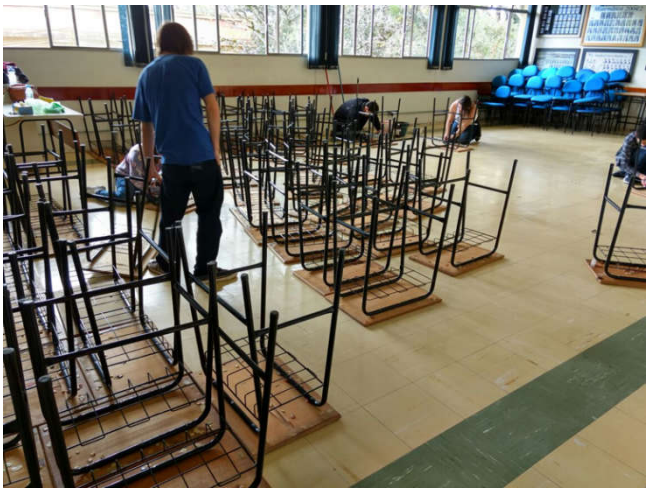
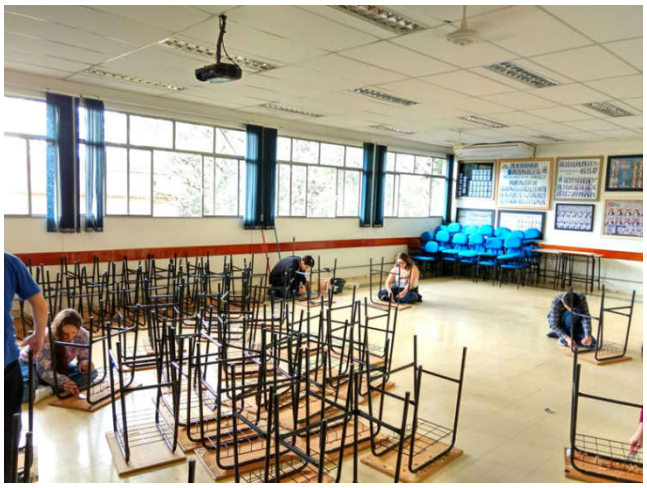


Figure 1. Results of the monitoring of cointainers





Figures 2 and 3. Cleaning process of tables and chairs

Preparation of promotional and educational material: It was prepared, in portuguese, banners instructing the students and visitors of the building on how to segregate waste, containing informations about the decomposition time of most chewing gums. It was also made a videoclipe, to inform the students and passersby about the situation of incorrect disposal

of gums in Iceg B2. Also, the group made two disposal containers exclusive for chewed gum disposal (Figure 5), that were installed in the monitored classrooms.

Figure 4. Chewed gum disposed incorrectly under two tables

Figure 5. Part of the group and the containers made

Application of questionnaires: Questionnaires were applied before and after the application of the campaign, consisting in the same questions. The results can be observed graphically in Figures 6, 7, 8, 9 and 10. The first question was "Do you have the habit of chewing gum?", for which in the pre-campaign application 78% answered "Yes" and 22% answered "No". In the post-campaign application the results were 73% and 27%, demonstrating that the students are consuming less chewing gum. Second question was "How Frequently?", for which the answers could be "Always", "Sometimes", "Rarely" or "Never". In the pre-campaign the results were 17%, 61%, 17% and 5%, and in the post-campaign the results were 13%, 50%, 27% and 10%, respectively. Third question was "Where do you dispose of your chewed gum?", for which the results, in the pre and post-campaign respectively, were 45% and 22%for "Any trash bin", 51% and 71% for "Non-recyclable waste" and 3% and 7% for "I usually swallow the gum". The higher numbers for the answers for question number 3 in the post-campaign demonstrate that the instructional material produced was able to sensibilizate the students. The fourth question was "Have you ever disposed of chewed gum under classes and chairs?", for which in the pre-campaign 26% answered "Yes" and 74% "No". The numbers changed because, even though the same individuals participated in the pre and post-tests, new individuals also answered the questionnaires: 19% for "Yes" and 81% for "No".

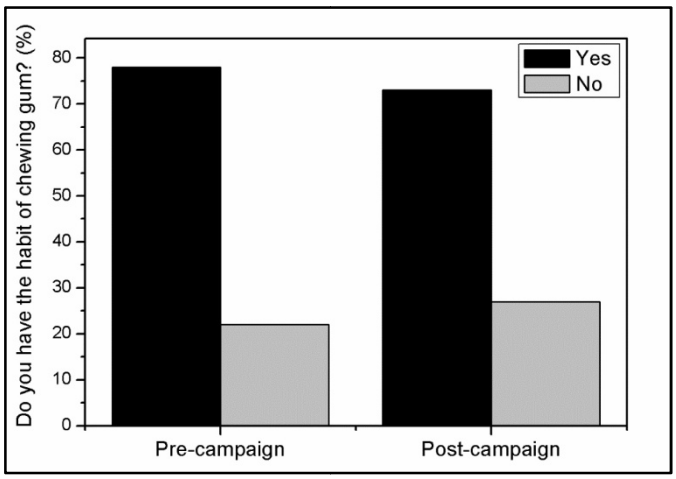


Figure 6. Graphical results for question 1

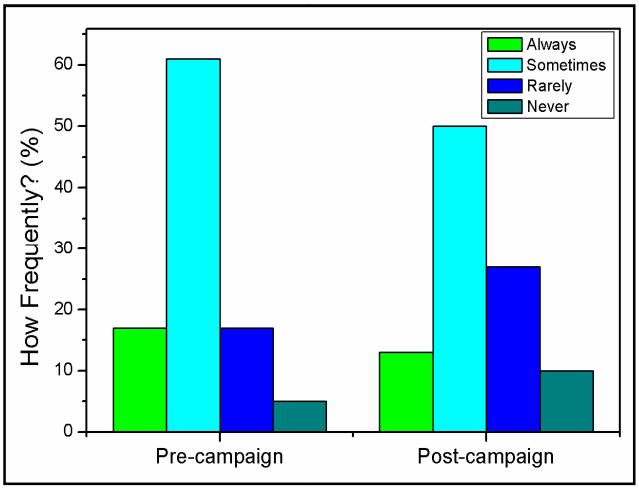


Figure 7. Graphical results for question 2

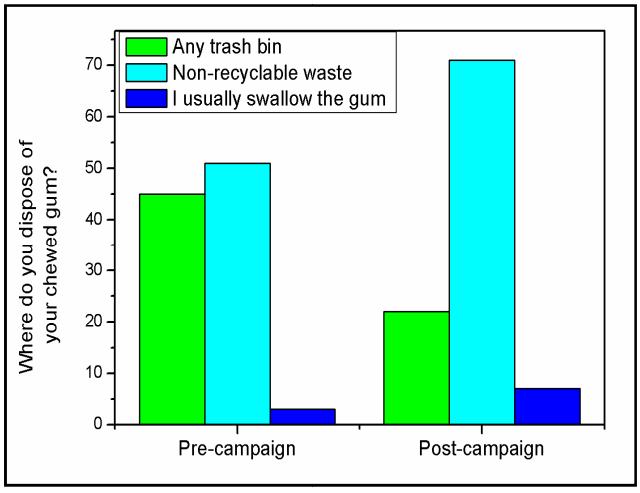


Figure 8. Graphical results for question 3

The fifth question was "Are you aware of chewing gum decomposition time?", and in the pre-campaign 79% answered "Yes", 13% answered "Yes, but I don't really care" and 8% answered "No". In the post-campaign the results were 82% for "Yes", 11% for "Yes, but I don't really care" and 7% for "No".

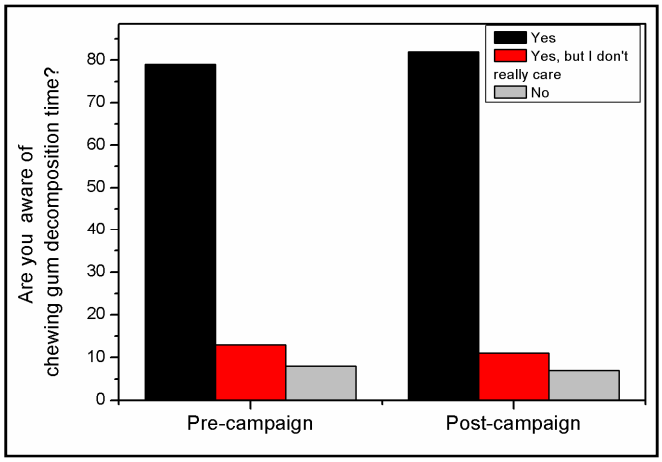


Figure 9. Graphical results for question 4

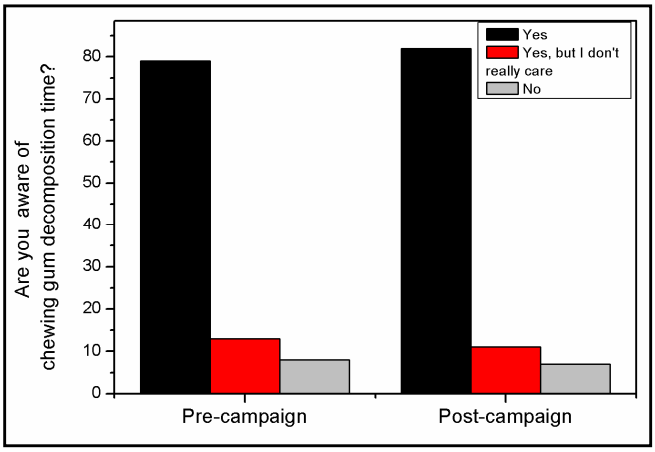


Figure 10. Graphical results for question 5

Conclusions

It was possible to verify that most students didn't know about the incorrectly disposal of gums problematic, the media created was positively accepted by the students and there was a diminishment of gums disposed under desks and tables of the institution after the campaign.

Acknowledgments

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