CHAPTER
154

The computer: My friend, my enemy

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Alvaro Antonio da Silva
Highest academic institution: State University of Mato Grosso do Sul - UEMS
Highest academic qualification: Computer Science – Bachelor
E-mail: alvarotoninhodasilva@outlook.com

Paulo Sidnei Stringhini Junior

Dalton Pedroso de Queiroz

ABSTRACT
Introduction: Over the years, computers have increasingly begun to participate in our lives and in routine activities. But with this breakthrough, we become more dependent on them. He is our daily agent as a friend and ally, from the beginning to the end. However, it can become our enemy, because all electronic products have chemical elements that can be harmful to the environment and people, being no different from computers. Methodology: Thus, we can say that there is a hidden enemy in them. This enemy is in its chemical elements that, discarded incorrectly, or not undergoing proper sorting and separation, can bring harm to those around you. Results: It was thinking about this fact, that an education project aimed to bring knowledge about the subject to students of public schools in the city of Dourados - MS, where they were presented didactic contents related to the theme, lectures, seminars and use of virtual tools in the modalityade EAD. Conclusion: In this educational project were presented not only the problems, but also the ways of reusing the main components of computers, as well as norms and public policies on the subject. A collection of data was madeon the degree of awareness of the students before and after the development of the actions proposed in the project.

Keywords: Student, Computer, Education, Electronic, Virtual.

1 INTRODUCTION

All garbage generated fromappliances the electronics, obsolete, damaged or simply discarded and its components, can be considered technological waste, also called electronic waste, high tech garbage, or simply "e-Trash". This garbage arises because every day new technologies are made available on the market and devices are replaced with increasing frequency. The speed of obsolescence of these materials increases progressively and often they become "outdated" before they even leave the stores, which represents a major problem for companies, society and the environment.

Batteries and batteries are a critical example of e-waste. Millions of devices are also thrown away that end up turning into electronic scrap, mainly computers, cell phones, televisions and stereos.

These devices have toxic polluting substances that are harmful to human health, such as heavy metals, for example. Lead is one example, being a heavy metal highly harmful to human health. Copper is also abundant in electrical and electronic devices, as well as lead and cadmium, among others. These elements contaminate soil and groundwater, causing environmental problems and disease. It is found that in places close to theareas of disposal of electro-electronic waste, there was contamination of the environment, animals and people with high levels of heavy metals.

The Brazilian environmental legislation treats the waste by the contaminant element and determines its treatment, however, only some manufactured have legal standards of disposal, such as Batteries and Batteries. On August 2, 2010, the National Solid Waste Policy (PNRS) was established, which aims to regulate the management of e-Waste, introducing Reverse Logistics for this waste, assigning post-consumption responsibility to manufacturers, importers, distributors, traders and consumers.

Due to the above, a teaching project was developed that aims to inform, discuss and ascertain the level ofknowledge of students about the treatment that has been given to this type of garbage, what problems exist and point out ways in the search for solutions.

2 OBJECTIVE

To bring to the target audience, which were the public schools of the city of Dourados - MS, the knowledge about the importance of computers in their daily lives, but also to demonstrate the problems and damages caused by the incorrect disposal of the same.

3 MATERIAL AND METHODS

The project began with a bibliographic review, from which references emerged that were suggested to the students for reading, being chosen the ones that best suited the language of these students and could bring information with a high degree of use to deal with the problem in focus.

After that, the preparation of didactic material to bepresented in schools in the form of videos, lectures, informative and elaboration of the questionnaire to be applied to the students began.

The discussion on the subject took into account a more colloquial language, of the student's daily life, both in the questionnaires and in the presentations, whose purpose was to better communicate and provoke awareness and environmental education in relation to the problems that the chemical elements present in the computers can cause.

The activities were carried out in a virtual way with the presentation of the contents in the EAD form for the participating schools, where the students could interact remotely with theauthors of the project in a time of 30 minutes, and the contents were later made available online.

The project was developed in this way because of the COVID-19 PANDEMIC, which restricted movement in schools for biosecurity reasons.

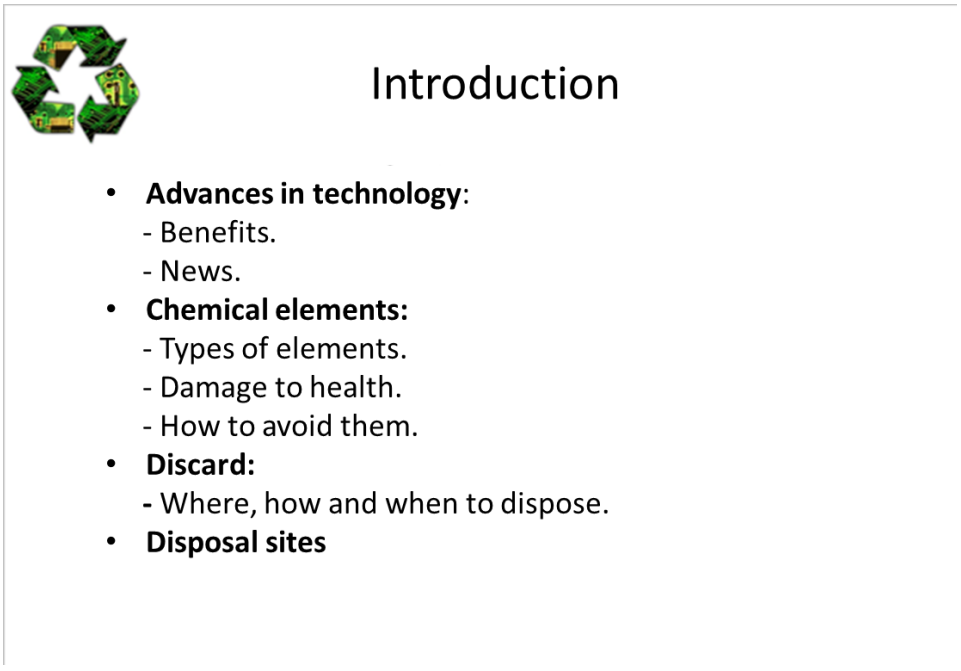
The data collected and documented were reviewed and analyzed for analysis and dissemination.

4 RESULTS AND DISCUSSION

The following figures show the initial screens of the main presentation (Figure 1 and Figure 2), as well as its contents.

The students were very participatory, with questions, suggestions and comments on the subject.

Figure 2: Introduction made for presentation.



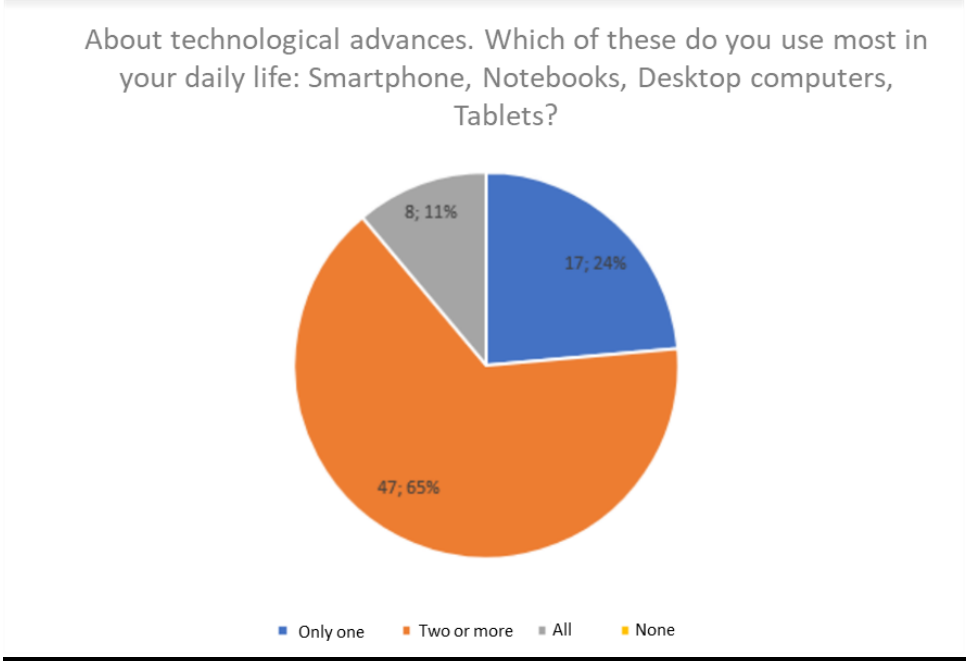
Source: Authors

The following are the datacollected by the questionnaires (Table 1.1, Table 1.2, Table 1.3, Table 1.4 and Table 1.5), where we can see the degree of understanding of the students.

1. About technological advances. Which of these do you use more in your daily life: Smartphone, Notebook, Desktop Computers or Tablets?

Table 1.1: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

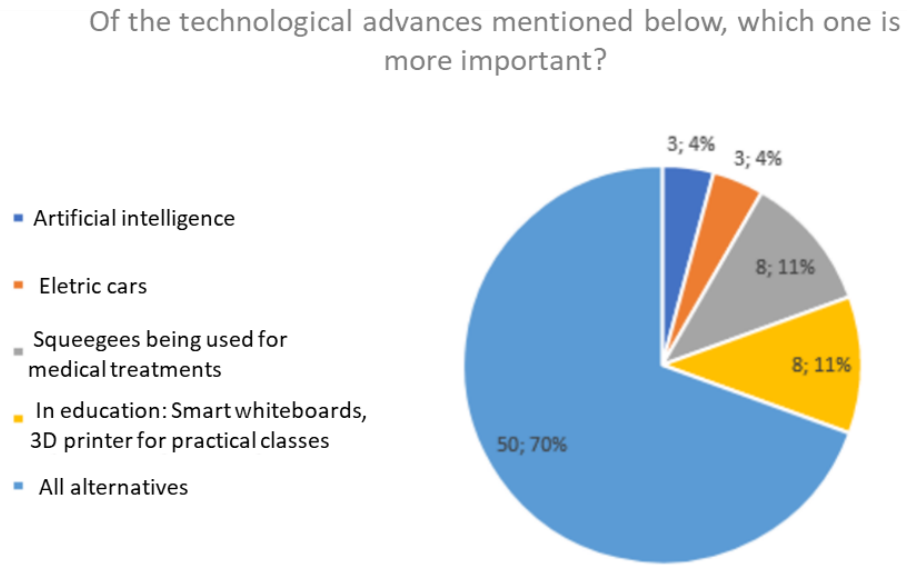
	Number of participants per alternative.
Only one	17
Two or more	47
All	8
None	0
Total	72



2. Of the technological advances cited below, which one is more important.

Table 1.2: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

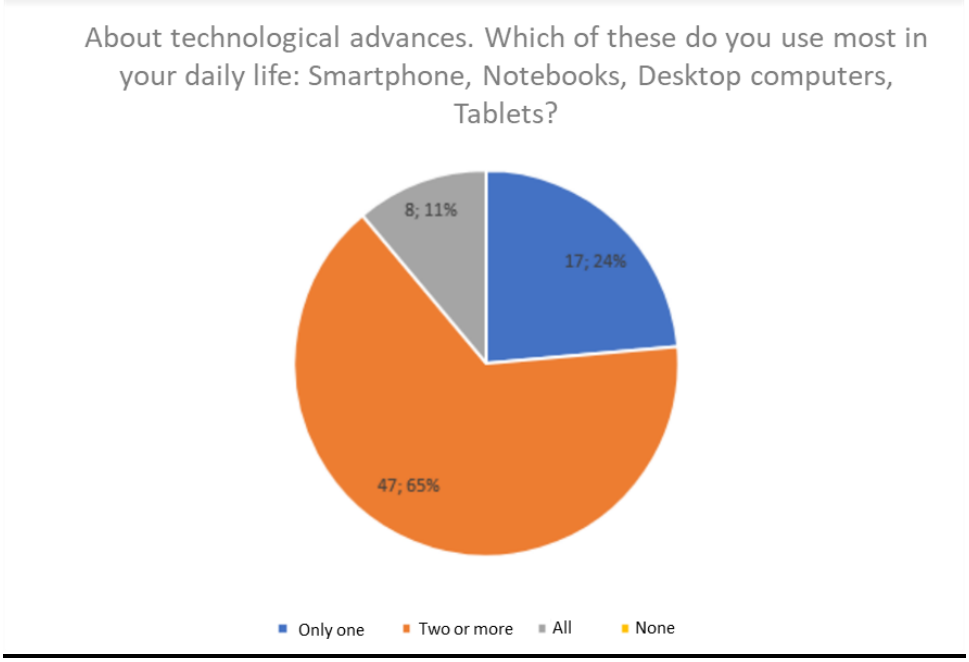
	Number of participants per alternative
Artificial intelligence	3
Eletric cars	3
Squeegees being used for medical treatments	8
In education: Smart whiteboards, 3D printer for practical classes	8
All alternatives	50
Total	72



3. You were aware of the numerous types of chemical elements in the Everyday appliances?

Table 1.3: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

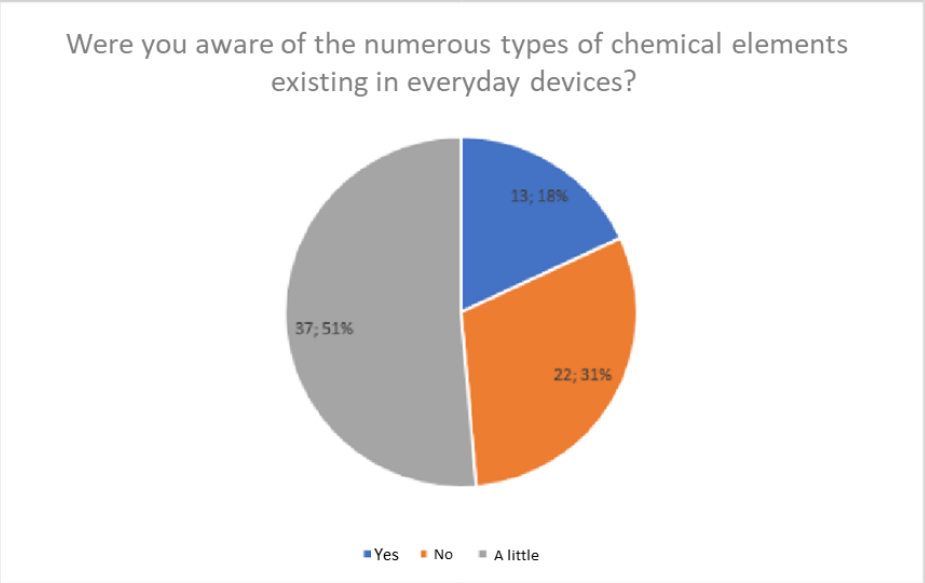
	Number of participants per alternative
Yes	13
No	22
A little	37
Total	72



3. Were you aware of the many types of chemical elements found in everyday devices?

Table 1.2: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

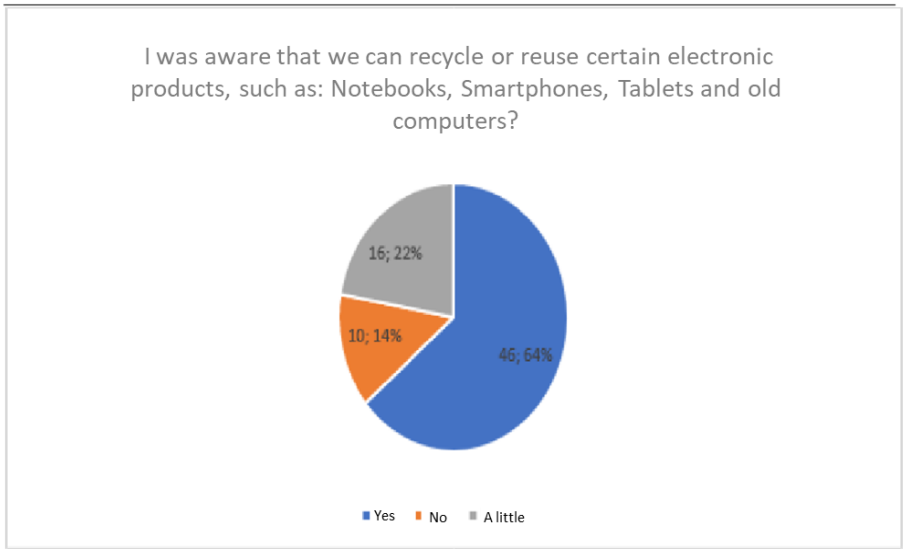
	Number of participants per alternative
Yes	13
No	22
A little	37
Total	72



4. Did you know that we can recycle and reuse certain electronic products, such as: Notebooks, Smartphones, Tablets and old computers?

Table 1.4: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

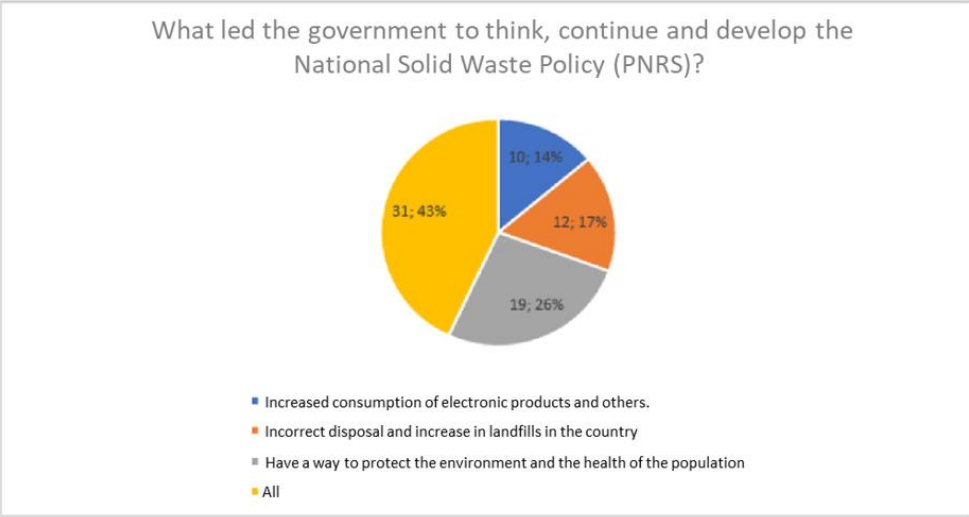
	Number of participants per alternative
Yes	46
No	10
A little	16
Total	72



5. What led the government to think, continue and develop the National Solid Waste Policy (PNRS)?

Table 1.5: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

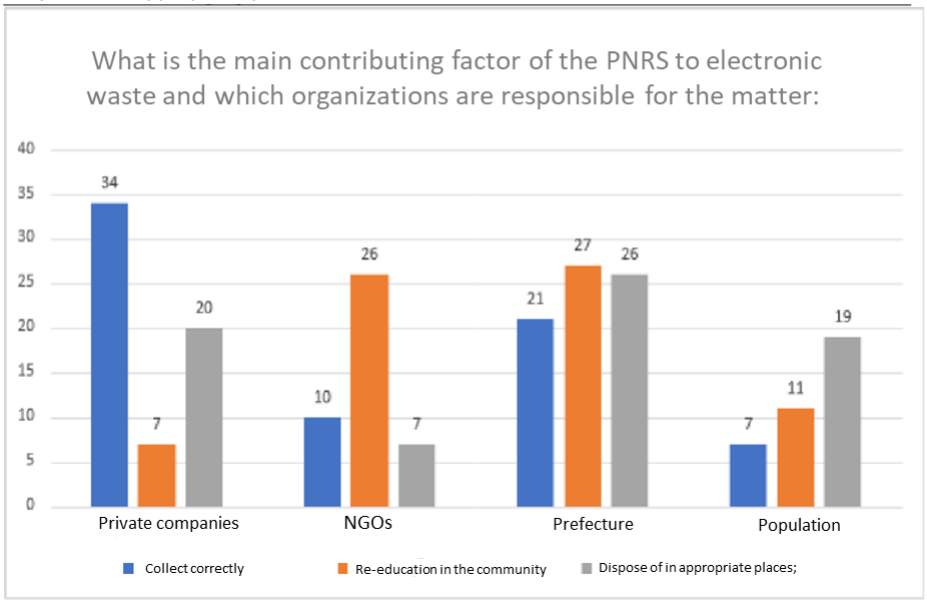
	Number of participants per alternative
Increased consumption of electronic products and others.	10
Incorrect disposal and increase in landfills in the country.	12
Have a way to protect the environment and the health of the population.	19
All	31
Total	72



6. What is the main contributing factor of the PNRS to electronic waste and which organizations are responsible for the matter:

Table 1.2: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

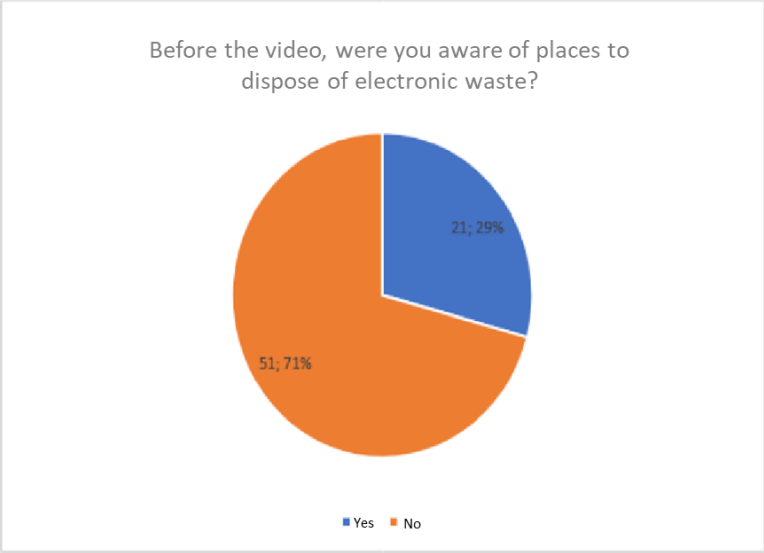
	Private companies	NGOs	Prefecture	Population
Collect correctly	34	10	21	7
Re-education in the community	7	26	27	11
Dispose of in appropriate places	20	7	26	19



7. Before the video, were you aware of places to dispose of electronic waste?

Table 1.2: Collection of answers for the conclusion of the project with the title: The Computer: My friend, My enemy between the years 2019/2020.

	Number of participants per alternative
Yes	
No	
Total	72



5 CONCLUSION

The data presented above show us that:

- 65% of students use more than one technological advance.
- 70% consider all technological advances to be important.
- 51% of them were aware of the chemical elements in their daily devices and 31% were not.
- Regarding the reuse of electronic products, about 64% were aware that it is possible.
- About the National Solid Waste Policy (PNRS), 43% believe that the reasons that led to the creation were these three options:
  - Increased consumption of electronic and other products.
  - Incorrect disposal and increase of landfills in the country.
  - Have a way to protect the environmentand the health of the population.

Still in this question (What is the main factor of contribution of the PNRS to the electronic waste and which organizations have responsibility on the subject:), we observe that:

  - Private companies must have a collection correctly.
  - NGOs and municipalities should opposea re-education in the community.
  - And the population needs a correct place for disposals.
- 71% were not aware of correct disposal sites and how to perform disposal.

These data reveal the importance of raising awareness about the correct disposal of computers and the implications of not doing so.

The project achieved its goals, even though there was a pandemic issue in focus, where students could acquire knowledge about intoxication and diseasesthat may exist in a place where computer parts are incorrectly disposed of.

Thus, it was contributed to promote Environmental Education in schools in the region of Dourados-MS.

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