

## Qualifying Students in Private and Public Schools from Apucarana for the OBMEP

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**Abstract:** The university aims to form professionals through transmission and dissemination of knowledge, therefore, the Extension, as a tool of the universities, has a major role contributing to improvements in the learning and teaching process. The Extension projects are extremely important for The Federal Technological University of Paraná (UTFPR), since they increase the scope of citizens, benefiting them with research and knowledge. The project ‘Qualifying Students in private and public schools from Apucarana for the Brazilian Mathematical Olympics for Public and Private Schools (OBMEP)’, was designed with the objective of developing logical thinking in students, that participate on the project, as well increasing their interest in mathematics through the application of various activities, thereby helping to reduce the discrepancies in the learning process. The project also has the purpose to increase the number of qualified students for the second phase and medalists of the Maths Olympics. The idea is to provide ways to entertain students, trying to introduce greater dynamics to their studies. In 2019, some students of the project were awarded scholarships by the Institutional Program of Scientific Initiation Scholarships (PIBIC Jr), in which the scholarship’s holder help in the development of research at the university. During the project, significant improvements of the participating students were noted, both in the school’s grade and in the results of the Maths Olympics. The project was indeed beneficial for everyone (students and volunteers) since there was personal and academic growth for those who were willing to teach. With the progress of this project, the importance of the University Extension for the community became evident, since it is keen to contribute to the intellectual and personal growth of each individual involved.

**Keywords:** Mathematics, maths olympics, dynamics, activities, teaching process, public and private schools, personal growth

### Introduction

The university is an important space for the production, accumulation and dissemination of knowledge, based on three interrelated bases: teaching, research and extension (UFES, 2013). Thus, talking about university and society, it is observed that extension has a secular role. According to João Antônio de Paula (2013) in “*The university extension: history, concept and proposals*”, the origin of the university extension had two aspects, one disseminated in England and the other in the United States, where each was objectified in different factors. However, these were limited to capitalism and how to distribute knowledge without being detrimental to mass control, in addition to favoring those in charge, parties, church or capital leaders:

Throughout history, the concept of university extension has undergone several guidelines and matrices, in which it ranges from extension courses, extension services, extension assistance, extension as a two-

way between society and university, among others, with a new meaning extension with other academic tasks, and in their relationship with the community (SERRANO, 2012, p. 1).

Hence, university extension is one of the means in which it allows the sharing of knowledge acquired at the institution to happen (UFES, 2013). Paula (2013, p.6) states that university extension is what calls the university to deepen its role as an institution committed to social transformation, bringing the transmission and production of knowledge to its recipients, taking care of any flaws that they do that knowledge, science and technology are unequal.

University extension projects bring numerous contributions, one of which is the promotion and social, emotional and physical well-being, guaranteeing values, rights and duties to people. This has a fundamental role in the development of people who enjoy the projects, as well as academics. (MENDONÇA et al, 2013, p. 150).

The extension has some characteristics that, if well explored, can contribute to a change in the process of teaching and learning: they have a different methodological arsenal; it is made up of meetings between students, teachers and communities; has the possibility, in this meeting, to incorporate other knowledge, to create a new common sense and to expand the capacity for reflection on practices, because they are constituted, that is, they are constituted by experiences (CASTRO, 2004, p. 5).

Therefore, such a project is the key for knowledge to be disseminated and worked equally among students and the community. For example, we have the Federal Technological University of Paraná (UTFPR), which has 13 (thirteen) campuses, being present throughout the state, so it is extremely important that large institutions like this develop extension projects aiming to reach the largest number citizens, thus being able to benefit them with their knowledge and research. For that reason, it is possible to understand the need for projects involving the community, and even more, students of basic education, who are at the peak of their development.

The project “*Qualifying students in private and public schools from Apucarana for the OBMEP*”, aims to develop students' logical reasoning, provide more interest in mathematics, through various activities, in addition to finding talents, encouraging them and directing them to enter universities in the areas of science and technology. The UTFPR is a public university focused on technological courses, mostly engineering, making it easy to find volunteer students able and interested in teaching mathematics in general, for these children. The project also aims to increase the number of medals in Paraná, as well as to increase the number of students classified for the second phase, which happened less frequently at the beginning of the project in 2016.

## Method

Academics and students who participate in the “*Qualifying Students in private and public schools from Apucarana for the OBMEP*” have the role to assimilate the learning in the classroom, for this reason, games of strategy and logical reasoning are made available and reproduced. By observing the unfolding of the teaching of mathematics and logical reasoning, such games contribute to the learning of formed and entertaining materials, thus making mathematics more playful. The students participating in the project are from public and private schools in the region of Apucarana-PR from the sixth to the ninth grade. The activities have your development at the institution itself (UTFPR). Analyzing the need of children in the city of Apucarana for educational support and the shortage of medals in the Olympics, it is possible to note the insufficiency in the area of mathematics and logical reasoning. Therefore, the project, implemented at UTFPR, tries to help fill this gap of students in their learning process.

The idea of the project is to bring more dynamics to learning by providing some ways to entertain students. The project, which has been going on since 2016, consists of face-to-face classes on Saturdays, on the UTFPR campus, where students solve lists prepared by volunteers, and have fun with educational games. The volunteer body consists of 27 students divided into groups of four members, who assist participants during classes. The lists are separated by three subjects: geometry, arithmetic and combinatorial analysis with probability and statistics.

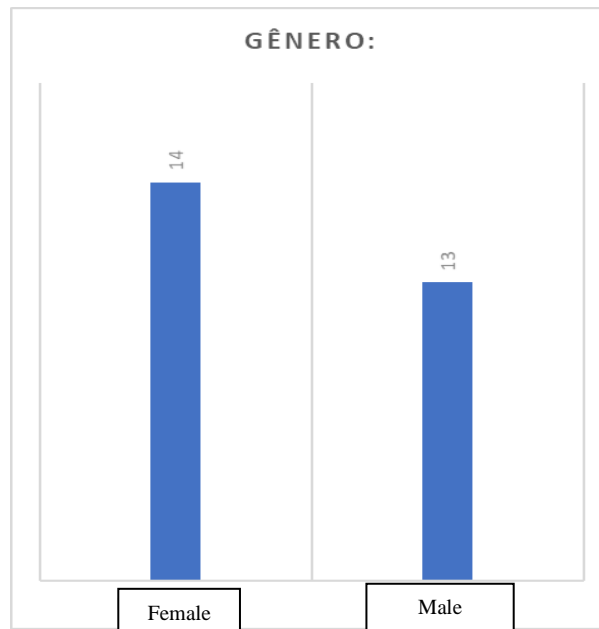
The project also have used the help of PIBICjr, that originated in 2019 with a national call for proposals that was launched at the CNPQ (National Council for Scientific and Technological Development), a government agency linked to the Ministry of Science and Technology, with the purpose of encouraging scientific and technological research and the training of Brazilian researchers, who would choose five projects to contemplate with scholarships of 100 Reais (almost 19 Dollars), for the six chosen students, given during one year, monthly.

The coordinator Danielle competed and was contemplated with one of these scholarships. Currently, scholarship students assist in the development of research at the university, accompanied by supervision of undergraduate students. For the 2020 year, new changes were adopted to the meetings, in which they start to occur from 8:00 to 11:40 o'clock in the morning instead of 10:00 to 11:20 o'clock. Having a determined time for the resolution of lists, interval and the application of games, among which are those purchased by sponsors, such as those created by the students of PIBICjr. Expected that with the development of the project, Apucarana will be able, in addition to increasing its medal index, to bring more pleasure to its children in learning mathematics, which also helps in their performance in schools in general.

## Results and Discussion

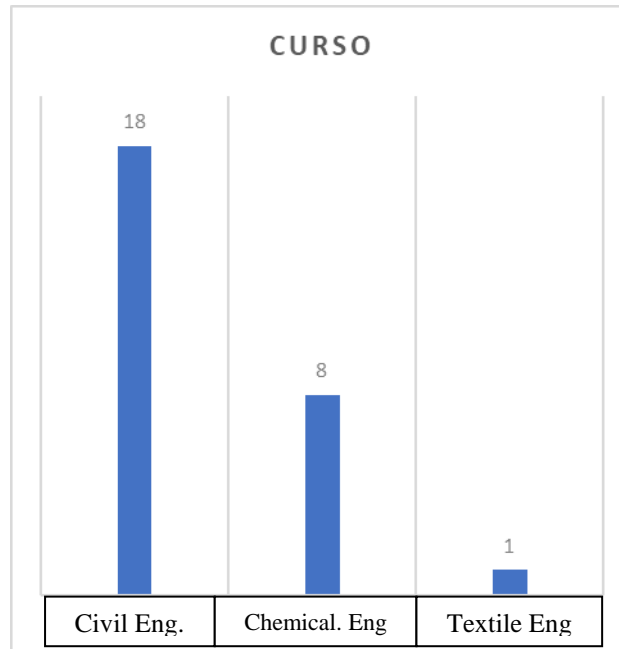
To begin with, an analysis of the profile of the volunteers who would work on the project was carried out, since they would be helping children in the community through monitoring, beyond to monitoring learning. As a result, it is possible to observe the importance and the total commitment that university extension projects have to the community. To this end, a form was prepared with the help of the "Google forms" application with the link [bit.ly/conhecendovoluntarios2020](https://bit.ly/conhecendovoluntarios2020), in which all voluntary participants should respond. The 27 students involved had divided tasks so that each one could do their homework in the best possible way, without overburdening anyone.

The form contained 10 questions. Among them were the student's gender; which course they was taking; the enrollment period of the volunteer in the system of the University; future area of activity; if it was already intended to study this area when they first enter their course; whether the volunteers already had contact with the teaching area; what would be this contact; what was the probability of them following an academic career; why did they choose to participate in this project, and finally, what were their expectations to the project. For the first question, Graph 1 was obtained with the responses of the volunteers. It was possible to observe that the number of volunteers of each sex was balanced; this can be an interesting factor since if any student felt more confident in answering their questions with a person of the same sex, they would be available to assist the child.

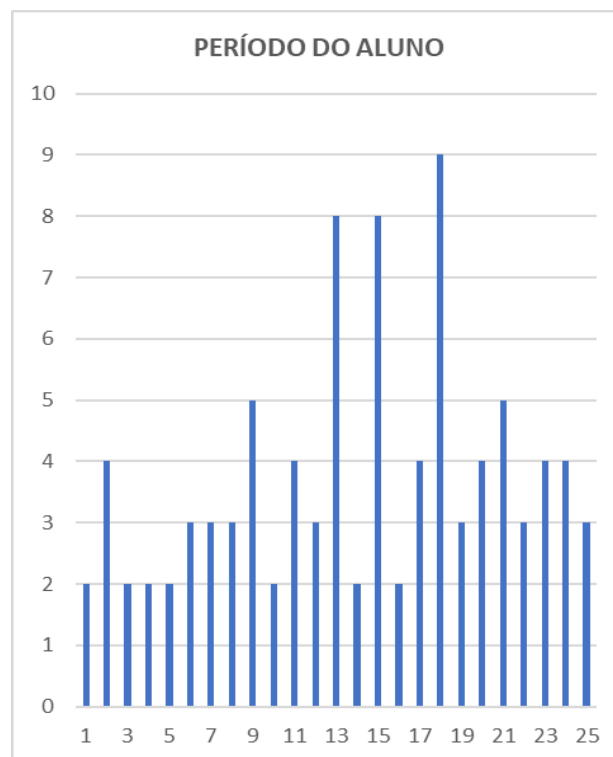


Graph 1. Student's Gender

Subsequently it was asked which course they were taking at UTFPR Apucarana, and what the system period they were enrolled in, such data was represented by Graphs 2 and Graph 3.

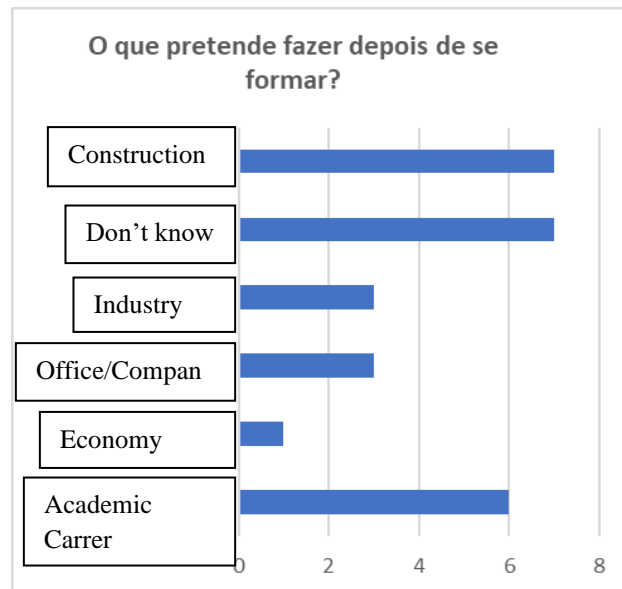


Graph 2. Volunteer's Course



Graph 3. Enrollment Period of the Volunteer in the System of the University

When analyzing the responses, it was possible to notice that large parts of the volunteers, 66.67%, were studying Civil Engineering, 29.63% were studying Chemical Engineering and 3.70% were studying Textile Engineering. With regard to the period they were attending, this proved to be quite diverse. The next graphs, Graphs 4 and 5, present the data related to future areas that the volunteers intend to act, related to their courses, as well as if this was already the intention when they chose the course.

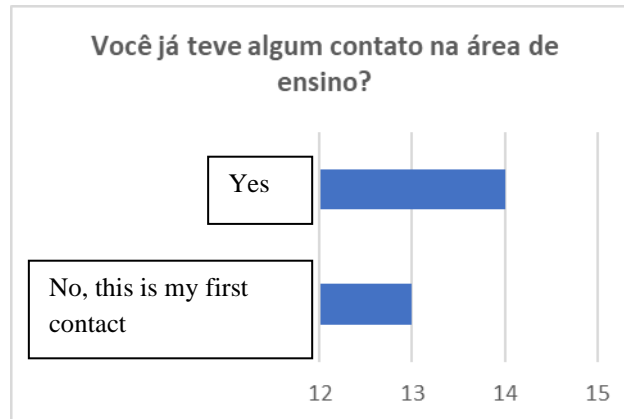


Graph 4. Future Area of Activity

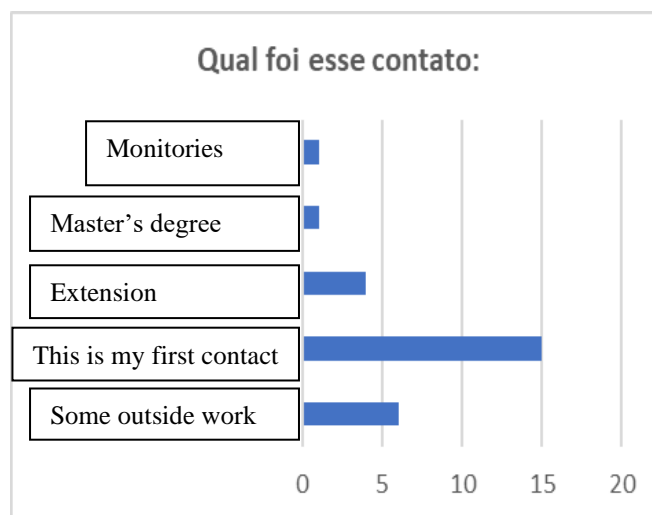


Graph 5. When They Chose This Course, This Area was already intended to Study

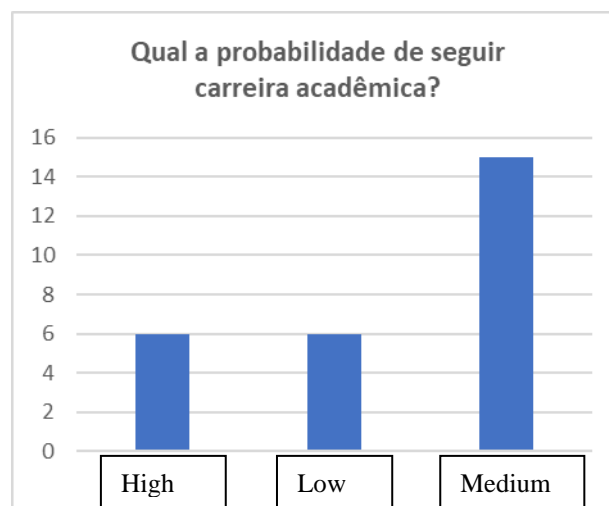
From Graph 5, it can be seen that a percentage of students changed their opinion regarding their future performance during the course, which may be related to various experiences provided by the university and extension projects, which allows a much broader view of society. The next questions evaluated were whether students had contact with the teaching area, what was this contact and what is the probability of continuing their academic career, the results can be evaluated in Graphs 6, 7 and 8, respectively.



Graph 6. Whether the volunteers already had Contact with the Teaching Area



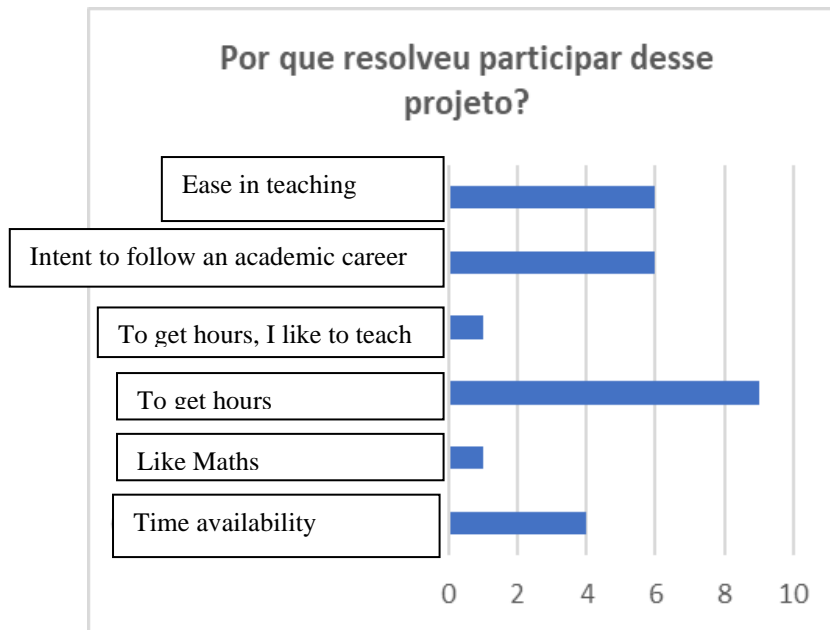
Graph 7. What was This Contact?



Graph 8. What was the probability of Them Following an Academic Career?

The responses obtained demonstrate that the number of students who have already had contact with the teaching area and those who have not had are almost equivalent, however the number of interested in pursuing an academic career has good rates, between medium and high probability. Thus, it is well known how university extension is of great relevance for the formation and direction of future academic careers.

Finally, it was asked why they chose to participate in the project, Graph 9, and what were their expectations for participating in the project, Table 1.



Graph 9. Why Did They Choose to Participate in This Project

Table 1. Volunteers' Testimonial with Their Expectations for the Project

Student x	Testimony
Student 1	Learn by teaching, and learn from life. I'm very closed in college, so I want to get involved in something. It will be good for the human side.
Student 2	Learning and experience.
Student 3	Helping other people to have more knowledge, just as I was helped; I know it will be a mutual learning.
Student 4	Learn and teach.
Student 5	Teach and learn together with others.
Student 6	Personal growth and contributing to the community.
Student 7	Have more contact with the area and gain more experience.
Student 8	Create ease in relating to different people, and have a small base of what it is like to "teach".
Student 9	Improve my math skills and develop communication skills.
Student 10	Hours, Experience.
Student 11	Grow as a person and professionally, try to learn how to teach.
Student 12	I hope to improve my communication and be able to pass on knowledge satisfactorily.
Student 13	To be able to contribute in the teaching of mathematics, knowing that there is a great lack of interest and a certain fear coming from some students in this area. Being able to show that we can learn in other ways, in addition to "dull" methods.
Student 14	Experience and learning.
Student 15	I hope to contribute by adding a little more knowledge to all children, in addition to being able to further improve my own knowledge, especially with the public. I also hope to learn more and improve my academic life with this project.
Student 16	Gain experience and see students learning.
Student 17	Get hours, assist in the project and gain more experience

<b>Student 18</b>	Being able to talk better with people and become more active
<b>Student 19</b>	get experience in the teaching area and relax.
<b>Student 20</b>	My purpose within the extensive project is to share knowledge. Whether acquiring or transmitting. Such a project still provides academic hours.
<b>Student 21</b>	Acquire knowledge and experiences.
<b>Student 22</b>	Improve my communication and ways of passing on what I know, in addition to acquiring more knowledge.
<b>Student 23</b>	Develop my teaching and get out of the classroom routine.
<b>Student 24</b>	Learn to teach and behave in a presentation.
<b>Student 25</b>	Having more contact with the external community and experiencing new experiences.
<b>Student 26</b>	Experience and improvement.
<b>Student 27</b>	Enhance teaching skills and encourage young people to discover the beauty of mathematics.

It is noted that in most of the responses presented in Table 1, the volunteers sought to learn and gain experience in the teaching area, as the project, in addition to providing opportunities for students from the 6th to the 9th years, it also contributes significantly to the growth of the volunteers and others involved. With the project being applied great results in the performances of the students have already been noticed, not only in Olympics, but also in schools, where they reported to present a better development in the subjects of mathematics. From Table 2 and 3, it is possible to observe the evolution of Apucarana students in the Olympics from 2016 to 2019.

Table 2. Comparison of the Number of Apucarana Medalists at OBMEP since 2016 of Both Levels

	Level	Year	Medals	Honorable mention	Awarded
1		2019	2	11	13
		2018	4	13	17
		2017	1	12	13
		2016	0	8	8
2		2019	1	10	11
		2018	1	7	8
		2017	1	10	11
		2016	1	3	4

Table 3. General catch of the comparison of the number of Apucarana medalists at OBMEP since 2016

Year	Medals	Honorable mentions	Awarded
2019	3	21	24
2018	5	20	25
2017	2	22	24
2016	1	11	12

We can see from the Table 2 and 3, that since 2016 the awards given to Apucarana have been doubled in both levels, what shows that the project has achieved its purpose successfully. University Extension is extremely important for universities. With it, countless projects can be put in practice, through the transmission of assistance to the community, as well as the opportunity for professional growth for the volunteers. After the implementation of the project, “*Qualifying students in private and public schools from Apucarana for the OBMEP*”, was noticed a great development of students and monitors, which could improve, both their individuals and collectives skills. Because of this improvement, the increase numbers of medals at OBMEP directed to Apucarana could be observed, consequently showing that the project achieved its purpose.



## Recommendations

The games are indispensable so the project work out. Attached are some good games to use in some action like this, which are Catan, Carcassone, Rush Hour, dubble, War and Dix it. It important to tell that in somehow is good to search and try to teach them to make games with their own hands. They feel proud and learn more from that than just playing the purchase games.

## Acknowledgements

To the project work, is fundamentally having a good advertising to get to the hidden whiz kids of the community, because they are there waiting to someone to push them up. Besides that, having a good volunteers that are in love about teaching is indispensable, because they are the front line in the monitories, they must have to be prepared to be there, to give the best they can, to the children. The volunteers have the mission to involve each child in the activities, so they want to be there, playing and learning from that.

## References

- Serrano, R. (2012). Conceitos de extensão universitária: um diálogo com Paulo Freire. [http://files.cristine-tanajura.webnode.com/200000021-6560e752b/conceitos\\_de\\_extensao\\_universitaria.pdf](http://files.cristine-tanajura.webnode.com/200000021-6560e752b/conceitos_de_extensao_universitaria.pdf)
- Paula, J. A. (2013). A extensão universitária: história, conceito e propostas. *Interfaces-Revista de extensão*. 1 (1), 05-23. <https://www.ufmg.br/proex/revistainterfaces/index.php/IREXT/article/view/5/pdf>
- Brasil, (2020). Instituto de Matemática Pura e Aplicada. Ministério da Educação. Olimpíada Brasileira de Matemática das Escolas Públicas: OBMEP. <http://www.obmep.org.br>
- Minuzzi, I. Camargo, M, (2010). A extensão universitária como auxiliar no ensino-aprendizagem da matemática. *Revista Ciências Humanas*, 11 (17), 09-34. <http://revistas.fw.uri.br/index.php/revistadech/article/view/334>.
- Lima, A. L. R., Prata, M. S., Batalha, T. B. S., Costa, C. L. N. A., Neto, I. F. P. (2013). Contribuições da extensão universitária na sociedade. *Caderno de Graduação - Ciências humanas e Sociais*, 1 (16), 141-148. <https://periodicos.set.edu.br/index.php/cadernohumanas/article/viewFile/494/254>
- Grando, R. C. (2000). O conhecimento matemático e o uso de jogos na sala de aula [Tese de doutorado não publicada]. Universidade Estadual de Campinas.
- Castro, L. (2004). A universidade, a extensão universitária e a produção de conhecimento emancipadores. *Política de Educação Superior*, 11. <http://www.anped.org.br/biblioteca/item/universidade-extensao-universitaria-e-producao-de-conhecimentos-emancipadores1>
- Mendonça, Iasmim Barreto et al. Extensão universitária em parceria com a sociedade. *Caderno de Graduação - Ciências humanas e Sociais*, Aracaju, v.1, n. 16, p. 149-155, 2013. O que é a extensão universitária. UFES-Universidade Federal do Espírito Santo, 2013. Disponível em: < <http://www.proex.ufes.br/o-que-%C3%A9-extens%C3%A3o-universit%C3%A1ria> >. Acesso em: 15 jun. 2020. O que é a extensão universitária (2013). UFES-Universidade Federal do Espírito Santo. <http://www.proex.ufes.br/o-que-%C3%A9-extens%C3%A3o-universit%C3%A1ria>.