

## **Flag species as a tool in education and social mobilization for biodiversity conservation**

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### **Abstract**

The PAIE (Program for Assistance to Teaching, Research and Extension Institutions) has as its main goal the development of integrated knowledge through a holistic view of the individual. Since 2014, the idea of working in a program format, based on continuous actions, has progressed and culminated in the implementation of visits to Otter Project, where PAIE is developed. An old mill, preserved and renovated, serves as a Visitation and Environmental Education Center. The Animal Refuge, the only scientific breeding of otters in Latin America, is used as an educational trail for school visits. From 2018 to 2019, 4,599 participants were served by PAIE. The number of public schools increased from 37 in 2018 to 60 in 2019. The number of private schools increased from 32 in 2018 to 45 in 2019. There were 22 environmental education events held on an itinerant basis, with 5,900 students served. The results obtained with the PAIE demonstrate that the children mind must be aligned with the teaching landscape for the resulting energy to go in the direction of this landscape. This will then be able to change adverse realities, such as loss of biodiversity, climate change, water pollution, and loss of habitat.

**Keywords:** *educommunication, animated theater, Lontra longicaudis.*

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### **I. Introduction**

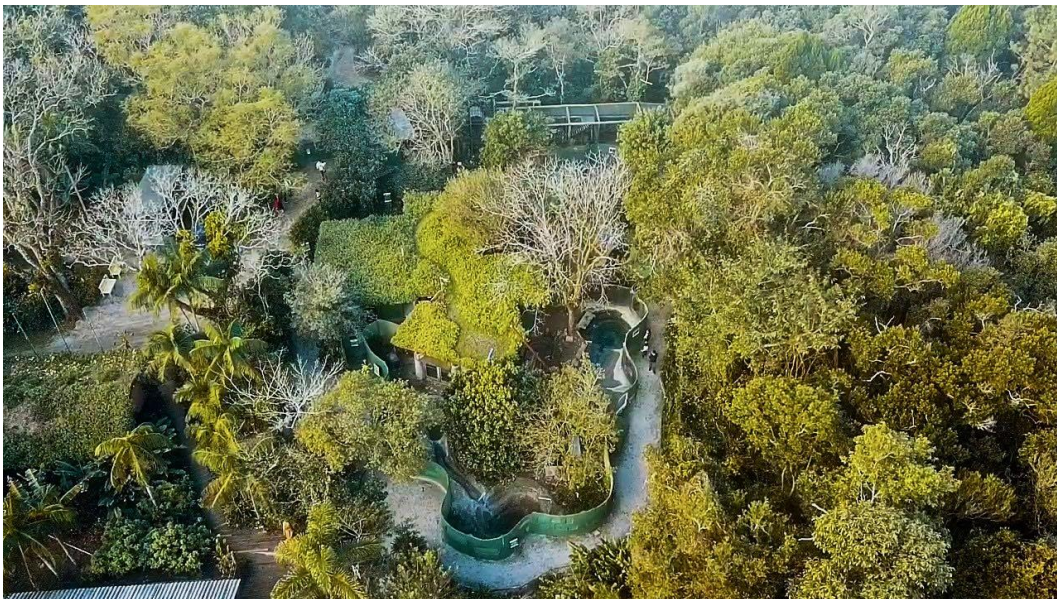
The current work intends to discuss the development of educommunication activities focused on the preservation of Brazilian biodiversity, with the otter as a flagship species. Educommunication is a field of study inspired by Paulo Freire's ideas of liberating pedagogy, popular communication, and cultural studies (Freire, 2014; Mateus and Quiroz-Velasco, 2017; Santos and Ghisleni, 2019). The Ekko Brasil Institute (IEB) is an NGO, that includes the PAIE (Program for Assistance to Teaching, Research and Extension Institutions). The research projects developed by the IEB were integrated into the communication, environmental education and social actions.

The Animal refuge and the Otter Mill Visitation Center are supporters of PAIE. The Refuge is a conservationist breeding site on Santa Catarina Island, southern Brazil. The IEB manages the site, which is located on the shores of Lagoa do Peri. The license to operate was received on November 28, 2007. The IEB was created in 2004. The mission of the Institute is to coordinate and support projects focused on biodiversity conservation, especially studies with the neotropical otter (*Lontra longicaudis*). Figure 1 is an aerial view of the Animal Refuge, Visitor Center, Project Management Office, Kitchen and Bathrooms, and accommodation for researchers, interns, and volunteers.



**Figure 1.** The Visitation Center (larger roof) and the Animal Refuge (green roofs), where PAIE operates, are located on the edge of Lagoa do Peri, on Santa Catarina Island, southern Brazil.

Figure 2 is an aerial view showing in detail the Animal Refugio and research laboratory, built with green roofs, and the otter trail. The Animal Refuge has three special enclosures intended for the shelter and recovery of the *Lontra longicaudis*, each with a swimming pool. The Refuge also serves three other species of the Mustelidae family, *Eira barbara*, *Galictis cuja* and *Galictis vittata*. Since 1994, the Animal Refuge has been conducting research with otters in captivity, associated with studies of the species in the wild since 1986 (Carvalho Junior et al., 2022; Carvalho Junior and Schmidt, 2022).



**Figure 2.** Aerial view of the Animal Refuge, with the otter trail, where PAIE receives visits from schools. The living roofs of laboratory structures and enclosures can be observed.

The communication, environmental education and social mobilization actions are based on data and information produced by research developed by Otter Project. From 2018 to 2022, 33 scientific papers were published in peer review journals, aimed at the academic community, and 12 Technical Notes were sent to decision-makers and government agencies responsible for formulating public policies. Of the published works, 64% were related to the species *Lontra longicaudis*. The concern with the dissemination of scientific information in different languages for different audiences places communication as an important tool, which integrates education with democratic spaces for environmental protection (Nagamini and Gomes, 2017).

The communication process has the *Lontra longicaudis* as a flagship species for the change of different realities, such as the degradation of aquatic environments, deforestation, and the loss of biodiversity. The presence of otters in recovery at the Animal Refuge and cubs born in captivity helps raise awareness and empathy towards the species and the topics covered. Issues such as climate change and the importance of water and biodiversity in people's daily lives can thus be discussed with greater ease and understanding. It is important to note that this work is carried out by a non-governmental organization, which provides an educational and communicative physical environment, enabling the practice and immersion of students and teachers from public and private schools. The objective is to allow the teacher to provide an integrated view of biodiversity to the students, with a focus on how it relates to their lives.

Most of the published works on biodiversity are developed by public institutions (Almeida et al., 2019). Teaching the concept of biodiversity is the focus of extensive debate among researchers (Van Weelie and Wals, 2002; Barber and Miller, 2005). Despite advances, there is still much to be done in terms of inclusion and public participation. Participatory and interactive databases can promote engagement between multiple stakeholders, which in turn can promote participatory education with greater aggregation of information. This can provide feedback to databases and research (Lendemer et al., 2019).

The organization and availability of data from different partners, with information associated with the social and economic relevance of the species can play an important role in the creation of inclusive, culturally relevant and socially aware educational materials. Examples of such partnerships can be found in tourism, which can be an ally in conservation when it uses flagship species such as the Komodo dragon (*Varanus komodoensis*) in Indonesia (Walpole and Leader-Williams, 2002).

Flag species are also among the main marketing tools used by conservation organizations to motivate public support for conservation actions. Home et al. (2009) found that public support for conservation actions is strongly linked to the presence of charismatic and/or endangered species. Examples of this include the use of flagship species in communication campaigns to demonstrate the importance of ecological services and mangrove conservation (Thompson and Ron, 2019).

The koala is used in community education in Australia to facilitate changes in planning laws (Schlagloth et al., 2018). Other factors, such as the charisma of a species, can also be an issue when it comes to invasive alien species. Cases like this require management measures and strategies that are integrated with education, awareness-raising programs, and public involvement campaigns (Jarić et al., 2020). Key species can play an important role in the development of management strategies that protect a diversity of socioecological values in aquatic environments (Noble et al., 2018).

Environmental education is, in part, also political education (Reigota, 2017). The relationship between society and nature, such as the definition of conservation areas, also has an economic, social, and cultural character. Municipalities whose economy is influenced by tourism may be tempted to manipulate the definition of conservation areas in order to hide interests in real estate development and drug trafficking. An example of this is the municipality of Florianópolis, state of Santa Catarina, southern Brazil, where the decreeing of protected areas serves as a control and domination mechanism that prevents free, conscious, and democratic participation. Reigota (2017) argues that environmental education must be inclusive, allowing society to participate in the search for solutions and alternatives that allow the proper use of the common good.

Although still few, some programs now prioritize the teaching of biodiversity, and seek to integrate research with environmental education and economy, through sustainable development. The Biota-Fapesp program and the PAIE-IEB are examples of initiatives in this field of knowledge in Brazil (Bizerra et al., 2022). These programs share the objective of reaching different social actors through communication actions, with the production of materials for use by teachers and students. Similarly, Citizen Science, coordinated by Cornell University, United States, was created to develop projects related to biodiversity (Kelemen-Finan et al., 2018). In Switzerland, Audrin (2022) stresses the importance of content on biodiversity in school programs, promoting a scientific and interdisciplinary approach to the subject.

A pedagogical or didactic game is one that provides learning, unlike pedagogical material, as it contains a playful aspect (Cunha, 1988; Rocha and Rodrigues, 2018). It can also be used to achieve pedagogical goals. Games represent an alternative method for improving student performance in content that is difficult to learn (Gomes, 2003). Being well-conducted and presented from a playful perspective, it is an excellent alternative for the transmission of information (Kishimoto, 2017).

PAIE serves an average of 200 children per month, from public and private schools in Greater Florianópolis. The Greater Florianópolis area encompasses 22 municipalities and has a population of 1,189,947 (IBGE, 2022). This project began in 2010, meeting a demand for visits from schools in the region. When the Otter Project opened the Research Base to the external public, it also began offering services to schools. It was already perceived at that time that the otter had great potential as a flagship species for raising awareness of contemporary environmental problems. Since then, through PAIE, more than 4,000 calls have been received. With this, the IEB decided to align its policy with the Sustainable Development Goals.

Since 2012, the IEB has been a signatory to the National Movement for SDGs We Can Santa Catarina, committing to the Sustainable Development Goals. The IEB Program was a finalist for the ODS Brasil Award in 2018. PAIE develops strategies for social mobilization and environmental education in order to protect the otter, which is a flagship species. One of the Programs strategies, conservation tourism, associates economic and socio-environmental gains with the protection of biodiversity. The improvement of quality of life is also associated with the protection of biodiversity. These strategies are based on information produced by research conducted by the IEB. This approach enables the knowledge produced to be used to collaborate with the modification of adverse realities, with the active involvement of researchers and institutional technical support, in line with the 2030 Agenda.

The 2030 Agenda is a World Action Plan that is part of an international agreement signed in September 2015 by 193 countries at the General Assembly of the United Nations (UN). On the occasion, the Brazilian Government committed itself to adopting a sustainable development model with goals to be achieved in 15 years. The 2030 Agenda contains a set of 17 Sustainable Development Goals, 169 targets and 230 indicators.

PAIE contributes to #ODS4, #ODS6, #ODS8, #ODS11, #ODS12, #ODS13, #ODS14, #ODS15, and #ODS17, providing an educommunicative space for teaching, research and extension institutions, use of educational trails as common spaces for living in nature and carrying out training and qualification courses. With this, it promotes the recovery and conservation of the neotropical otter and other species of biodiversity, using the otter as a flagship species through campaigns on social media. In this way, it expands knowledge about the otter with different lines of action and thematic areas focused on social mobilization and educommunication.

## **II. Methodology**

PAIE's contribution to research and practice in environmental education was based on communication indicators and school visits in the 2018/2019 biennium. The neotropical otter was used as a flagship species. PAIE is structured in the form of campaigns and actions, each of which is tied to a transversal theme. This theme is incorporated into the research projects, which are based on the application of a participatory pedagogy.

The projects that make up the Program are thematic, and the campaigns are developed according to the problem and the common collective causes. Teachers from visiting schools are also able to propose a theme for the visit, according to the program developed at the school. Visits are documented in spreadsheets, and the data is supported by school letters, guestbook signatures, and photos. The data obtained from social media and communication channels are organized in digital spreadsheets. Similarly, the clipping of communication materials shown in the media is organized by type of media, city, state, type of disclosure, and date. The media valuation is calculated for each type of media, by a company hired especially for this purpose.

Communication is integrated to all actions and research carried out by PAIE and Otter Project, focusing on otter conservation, biodiversity, and aquatic ecosystems, treated as common goods and important economic assets for society. Children aged 0 to 6 were the priority targets, but schools and universities were also considered. This audience comes from Early Childhood Education Centers (NEI) in Florianópolis and surrounding municipalities, schools and universities in the municipality of Florianópolis, and other states in Brazil. The universities of the United States and France, which are partners of the IEB, send students to gain experience and develop projects, masters, and doctoral degrees. Partners for volunteering and responsible tourism, both in Brazil and abroad, are also responsible for sending students searching for experience in research projects and fieldwork. For this audience, the IEB has the Ecovolunteer Program, which also helps with reception of visitors and schools, with children who come through PAIE.

The actions developed allow the child to have direct contact with the environment, involving both, affectivity and emotion, as basic elements. Although Brazil's 1988 Constitution guarantees early childhood education as an obligation for municipalities, additional training is needed in the teacher training process, as well as appropriate structures in schools (Pizato et al., 2014). PAIE seeks to collaborate in order to create a playful, educational, informative, and safe space suitable for the development of activities that stimulate the creative and imaginative side of children.

The PAIE aims to align with the National Curriculum Parameters (PCNs) included in the National Common Curricular Base (BNCC) for teaching in Brazil. The physics content, for example, is related to biology, art education, ecology, economics, and environmental education. Recreational activities are conducted

to facilitate the children integration into the natural world of the otter. Data and research information from Projeto Lontra is passed on to children and teachers in an appropriate and accessible language, according to age group. Data on how the otter lives, type of food, and care for the cubs are passed on with the care people must have with the environment. The availability of adult otters and cubs for visitation is important in order to create empathy between children, teachers, and the animal.

Many of the children interact with the species by observing the animal and its movements, which are then explored with the children in an open-air conversation circle or at the visitation center. Using this empathy, efforts are made to conserve the species as a symbol of care for marine and freshwater aquatic systems. The goal is for the child to have an immersive experience in this world of the otter, showing them other views that we should have with the environment. When the visit is over, the child takes this information to their socialization space, at school, in the family, and with friends. Another action is the Otter Caravan, when services are provided within schools. A team from Projeto Lontra travels to the teaching units and carries out ecological activities and competitions there.

Through puppet theater, interactive games, the distribution of teaching material, and numerous games, environmental education activities are carried out, working on children's affective memory. This is mainly done with children up to 6 years old, who are in a period of development that requires special attention, work, and protection. It is well established that a children level of learning is even higher when they are accompanied by an early childhood assistance program. A safe, welcoming, and stimulating environment can contribute to learning and development. This is important, especially for the PAIE program, since the Animal Refuge and the Visitation and Environmental Education Center represent critical aspects. Environment stimuli and interactions with otters have a decisive impact on children's brain formation, especially when encountered in the first 10 years of life.

All groups are welcome to explore the lake and the Animal Refuge trail, where you can expect to see otters, tayra, and lesser grison. These are all members of the Mustelidae family. On the trail, silence is worked during the observation of the animals. It is a moment of many stops and few speeches, stimulating the observation of the species present without intervening in the animals' routine. Students are encouraged to think of characters who need silence during fieldwork, such as researchers and photographers. This helps children realize the importance of silence and respect for animals when in the natural environment (Figure 3).



Figure 3. From left to right, visiting schoolteacher with students on the edge of Lagoa do Peri. Child interacting with an orphaned baby otter rescued from the wild. School on the educational trail with an environmental educator from PAIE.

For early childhood education groups, animation techniques are used, especially those used in the construction of the character Mané Otter (Bacci, 2013). The purpose of this character is to capture children's and adults' attention and unite fun and learning in a single space (Figure 4).



Figure 4. Mané Otter with PAIE environmental educators, in real size and in the puppet theater.

PAIE represents an educational and training process, a pedagogical tool that combines theory with practice. The animation theater, with Mané Otter, transforms the information transmitted in the lectures into a theater, changing the dynamics of the visit and keeping visitors' attention, especially children. The Mané character has the mané island accent. The mané is the person who was born on the Island of Santa Catarina and has a fast speech with many peculiar and typical words from the place. This accent has a funny relationship with the information, using the local culture itself to bring the child closer to educational activities.

PAIE's animated theater uses techniques such as triangulation, which is the dramaturgical space between three points. The actor-manipulator must direct the audience's gaze to what he wants them to pay attention to in order to retain attention. In the case of the Mané Otter character, the actor must always look at the character and never directly at the audience because the actor's gaze will take the attention of the puppet's gaze. In puppet theater, the object temporarily takes over the physical resources of the puppeteer. Beyond the object, the puppeteer's voice and mobility are present. Mané Otter has its own personality due to this. When it enters the scene, the figure of the handler is practically eliminated and invisible.

Lectures on the otter are prepared and offered to an audience over 8 years of age. The slides are organized to be interactive, and on each slide, the student is asked about the characteristics of the otter. This helps fix the content. The lecture describes the physiology, diet, habits, challenges faced in the natural environment, and reproduction of the neotropical otter. The subject can be guided towards the contents worked in the classroom of the visiting school, depending on the class and the interest of the teacher. In some schools that have participated in the project several times, it is the case that the teacher arrives with the class already prepared, using only the available space, with minimal participation from the work team. For ages 10 and up, various games were designed, such as the otter board (Figure 5). Games are used as a didactic tool to aid in fixing the content covered during school visits.



Figure 5. Otter game, created especially for audiences over 10 years old.

Another tool used is video, generally for university students, youth groups, and adults. It serves as an educational tool with the specific objective of helping the technical team during lectures, but they are also available on YouTube and Vimeo. The videos give information about the research carried out with the otter by the IEB/Otter Project, about the PAIE, the Ecovolunteer Program, scientific expeditions, social mobilization actions and environmental education. An example of used video can be seen at the link: <https://vimeo.com/user90943301>.

Theatre games are used to start or end the sessions. These are planned at different times of the visit for different age groups. The goal is to enhance focus, memory, spontaneity, and cooperation through cognitive stimulation. For example, the energy transfer game is used to reduce students' anxiety and excitement, preparing them for the otter trail, which requires silence so as not to stress the animals. This game exercises breathing techniques and attentive listening.

Schools interested in the service are asked to schedule an appointment and indicate at least one teacher who will participate and accompany the students. Activities can be changed to fit the needs of the group. Children with special needs are encouraged to take part. Following the visit, the institution receives materials to help facilitate future field activities at the school. The school has also internet access to drawings, distribution of teaching material, videos, laboratory analysis, and publications on the area of study. Later, several of these works are sent to PAIE and serve as indicators and feedback for adjustments. From there, the final production of texts and teaching materials for primary and secondary education is done in the form of educational booklets, such as the booklet "A Viagem da Lontra Tupi" (Figure 6). This horizontal and transversal integration aims to deepen content and research, as well as serve as an aid to participating schools and teachers.



Figure 6. Printed booklet and ebook distributed to schools as auxiliary teaching material.

Other materials produced for distribution or sale include stickers, folders, ecological backpacks, plush otters, sketchbooks, ecobags, and t-shirts. The products serve as a complement to environmental education actions to reinforce learning and empathy towards the otter. When the production cost of the product is very high, a smaller quantity is distributed through raffles.

### III. Results

From 2018 to 2019, PAIE directly served 4,599 participants. The number of public schools has increased significantly, from 37 in 2018 to 60 in 2019. Similarly, the number of private schools increased from 32 in 2018 to 45 in 2019. For public schools, visitation peaked in the months of September and October, while for private schools, it peaked in the month of June. The number of students mirrored the evolution of the number of public schools, starting at 865 in 2018 and rising to 1374 in 2019, with a peak in September and October 2019. Figure 7 shows the distribution of the number of students and teachers over the months, for public and private schools. The number of students tends to follow the number of teachers (Figure 8).

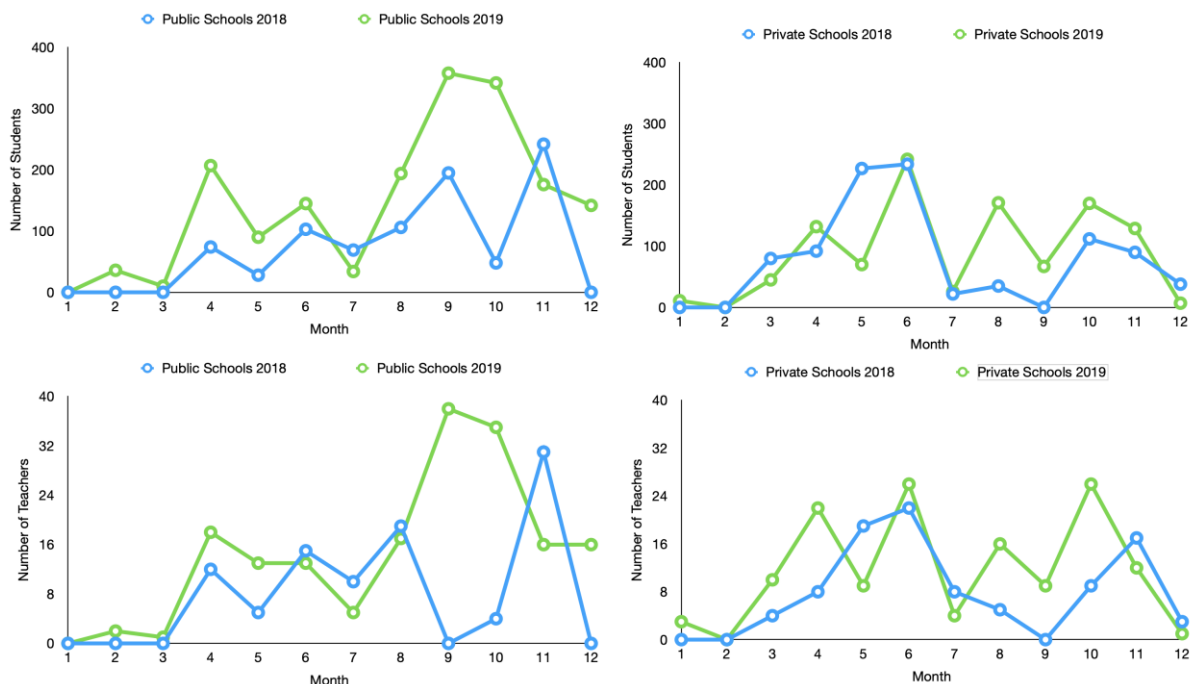


Figure 7. Distribution over the months of the number of students and teachers, from public and private schools, for 2018 and 2019. Blue line for 2018 and green for 2019.

In 2019, there is a clear majority of students from public schools (62%) compared to private schools (38%). This may be because there are usually more students in public school classrooms than there are in private school classrooms. For 2018, the number of teachers in public and private schools is identical (50%), while for 2019, the number of teachers in public schools reflects the increase in the number of students (56%). These results illustrate the importance of the Project for public education, which normally faces more difficulties with more crowded rooms, and serves a public with lower purchasing power.

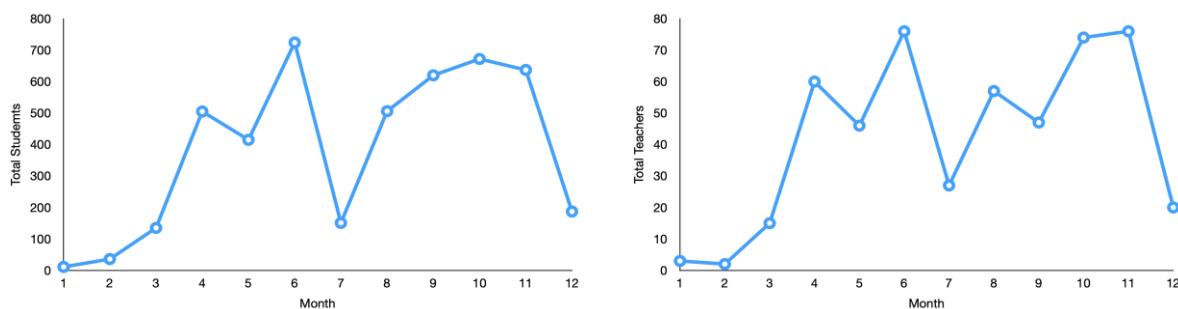


Figure 8. The distribution of visits by students and teachers over the months of 2018 and 2019 is provided above. In the 2018-2019 biennium, 174 schools visited the Project.

The PAIE assisted 1,419 children from 0 to 6 years old, 2,117 from 7 to 14 years old, 577 from 15 to 17 years old, and 545 over 18 years old. All schools were from both public and private schools (Figure 9). It is worth noting that 1,419 children up to 6 years of age were attended exclusively by educommunication actions. Children at this age are considered a priority by the Project, since they are the protagonists of change and social transformation.



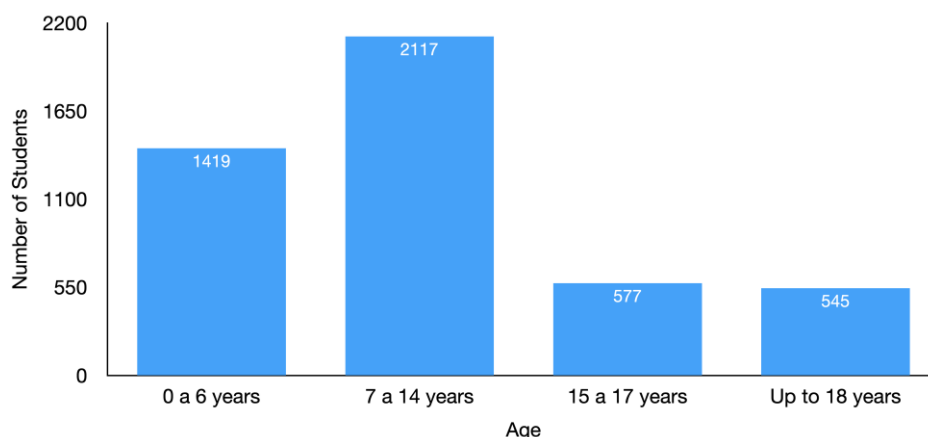


Figure 9. Attendance of students by age group in PAIE.

In 2019, there were 138 private school teachers, compared to 95 in 2018. In total, 174 schools participated, 97 of which were public schools and 77 private schools. The months with the highest number of visiting schools were April, May, June, August, September, October, and November. This results from the fact that these are the months that coincide with the school calendar. January, February, March and December were the months with the lowest number of visiting schools, reflecting the academic school recess. Figure 10 provides comparative data on visits to public and private schools. As is evident, the proportion between public and private schools is practically the same, with a slight predominance of public schools.

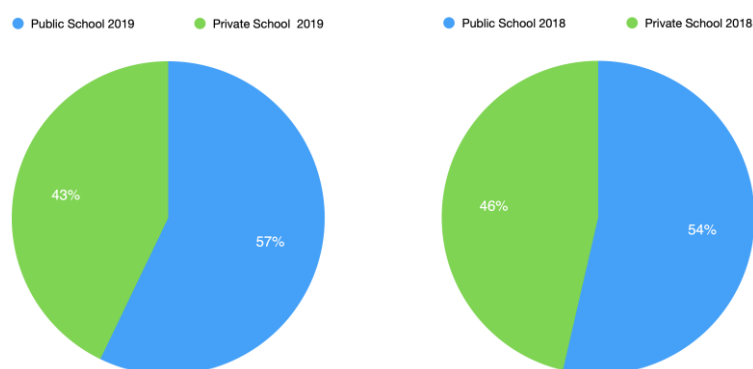


Figure 10. In 2018 and 2019, visits from private (green) and public (blue) schools.

Communication campaigns were launched to enhance and disseminate environmental education actions. The campaigns were developed on social networks and in the conventional media, always aiming at the transmission of information and the promotion of social mobilization around a common cause. The common cause was the neotropical otter and the focus was the 2030 Agenda and the SDGs. There were 22 environmental education events held on an itinerant basis with 5,900 people in attendance.

Between 2018 and 2019, 369 publications were made on Facebook, 390 on Instagram, and 6 videos were published on YouTube. The Facebook page achieved an engagement of 1,200 likes. There was an increase of over 8,000 people on Instagram. In the professional media, there were 134 publications that exposed the program in several Brazilian states, totaling R\$ 3,106,659.96 in media value. Three environmental education booklets were edited (Figure 11).



Figure 11. Educational booklets distributed by PAIE to schools. From left to right: The journey of the Otter Tupi, I'm from the family too, and the Ecovolunteer Program - Good Practices for Conservation Tourism.

Three games called otter boards were made, each size 4 meters x 8 meters and made of canvas, with a cloth die and cards with information about the otter (Figure 12).



Figure 12. Otter games used as environmental education tools for children over 10 years old.

Five hundred plush otters were also produced for distribution and raffle among students, 500 printed sketchbooks, 1,000 engraving booklets, 1,000 ecological backpacks, 5,700 ecological ecobags, 2,613 promotional t-shirts, 18 informative banners, 37 educational boards for the otter trail, 6,000 educational folders, 3,000 posters, 250 garbage bags for the car, 1,000 books about the otter, 1,000 ecological bags, and 2,000 printed booklets.

#### IV. Discussion

The press texts directed to social media, blogs, newspapers, websites, radio and television were important for the dissemination of PAIE. In 2019, there were 134 spontaneous media exposures on the main professional media (TV, journals, blogs) in Brazil. Facebook was used most to disseminate scientific works and texts on PAIE's actions, as it allows for photos, videos, and longer texts. From 2018 to 2019 there was an increase of 1,200 followers, reaching a total of 18,151 likes.

Instagram was the primary means of publication, as it is the most popular media among young people. There was an increase of more than 8 thousand persons in two years. Besides YouTube, Instagram, and Facebook, Twitter and LinkedIn were also used. These regular publications were instrumental in publicizing and attracting schools.

The distribution of the number of students and teachers over the months mirrored the distribution of the number of schools. One of the contributing factors to the higher number of teachers in 2019 was the exemption from payment when accompanying students. Teachers at public schools were exempt from payment due to the low and incompatible salaries they received. They are multipliers of the acquired knowledge, enabling partnerships and the development of joint projects between the school and PAIE. Many teachers took advantage

of the support and freedom of use of the space to use the visits as an extension of the classroom at school, taking the opportunity to develop activities and work on concepts with the help of the PAIE technical team.

PAIE's public policy actions were carried out in forums such as the GTEA (Technical Environmental Education Group) and COMDEMA (Municipal Council for the Environment). At COMDEMA, PAIE actively participated in the revision of the Environmental Education Law of the Municipality of Florianópolis.

The environmental education strategy consists of stages, following the methodology of Toro and Werneck (1996). The final stage of the mobilization process is when there is the empowerment of the common civil society organized in the Projects actions. This happens when society is already sensitized to the cause. When that happens, the Project becomes a common cause for all. Since 2010, the number of 4,000 children up to 6 years of age assisted through PAIE is an indicator of this empowerment. Likewise, the fact that teachers use the space on their own initiative to teach classes represents another positive sign for the PAIE.

At the Visitation Center, children have the unique opportunity to interact with the species, watching the animal and helping to feed it. Through this process, the most relevant information about the species is passed on, discussing the necessary care for the conservation of biodiversity and the otter. This information is then used by the student in their socialization space at school and in the family. For this purpose, puppet theater, interactive games, and the distribution of teaching material are used, primarily targeting the children affective memory. This is particularly important in early childhood, which is a period of development that requires special attention, work, and protection. The presence of a safe and welcoming environment, such as that provided by PAIE, contributes to the infant's development.

Children achieve higher levels of learning when accompanied by an early childhood assistance program (Hussar et al., 2020). During this phase, environmental stimuli and interactions have a decisive impact on brain formation. Children who are well stimulated in the first years of life tend to perform better in school. Early childhood marks this formation of individuals, with conscience and citizenship.

PAIE had a great advantage, as it came up with a structure that was already ready for use, the Animal Refuge, the Visitation Center, the Otter Project as a generator of information, and the Ekko Brasil Institute as a support institution. Particularly, the Animal Refuge, where otters can be seen. This set is responsible for creating a positive landscape for research and school visits. It is important to emphasize that the observation of the impact caused by adult and orphan otters on the feelings and behaviors of children, teachers, volunteers, researchers, and visitors, was vital in adjusting the educommunication actions and the PAIE itself.

## **V. Conclusion**

In this case, the main objective of the traditional view of science would be to study everything about children, teaching and learning, based on various academic theories and concepts, freezing reality and working the phenomenon in a statistical way. Although this approach is valid, it represents an attempt to clarify what is happening in an increasingly detailed way without being able to change it if necessary. To avoid this problem, it was decided to read the children themselves. The first question asked was whether the children from the visiting schools were what was being observed, or were they a reading made from us?

It was not uncommon for us to receive a visit from parents with their son or daughter, after the child had visited the project with their school. She or he would return to introduce the otters to her or his parents. When this occurred, the child was asked to act as a guide for the parents. The entire process is monitored by a PAIE technician and then described in a report called lesson learned. This lesson learned is presented later to the PAIE team for discussion.

It became clear that PAIE's actions trigger internal energies in people, defining a resulting action. The conclusion was not to take action based on theoretical frameworks of reasoning. For example, how will competition, emphasized in school and society, operate with the harmony and collaboration discussed in the PAIE? Or with the climate issue? With otter conservation? Therefore, the main objective of PAIE's educational communication and environmental education actions is to provoke a critical thinking in children, coming from the inside out and not the other way around. Providing a natural and healthy environment was considered the most important thing in order to allow people to express themselves freely.

The mental landscape, which was strategically formed by PAIE, encourages people to think critically. This leads to the evaluation of the children's actions during the visit. This evaluation brings out an energy that is harmonized with the created mental landscape, resulting in a sincere and true action by the child. In PAIE, thought is not imposed as a dogma or concept. The child is encouraged to create their own concept, to express themselves in a critical and collaborative way.

The imposition or repression by concepts must be avoided. Any form of imposition will not have the desired effect, which is to encourage the children conscious participation in his surroundings. For the child's mind to be receptive to learning, it must be attuned to the teaching landscape. When the child's mind is attuned to the teaching landscape, their thoughts will flow towards that mental landscape and be able to have a greater impact on adverse realities such as loss of biodiversity, climate change, water pollution, and loss of habitat.

Most of the work in the society, developed with children, students, and teachers, indicates that there is a dissociation between the mental landscape and the individual. For example, global warming and environmental degradation are not something associated with the person. As if she or he had nothing to do with it. This landscape is called resident because it is not observed with what it is acting on. Thus, the mental landscape of environmental problems is not contested. Only the object is handled. For example the climate and the increase in emissions of harmful gases into the atmosphere. The fact that the object is part of the landscape and its consequence is not observed.

When children are welcomed at PAIE, they need to be seen from the physical and mental landscape and not as a reading from the environmental education team. When the child is encouraged to stop, look around, and notice the trees, the otters, and the classmate next to him, he incorporates these objects into his own landscape, creating a different energy. This energy can be directed towards what we want or think needs to change. It is important to preserve the otter because the otter is part of our daily lives. It has social and economic importance in tourism, plays ecological roles that reflect on people's quality of life and the economy. This awareness can create an action, like that of the child, who, after visiting the Project with the school, returns with his/her parents.

The broader view is important in the process of changing adverse realities. The child and the teacher, when contemplating external objects, end up internalizing them, and making them inseparable from themselves. Therefore, according to the landscape in which people's minds are operating, the resulting energy can be used to direct consciousness and thus effectively mobilize socially around a common cause. Thus, education means becoming aware.

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