



Universidade de Aveiro
Ano 2020

Maria João Salgado da Silva Santos **O papel dos zoológicos na Cidadania e Educação Ambiental: Educar para Conservar.**

The role of zoos in Citizenship and Environmental Education: Educate to conserve.



Universidade de Aveiro
Ano 2020

Maria João Salgado da Silva Santos **O papel dos zoológicos na Cidadania e Educação Ambiental: Educar para Conservar.**

The role of zoos in Citizenship and Environmental Education. Educate to conserve.

Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Ecologia Aplicada, realizada sob a orientação científica do Doutor Ulisses M. M. Azeiteiro, Professor Associado com Agregação, e Doutor Mário J. V. Pereira, Professor Auxiliar, do Departamento de Biologia da Universidade de Aveiro

“No one will protect what they don't care about; and no one will care about what they have never experienced” by Sir David Attenborough

"If we can teach people about wildlife, they will be touched. Share my wildlife with me. Because humans want to save things that they love"
by Steve Irwin

o júri

presidente

Prof. Doutora Maria Helena Abreu Silva
Professora Auxiliar, Universidade de Aveiro

vogais

Doutor Victor José Bandeira
Técnico Superior, Universidade de Aveiro

Prof. Doutor Ulisses Manuel de Miranda Azeiteiro
Professor Associado c/ Agregação, Universidade de Aveiro

agradecimentos

No decorrer da presente dissertação contei com o apoio de muitas pessoas e instituições, às quais estou profundamente agradecida. Assim, expresso a minha gratidão a todos que permitiram que esta dissertação fosse possível:

- Aos Professores Ulisses Azeiteiro e Mário Verde, pela orientação, disponibilidade, paciência e incentivo, mesmo durante o momento de incerteza devido à Pandemia COVID-19;
- À doutora Mónica Correia pela orientação, ajuda, encorajamento e por tudo o que me ensinou, durante a minha passagem no Zoo da Maia. Agradeço também aos colaboradores do Zoo da Maia por me permitirem acompanhá-los e aprender mais sobre os animais que tratam;
- A todos os Zoológicos e Parques nacionais e internacionais que participaram neste estudo, e permitiram a realização desta dissertação;
- A todos os Professores e Instituições que fizeram parte do meu percurso académico, por todos os ensinamentos e rumo;
- À minha família que sempre me amparam de tantas formas, para que eu conseguisse alcançar os meus objetivos, mantendo a minha saúde mental;
- À minha prima Ana Pacheco por todo o ânimo, por me deixar desabafar nos piores momentos e por tratar de mim;
- À Mariana Mendes, Sara Silva e Sérgio Correia por me acompanharem sempre durante o meu percurso e por me darem a sua amizade, força para não desistir e muitas memórias;
- À Carlota Pita e Rita Ângelo por todo o apoio e companheirismo durante o mestrado;
- À Francisca Saavedra pelo incentivo, auxílio e companheirismo ao longo desta dissertação;
- À Luísa Carneiro, Cláudia Maia, Cláudia Costa, Joana Azevedo e Tiago Neto pela amizade, carinho, apoio e tantos momentos para recordar;
- À Joana Maia por me ter auxiliado na fase final da tese com a revisão ortográfica;
- À Sara Carvalho pela ajuda com a tradução do questionário.

O meu sincero OBRIGADA!

palavras-chave

Actividades educativas, Conservação, Educação Ambiental, Equipamentos de Educação Ambiental, Impacto educativo, Parques Zoológico

resumo

A educação ambiental permite a criação de cidadãos conscientes e preparados para desafios ambientais atuais, nomeadamente a perda de biodiversidade. Os zoológicos são equipamentos de educação ambiental, que utilizam atividades educativas, de forma a informar o público sobre a biodiversidade e os desafios para a sua conservação. Estas atividades podem ser desenvolvidas, potenciando o impacto educacional destes equipamentos de educação ambiental. A presente dissertação teve como objetivo verificar o panorama das atividades educativas disponibilizadas por zoológicos em Portugal e na Europa. O estudo realizou-se utilizando um questionário enviado para os zoológicos, sendo que este tinha questões relacionadas com a caracterização do zoológico e as atividades educativas propriamente ditas. Posteriormente, realizou-se a análise dos dados, recolhidos de respostas em 38 zoológicos em 16 países, através de estatística descritiva. Os resultados indicaram que todos os zoológicos que participaram no estudo realizam atividades educativas. Assim, verificou-se que os zoológicos dão ênfase a painéis informativos sobre espécies, apresentações educacionais, visitas livres e/ou guiadas, contacto direto e a utilização das redes sociais. Em suma, os resultados desta dissertação realçaram o papel dos zoológicos como elo de ligação entre humanos e animais, e consequentemente como educadores para o ambiente e a conservação.

keywords

Conservation, Educational Activities, Environmental Educational, Environmental Educational Equipments, Educational impact, Zoological Park

abstract

Environmental education allows the creation of citizens who are aware and prepared for current environmental challenges, namely the loss of biodiversity. Zoos are environmental education equipments that use educational activities in order to inform the public about biodiversity and the challenges for its conservation. These activities can be developed, enhancing the educational impact of these environmental education equipments. The present dissertation has the aim of verifying the scale of the educational activities made available by zoos in Portugal and in Europe. The study was carried out using a questionnaire sent to the zoos, which had questions related to the characterization of the zoo and the educational activities themselves. Subsequently, data analysis was performed, collecting responses from 38 zoos across 16 countries, through descriptive statistics. The results indicated that all zoos that participated in the study carry out educational activities. Additionally, it was found that zoos emphasize information panels, educational presentations, free and/or guided visits, direct contact and the use of social media. In short, the results of this dissertation highlight the role of zoos as a link between humans and animals, and consequently as educators for the environment and conservation.

Index

LIST OF ABBREVIATIONS	I
LIST OF FIGURES	III
LIST OF TABLES	IV
1. INTRODUCTION	1
2. CHAPTER I - THEORETICAL REFERENTIAL	3
2.1. ENVIRONMENTAL EDUCATION	3
2.1.1. <i>Concept and objectives</i>	3
2.1.2. <i>Models and Environmental Education Equipment</i>	5
2.1.3. <i>Historic Marks</i>	8
2.2. LEARNING ACTIVITIES	10
2.3. ZOOLOGICAL PARKS	12
2.3.1. <i>Concept and History of Zoos</i>	12
2.3.2. <i>The Zoo Mission</i>	19
3. CHAPTER II - THE EDUCATION IN ZOOS	23
3.1. THE EDUCATIONAL ROLE	23
3.2. ZOOS AS ENVIRONMENTAL EDUCATION EQUIPMENT - LITERATURE REVIEW	25
4. METHODOLOGY	30
5. RESULTS	34
6. DISCUSSION	40
7. CONCLUSION	46
8. REFERENCES	47
9. ANNEX	58
9.1. ANNEX 1 – QUESTIONNAIRE IN ENGLISH	58
9.2. ANNEX 2 – QUESTIONNAIRE IN SPANISH	62
9.3. ANNEX 3 – QUESTIONNAIRE IN PORTUGUESE	67

List of Abbreviations

AUT - Austria

AVIs - Animal-Visitor Interactions

BEL - Belgium

BUL - Bulgaria

CZE - Czechia

DEN - Denmark

EAZA – European Association of Zoos and Aquaria

EE - Environmental Education

EEEq - Environmental Education Equipment

EEP - European Endangered Species Programme

ESP - Spain

EST - Estonia

EU - European Union

FIN - Finland

FRA - France

FTs - Field Trips

GER - Germany

GRE - Greece

HRV - Croatia

HUN - Hungary

ITA - Italy

IUCN - International Union for Conservation of Nature

LAs - Learning Activities

LAT - Latvia

LIT - Lithuania

LUX - Luxembourg

NLD - Netherlands

NOR - Norway

OSDs - Objectives for Sustainable Development

POL - Poland

POR - Portugal

ROU - Romania

RSPCA - Royal Society for the Prevention of Cruelty to Animals
RUS - Russia
SDG - Sustainable Development Goals
SRB - Serbia
SUI - Switzerland
SVL - Slovakia
SVN - Slovenia
SWE - Sweden
TUR - Turkey
UK - United Kingdom
UN - United Nations
UNDESD - United Nations Decade of Education for Sustainable Development
UNEP - United Nations Environment Programme
UNESCO - United Nations Educational, Scientific and Cultural Organization
USA - United States of America
WAZA - World Association of Zoos and Aquariums
ZSL - Zoological Society of London

List of Figures

FIGURE 1 - PERSPECTIVES OF ENVIRONMENTAL EDUCATION EQUIPMENT. SOURCE: SERANTES (2005)	6
FIGURE 2 - NUMBER OF QUESTIONNAIRES ANSWERED BY COUNTRY	34
FIGURE 3 - ORIGIN OF MAJORITY OF ZOO REVENUE	35
FIGURE 4 - TYPES OF EDUCATIONAL ACTIVITIES	36
FIGURE 5 - TYPES OF EDUCATIONAL PRESENTATIONS.....	36
FIGURE 6 - TYPES OF DIRECT CONTACT ACTIVITIES	37
FIGURE 7 - TYPES OF PRIORITIES DURING DIRECT CONTACT ACTIVITIES	37
FIGURE 8 - SOCIAL MEDIA AS AN INSTRUMENT OF COMMUNICATION AND EDUCATION	39

List of Tables

TABLE 1 - EXPLANATION OF THE OBJECTIVES OF THE EE. SOURCE: UNESCO-UNEP, 1975	4
TABLE 2 - NUMBER OF ZOOS CONTACTED BY COUNTRY AND GROUP	31

1. Introduction

Environmental education (EE) is a fundamental aspect in the creation of citizens that are aware and prepared for the environmental challenges of the present and the future (Amaral et al., 2018; IUCN; & UNESCO, 1970; UNESCO-UNEP, 1987). This subject is addressed in several international conferences throughout the 20th and 21st century and in publications such as Aldo Leopold's "A Sand County Almanac" in 1949 and Rachel Carson's famous "Silent Spring" in 1962 which has sparked an interest in society about its connection to the environment and the environmental challenges of the future (Costa, 2019; Teixeira, 2012). The EE can be transmitted through Environmental Education Equipments (EEEq), that are non-formal initiatives (Serantes, 2006) dedicated to changing attitudes and behaviours related to the environment, being zoological parks (or zoos) one of these Equipments. Zoos have education as one of their main roles, and Learning Activities (LA) are one of the ways zoos inform the public about the biology of their animals, the challenges of their conservation and other subjects (EAZA, 2013). Thus, zoos have EE as one of their objectives, in order to transform behaviours to improve biodiversity conservation (WAZA, 2015a).

However, the educational role of zoos has been criticized in recent years due to the lack of demonstration of their impact (Jensen, 2014). The demonstration of the impact of LA can be done through a study that evaluates the effectiveness of study visits or other activities and consequently allows the zoo to improve them and their role as an EEEq.

This dissertation aims to verify the scale of the LA in zoos in Portugal and in Europe and analyses some aspects about this, since there is no general record of the LAs that zoos make available to their visitors. The data used to analyse this scale was collected by applying questionnaires related to the zoo characteristics and the EE provided, to zoos in Portugal and Europe.

The present dissertation is structured in Introduction, Chapter I, Chapter II, Methodology, Results, Discussion and Conclusion, noting that Chapters I and II are divided into sub-chapters. In short, this dissertation aims to compile information

focused on Environmental Education, Learning Activities and Zoos, and to verify the panorama of the LAs provided by zoos to their visitors.

2. Chapter I - Theoretical Referential

The Dissertation here focuses on Environmental Education, zoos as EEEq and Learning Activities in zoos, therefore a description of each of these topics is deemed essential. Thus, in this chapter, the focus of study will be the concepts, objectives, history, and other subjects related to the central themes of this thesis to better understand it.

2.1. Environmental Education

2.1.1. Concept and objectives

The concept of EE has evolved throughout history, being first used at a conference in Paris in 1948, promoted by the IUCN (Teixeira, 2012). However, it was in 1970 in a IUCN meeting in Nevada, USA, that the concept was formally defined and accepted (Teixeira, 2012), as the following:

“Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulating of a code of behaviour about issues concerning environmental quality.” (IUCN, 1970, p. 11)

The concept of EE arises in an attempt to respond to the need of educating the public for environmental degradation that is associated with technological and scientific evolution and the unsustainable use of environmental resources (Guerra et al., 2008).

Despite the importance of this first description, it is in the International Strategy for Action in the field of Environmental Education and Training for the 1990s of the UNESCO-UNEP that EE gets its formal definition that is still relevant nowadays:

"Environmental education is regarded as a permanent process in which individuals and the community gain awareness of their environment and acquire the knowledge, values, skills, experiences and also the determination

which will enable them to act - individually and collectively - to solve present and future environmental problems." (UNESCO-UNEP, 1987, p. 6)

In addition to the concept of EE, its goals have also evolved over the 20th and 21st century. In 1995, The Belgrade Charter defined six objectives of EE, Awareness, Knowledge, Attitude, Skills, Evaluation ability and Participation (UNESCO-UNEP, 1975), that are detailed in Table1.

Table 1 - Explanation of the Objectives of the EE. Source: UNESCO-UNEP, 1975

Objective	Explanation
Awareness	Individuals and social groups gain awareness and sensitivity to the environment and its associated problems
Knowledge	Individuals and social groups acquire basic understanding of the environment, its associated problems and humanity's critically responsibility and role
Attitude	Individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement
Skills	Individuals and social groups acquire the skills for solving environmental problems
Evaluation ability	Individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetic, and educational factors
Participation	Individuals and social groups develop a sense of responsibility and urgency regarding environmental problems to ensure appropriate action to solve those problems.

In 1977, the Tbilisi Conference also defined that EE has as primary fundamentals to "enable people to understand the complexities of the environment and the need for nations to adapt their activities and pursue their development in ways which are harmonious with the environment" (UNESCO-UNEP, 1977, p. 12) and "help create an awareness of the economic, political and ecological

interdependence of the modern world so as to enhance a spirit of responsibility and solidarity among nations" (UNESCO-UNEP, 1977, p. 12).

Therefore, EE is a fundamental component of citizenship education, integrating more and more life in and out of school (Amaral et al., 2018), because of its principles based in interdisciplinary action, a continuous process, the view of the environment as a whole, the focus of global problems while paying attention to regional situations and the promotion of participation and collaboration in a local, national and international levels (UNESCO-UNEP, 1975). The EE allows the acquisition of competencies and values that create people with a clear view of their role as active and responsible citizens (Amaral et al., 2018).

In short, EE empowers the learning of new knowledge and attitudes, which changes people's mentality about the environment and their behaviours. This change is especially relevant in the 21st century due to the challenges that the world faces, including pollution (especially at ocean level), deforestation, biodiversity loss and the "Climate Emergency" declared in 2019 by several countries, including Portugal.

2.1.2. Models and Environmental Education Equipment

The EE is a continuous process of education, and its application follows educational models, these being the formal, non-formal and informal model. It should be taken into consideration that there are no different types of education, but different application models or practices, which are complementary in most situations (Fernandes et al., 2007). Informal education is defined, by the UNESCO-UIS (2012), as "forms of learning that are intentional or deliberate, but are not institutionalised" (p. 12), in other words, it takes place during social moments (family, friends, school or work colleagues, etc.), which are spontaneous unplanned and without structured knowledge, being influenced by values, culture and other factors such as nationality, gender, age religion, ethnicity, etc. (Gohn, 2006).

On the other hand, non-formal and formal education, despite having different curricular applications, are an organized and intentional process (Fernandes et al., 2007; UNESCO-UIS, 2012). Formal education is characterized as "education that is institutionalised, intentional and planned through public organizations and

recognised private bodies, and – in their totality – constitute the formal education system of a country” (UNESCO-UIS, 2012, p. 11), thus having a defined program for the development of skills and competences (Gohn, 2006). In contrast, non-formal education takes place in the context outside the classroom, particularly in institutions or organizations, by an "educational provider" who may not be the teacher, in a planned, intentional and non-continuous manner, and can be applied to all ages with the aim of transmitting knowledge about the environment and the interactions surrounding the individual (Gohn, 2006; UNESCO-UIS, 2012).

In the present study, the EE is transmitted through a specific environmental education equipment (EEEq), the zoos. The EEEqs are "heterogeneous initiatives of non-formal education" (Serantes, 2006, p. 196) and in addition to zoos, these can be pedagogical farms, aquariums, museums, among others. Furthermore, the EEEqs are characterized by fixed (or adapted furniture) facilities, an educational project, an educational team, material and methodological resources, sustainable and coherent management, a continuous evaluation process and being adapted for its users (Serantes & Barracosa, 2008).

Although the EEEqs follow the same criteria, they may have different perspectives such as: conservationist/institutional; social; educational/didactics; and reference centres (Serantes, 2005), which are characterized in Figure 1, by a description and examples of each perspective.

CONSERVATIONIST INSTITUTIONAL	<ul style="list-style-type: none"> •Support the management and distribution of heritage value •Ex: archaeological parks, museums
SOCIAL	<ul style="list-style-type: none"> •Modernize local resources through the participation of the population and seek to recover traditional values •Ex: Rural development centers
EDUCATIONAL DIDACTICS	<ul style="list-style-type: none"> •Develop fundamental skills, values and knowledge •Ex: Field trips
RECREATIONAL TOJMJJJ333URISM	<ul style="list-style-type: none"> •Offer leisure options, alternative tourism (ecotourism) and active tourism (trails) •Ex: Rural tourism
REFERENCE CENTRES	<ul style="list-style-type: none"> •Offer training for mediators (teachers, technical staff); propagation of good practices; resource development and distribution of technical documentation

Figure 1 - Perspectives of Environmental Education Equipment. Source: Serantes (2005)

The different perspectives, often combined, lead to the EEEqs having an impact on the community where they are inserted. Thus, Serantes (2005) found that the EEEqs have a fundamental role in education at various levels of education; they allow training of education professionals and other technical and political staff; they are stable references for the local community, for various institutions and for international organizations; they are continuous, enabling long-term projects; they have a larger number of participants and collaborators than in any other EE program; they generate and streamline other programs, resources, actions and facilitate the development of investigations at local, autonomous, state or international level.

However, not all EEEqs have the same social impact, and Serantes & Barracosa (2008) identified two types of impact: High impact and Medium or Low impact. The High impact EEEqs (e.g. environmental education centres, educational farms, nature classes), provide more active activities that are usually carried out for longer periods of time (workshops of one or several days), with the goal of offering a better understanding of reality and environmental challenges to the community (Serantes & Barracosa, 2008). Contrarily, Medium or Low impact EEEqs, like museums, botanical gardens and zoos, are characterized by having a shorter duration (a few hours) and by offering the public a less personalized activity of unidirectional communication and with little possibility of public participation (Serantes & Barracosa, 2008).

Despite having a high potential, the EEEqs also face obstacles, such as lack of commitment and political investment, sociological fears and the general training of "educational agents", which mostly addresses technical, instrumental and biophysical information, without giving importance to social and pedagogical aspects (Muñoz, 2002).

In short, the EEEqs are significant in the commitment to change social behaviours and attitudes associated with the environment and present themselves in various ways and perspectives.

2.1.3. Historic Marks

EE has been discussed since the beginning of the 20th century on a global scale, this subchapter highlights the most important historical milestones for this subject and the environmental theme in general.

As mentioned before, the concept of EE was first used at a conference in Paris in 1948 promoted by the IUCN, but was only defined formally in 1970 at an IUCN meeting in Nevada, USA (Teixeira, 2012).

In 1972, the United Nations (UN) Conference on the Human Environment was held in Stockholm, Sweden, being one of the most important milestones of EE, since in the "Declaration of the Environment" this concept is referenced in one of its Principles (Principle 19), declaring the relevance of education for raising awareness of the responsibility of individuals and the community in the protection of nature (Teixeira, 2012).

The United Nations Environment Programme (UNEP) was established in 1971, and in 1975 together with UNESCO organizes the "Colloquium on Environmental Education" in Belgrade, Serbia, which resulted in the "Belgrade Charter", which is a reference in the history of EE (DGE, 2019) and it remains a model for the concept and governing principles of EE today.

In 1977, organized by UNESCO and UNEP, the Conference of Tbilisi was held in Georgia, resulting in the "International Program on Environmental Education" which aims to integrate EE into the life of the population at all levels (UNESCO-UNEP, 1978).

In 1987, promoted by UNESCO and UNEP, the International Conference on Environment Training and Education took place in Moscow, also known as Tbilisi Plus Ten, with the aim of reinvigorating the importance of EE and generating the International Strategy for Action in the field of Environmental Education and Training for the 1990s, which lists a number of principles with guidelines and objectives for improving actions in relation to education and training in environmental matters and its problems (UNESCO-UNEP, 1987).

The United Nations Conference on the Environment and Development, also known as the Rio Summit, Earth Summit or Eco-92, was held in Rio de Janeiro, Brazil in 1992 (Costa, 2019), where two elementary documents for EE were

approved: the Rio Declaration and Agenda XXI (Amaral et al., 2018; DGE, 2019). The Agenda XXI was particularly significant since it is referred to as being fundamental for people to change attitudes, acquire capacities to respond to problems and participate in decision-making on environmental dynamics (UN, 1992).

In 2000, the UN approved the Millennium Declaration which highlights "values, principles and objectives for the international agenda for the 21st century" (UN, 2000a) in order to ensure a "more peaceful, prosperous and just world" (UN, 2000a). In the Millennium Conference, eight Millennium Development Goals are defined, and the environment and its challenges are included in Goal 7 "Ensure Environmental Sustainability" which includes four targets by 2020 covering topics such as sustainable policy, loss of biodiversity and resources and the quality of life of the most disadvantaged people (UN, 2000b). In addition, in the same year, the Earth Charter is released and described as "an ethical foundation for actions to build a more just, sustainable, and peaceful global society in the 21st century. It articulates a mindset of global interdependence and shared responsibility. It offers a vision of hope and a call to action" (Earth Charter, 2000).

The World Summit for Sustainable Development is held in Johannesburg, South Africa, in 2002 and in 2005 it is unveiled the UN Decade of Education for Sustainable Development (UNDESD) (2005-2014), with the main purpose of mobilising educational resources for the creation of a sustainable future (UNESCO, 2019).

The UN Conference on Sustainable Development took place in Rio de Janeiro in 2012, also known as Rio+20, because it happened 20 years after the Rio Summit (Amaral et al., 2018). The Conference aimed to "renew the political commitment to sustainable development by assessing progress and gaps in the implementation of decisions taken by the main summits on the subject and the treatment of new and emerging issues" (Rio+20, 2012) and the final document highlights the importance of education in achieving sustainability at all levels (UN, 2012).

The UN's Agenda 30 for Sustainable Development was adopted in 2015, with 17 Sustainable Development Goals (SDGs) which determined "priorities and aspirations for global sustainable development for 2030 and sought to mobilise global efforts around a set of common objectives and targets" (BCSD Portugal,

2020a). The SDGs cover subjects ranging from economy, society and the environment, and SDG 4 – Quality Education, is directly related to EE (UN, n.d.-a), since its main objective is: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (BCSD Portugal, 2020b). The SDG 4 has specific goals for education, and one of them refers to education for sustainability and consequently EE: "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles (...)" (UN, n.d.-a). On the other hand, there are SDGs related to EE indirectly, such as SDG6 – Clean Water and Sanitation, SDG7 – Affordable and Clean Energy, SDG11 – Sustainable Cities and Communities, SDG12 – Responsible Consumption and Production, SDG13 – Climate Action, SDG14 – Life below Water and SDG15 – Life on Land, since each of these goals require a process of learning skills and changing behaviours that are part of the objectives of EE (UN, n.d.-b).

More recently, the EU implemented the EU Biodiversity Strategy for 2030, stating that "in the post-COVID context, the Biodiversity Strategy aims to build our societies' resilience to future threats such as climate change impacts, forest fires, food insecurity or disease outbreaks, including by protecting wildlife and fighting illegal wildlife trade" (EU, 2020). The Strategy includes a recommendation (in 2021) for an action with the goal of collaboration in EE, sustainability, the teaching of biodiversity and the release of guidelines for educational providers and institutions about these subjects (EC, 2020).

In conclusion, the EE's history led to a shift in the perspective of its role in society both in an informal and formal way, which demonstrates the growing concern with environmental issues and a will to change attitudes and behaviours at the political, educational and civil level.

2.2. Learning Activities

Learning Activities (LAs) or Educational Activities is a "deliberate activity involving some form of communication intended to bring about learning" (UNESCO-UIS, 2012, p. 79), hence they are an integral part in the formation of citizens. The LAs are distinguished from the Non-learning Activities because they are intentional

and consequently there is a goal to the activity and organized since it involves the communication of information. However, some culture, sports or religion activities may not be considered LAs, depending if there is an educational intention (EU, 2016).

LAs are a fundamental part of the education for citizenship, occurring in school where studies show improvement of skills and knowledge in students and teachers (Bakkenes et al., 2010; Lee et al., 2013; Miller, 2007) or in activities outside of school context. Therefore, just like EE these activities can be part of formal (e.g. school programmes), informal (e.g. family events) or non-formal (e.g. programmes on life skills) education (EU, 2016; UNESCO-UIS, 2012). Although these activities might have different perspectives, they all are part of Lifelong Learning since they include “all learning activities undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective” (CEC, 2001, p. 33).

Nowadays, EEEqs offer a variety of LAs, such as interactive activities, signs, presentations, programs, workshops and Field Trips (FTs) in personal or school context (EAZA, 2013; Rees, 2011), being the latter one of the most effective. FTs are successful because they have a didactic component that is linked to the motivation for a greater commitment on the part of students, and a playful component associated with the learning of new knowledge and the creation of a link between theory and practice (Oliveira, 2012). The FTs can be done in enclosed spaces such as a Museum or in an open spaces such as a parks or zoos, and have benefits like gaining, applying and expanding knowledge, promoting contextualized learning and integrative learning of knowledge from various areas, development of values and attitudes of sociability, cooperation, respect and preservation of historical, cultural and natural heritage, improvement of the ability to observe, research and analysis, among others (Oliveira, 2012).

In short, the LAs constitute a teaching strategy that covers more than the acquisition and consolidation of knowledge, since activities such as these allow an education for citizenship, since people develop irreplaceable values and attitudes to the informed, critical, active, ethical and integrated citizen in the community.

2.3. Zoological Parks

Zoological Parks or Zoos play an indispensable role, both in preserving biodiversity and in EE nowadays. Thus, in this chapter there will be presented several subjects and examples related to the history of zoos and their roles and mission. The educational role of zoos is individualized and described in more detail since it is the central subject of this dissertation.

2.3.1. Concept and History of Zoos

The modern and urbanized world in which most of the population lives sometimes creates a gap between people and nature. Hence, zoos serve as a link between human beings and the natural world, allowing a close experience of wildlife, in a safe and engaging way (Mellor et al., 2015). However, this connection is not recent, humans have kept animals since 10,000bc (Courcy et al., 2000), namely as a source of food, company and as a symbol of religion, power or wealth (Rees, 2011). The creation of collections of wild animals only begins in 3000bc, with the appearance of the first urban civilizations (Courcy et al., 2000).

For the purpose of this dissertation and based on several authors such as Loisel (1912), Graetz (1995) and Courcy et al. (2000), the history of animal captivity from collections to modern zoos will be divided into four periods of time: Premodern, Modern, the 20th Century and 21st Century.

The first period, the Premodern, consists of the time interval from the beginning of civilization to the first half of the 18th century. However, due to the long interval of this period, for the purpose of this dissertation, this will be divided into two subparts: Ancient Times, which ends around the 15th century (end of the Middle Ages) and the Age of the Menageries, which begins in the Renaissance and ends in 1750. The Premodern Period is characterized by "collections", that are groups of animals kept in natural spaces (Courcy et al., 2000) and by "menagerie", that is a place where wild animals were exposed in large numbers, in cages, without consideration for their welfare, and were removed directly from the wild (EAZA, 2013), both of which existed all over the world (Graetz, 1995; Loisel, 1912). Ancient civilisations like the Egyptians, the Greek, the Roman and the Chinese, kept wild animals in collection as a form of company, sacred symbol or to display their power and wealth (Courcy

et al., 2000; Rees, 2011). Besides this the animals were also used for entertainment, for instance the slaughters in the Colosseum by the Romans, which were responsible for the extinction of species of large mammals in the empire (Graetz, 1995). The collections had various animals, such as birds (e.g. owls), reptiles (e.g. crocodiles) and mammals (e.g. primates, lions, tigers, hippopotamus, elephants, bears) (Courcy et al., 2000; Rees, 2011). In the Middle Ages, European monarchs created vast collections, since it was common to possess a large number of exotic animals, many of them received as gifts from other monarchs (Rees, 2011). The collections included various mammals (e.g. lions, leopards, camels, elephants, snow leopards and primates) and also birds, particularly falcons (Courcy et al., 2000; Rees, 2011). During the Middle Ages, collections and menageries also thrived outside Europe, notably in Cairo and Constantinople, and in China, where the tradition, started by ancient dynasties, of parks, reserves and gardens remained (Courcy et al., 2000). In Latin America, the Aztec Emperor Montezuma had a vast and magnificent collection that contained llamas, antelopes, snakes, birds, an aquarium and carnivores, but this was destroyed by Hérman Cortes with the conquest of Mexico by Spain between 1517 and 1521 (Rees, 2011). In addition to the Aztecs, the Incas and Mayans also kept impressive collections of animals, at the peak of their civilizations, before the arrival of the Europeans (Courcy et al., 2000). Even though the menageries existed in Ancient Times, it is in the Age of Menageries that it proliferates with Renaissance thought, which led to small royal, monastic or municipal private collections expand in size and number of animals, giving rise to European menageries (Courcy et al., 2000). The spread of these menageries coincided with the time of European expansion, bringing newly discovered animals from America, to be added to collections that already had animals of European, Asian and African origin (Courcy et al., 2000). In Renaissance Italy of the late 15th century the members of rich noble families interested in natural history created collections that resembled true menageries, with all kinds of animals, such as large mammals (e.g. elephants, lions, tigers, etc.), birds and reptiles (Courcy et al., 2000). One of the most famous menageries of this time was the Palace of Versailles, founded by King Louis XIV in 1665 (Rees, 2011). This collection grew over the years until its closure in 1792 (Rees, 2011). In short, until 1750 there were many

civilizations that had collections and menageries, and used the animals in captivity for various ends, being the main one entertainment and display of status, wealth and power, whether of a person or of civilization as a whole.

The Modern period of zoos began in 1751 and ended in the 19th century, and it is in this period when the private and royal menageries became public, due to the cultural change in the public that began to support these institutions through the payment of a quota in societies or government taxes (Courcy et al., 2000). In addition, according to Courcy et al. (2000) it is in this period that menageries start to be called Zoological Gardens, Zoological Parks or Zoos, especially those established during the 18th century. According to the same author, this change in nomenclature happened in some cases only because it was more "fashionable", since institutions with such names were considered to have better facilities. However, in other cases there was a change beyond the nomenclature, and the facilities differed in their quality, staff, programs, and budget. In this period, zoos also begin to highlight education and science, rather than entertainment as their roles in society (Courcy et al., 2000). This period also mark the opening of some of the largest and famous zoos of the world, like The menagerie of Schönbrunn in Austria (also known as The Tiergarten Schönbrunn or Vienna Zoo) that opened to the general public for free in 1779 (Schloss Schönbrunn Kultur- und Betriebsges.m.b.H., 2018), thus becoming the world's first modern zoo (Rees, 2011). In addition to the Tiergarten Schönbrunn, there are other menageries/zoos that marked this period, such as the Jardin des Plantes, considered to be the second oldest zoo in the world, which was founded in 1792 and suffered a lot of changes through time including its location (Rees, 2011). The 19th century is marked by scientific developments in zoos, notably with the foundation of the Zoological Society of London (ZSL) and the London Zoo in Regent's Park in 1826 (Graetz, 1995), although the London Zoo opened only to members of the ZSL at first, and to the general public later on, in 1847 (Rees, 2011). According to Rees (2011), the London Zoo is regarded as the world's first scientific zoo. During the 19th century, other zoos opened throughout Europe, USA and Australia, some of which are highly regarded today, such as the Berlin Zoological Garden (1844, Germany), the Royal Melbourne Zoological Garden (1862, Australia), the Cincinnati Zoo (1875, USA), the Ueno Zoological Gardens

(1882, Japan) and the Bronx Zoo (1899, USA) (Rees, 2011). Although zoos opened all over the world, it is worth mentioning the foundation of the Jardim Zoológico de Lisboa, Portugal, in 1884 with private management, this being the "first park with fauna and flora of the Iberian Peninsula", which was declared as a Public Utility Institution in 1913 (Jardim Zoológico de Lisboa, 2018). The changes in the zoos of the Modern period, whether in the management of animals and facilities, veterinary medicine, education and conservation research, led zoo professionals to further their knowledge and technology and consequently transforming menageries into modern zoos (Courcy et al., 2000). In short, this evolution has allowed zoos to apply science, environmental education, and conservation for the first time in the history of wild animal captivity.

The 20th century marks a new period for the history of zoos, which were greatly influenced by Carl Hegenbeck and the way he modified the animal facilities (Rees, 2011). Carl Hegenbeck was a trainer and animal trader who started a private collection with an innovative perspective: animals were installed in open spaces without bars, simulating natural spaces and using "moats" to separate the public from wild animals (Graetz, 1995; Rees, 2011). In addition, according to Graetz (1995) and Courcy et al. (2000), Carl Hegenbeck also 'revolutionized' the organization of animals in zoos, because the animals began to be organized geographically or ecologically rather than taxonomically and the exhibits began to be multi-species, changing the perspective of zoos around the world and influencing a new generation. However, the evolution of zoos was greatly affected by World War I that put Europe in an economic crisis (Courcy et al., 2000). In addition, World War I and the Russian Revolution led to the extinction of the European Bison in the wild in Białowieża, but this propelled zoos to create one of the most important conservation strategies in Europe: a group of zoological institutions and scientists came together to prevent the species from extinction, allowing the bison's introduction into the wild, where remains today (Courcy et al., 2000). It should be noted that despite the difficulties up to this time, between World War I and World War II some new zoos were created such as the Edinburgh Zoological Garden (1913, UK), the San Diego Zoo (1916, USA) and the Chester zoo (1931, UK), the last two being some of the world's most acclaimed zoos today (Rees, 2011).

Nevertheless, World War II brought new challenges to zoos, particularly a lack of staff, food, material, fuel and budget; the destruction and damage of facilities by bombing scans and the death of several animals (Courcy et al., 2000; Itoh, 2010). All across Europe, zoos had the need to create evacuation plans, close temporarily and even slaughter some animals as a preventive measure in case of escape or due to the lack of food for them (Itoh, 2010). Among the many zoos that endure the war, there were examples like the London Zoo, Rotterdam Zoo, Amsterdam Zoo, Belfast Zoo, Carl Hegenbeck Animal Park, Warsaw Zoo, Rome Zoo and Berlin Zoo, one of the most affected, due to air bombing and direct combat that happened in several dates for a few hours, that led to the visible destruction of one of Europe's oldest zoo, as well as the death of most of its animals (Itoh, 2010). Nevertheless, the European zoos were not the only ones affected, the zoos in Japan and in the USA also suffered the consequences of war, in fact Itoh (2010) compares the case of USA and Europe and stated that "American zoos suffered from deprivation, while European zoos suffered from destruction" (p. 145). Although, according to the same author, American zoos did not suffer physical damage to their facilities, the zoo had to deal with the lack of qualified personnel and lack or restrictions of food for animals. After World War II zoos began to recover, just as what happened after World War I, and with the increase in the number of visitors, it became possible repair the facilities that suffered damage during the war and create new ones, both with more space and improved hygienic conditions (Courcy et al., 2000). Along with the improvement of facilities, the second half of the 20th century led to an increase in scientific knowledge in biology and behaviour, such as the progress in medicine that allowed safer contact with animals by the keepers; the development of genetic profile, which helped in determining genetic viability for breeding programs; the advance in assisted reproduction; new knowledge on behavioural, social and food requirements; a better understanding of animals in the wild and their relationship to the environment (Graetz, 1995). Furthermore, concern about the treatment of animals in general and in zoos grows in this period, as well as attention to environmental and conservation problems (Graetz, 1995). With all the advances during the 20th century, the opening of new zoos around the world was inevitable, like in the USA, England, Wales, Spain, France, Belgium, Portugal, among others.

The opening of new zoos and the need for cooperation between them to combat biodiversity loss has resulted in the creation of long-term breeding programmes in the 1970s and 1980s, resulting in the foundation of the European Endangered Species Program (EEP) in 1985 (Courcy et al., 2000). However, EEPs were not the first international zoo coalition with the aim of improving zoos, fulfilling their roles in society, and achieving conservation challenges. In 1924 the American Association of Zoological Parks and Aquariums (AAZPA) was formed, known today as the Association of Zoos and Aquariums, USA (AZA) (Rees, 2011) and in 1935 the International Union of Directors of Zoological Gardens (IUDZG) was established, which in 2000 changed its name to the World Association of Zoos and Aquariums (WAZA) as it is currently known (WAZA, 2015b). The WAZA is one of the most important and recognized international organizations of zoos and aquariums, becoming a member of the IUCN in 1949, just 14 years after its formation (WAZA, 2015b). In addition to WAZA and AZA, the European Association of Zoos and Aquaria (EAZA) was also established in 1992 (EAZA, 2020), the British and Irish Association of Zoos and Aquariums (BIAZA) in 1966 (formerly known as the Federation of Zoological Gardens of Great Britain and Ireland) (BIAZA, 2020), the Iberian Association of Zoos and Aquariums (AIZA) in 1988 (AIZA, 2020), the Zoo and Aquarium Association (ZAA) (initially known as the Australasian Regional Association of Zoological Parks and Aquaria, ARAZPA) in 1990 and the Pan-African Association of Zoos and Aquaria (PAAZAB) in 1989 (Rees, 2011). The main goal of these institutions was the unity of zoos on an international level, assisting them in sharing knowledge about animal management, education, research, among others, and imposing minimum animal welfare standards on their members (Rees, 2011). Along with international organizations, governments also impose rules and measures on zoos, like the “Council Directive 1999/22/EC of 29 March 1999 relating to the keeping of wild animals in zoos” that regulate the European Union zoos (CEU, 1999). This Directive controls various aspects such as zoo requirements, licensing, closure, sanctions, among other details, and defines zoological parks or zoos, at the European level for the first time in legislative and formal format (CEU, 1999). Therefore zoos are "all permanent establishments where animals of wild species are kept for exhibition to the public for 7 or more days a year, with the exception of

circuses, pet shops and establishments which Member States exempt from the requirements of this Directive on the grounds that they do not exhibit a significant number of animals or species to the public and that the exemption will not jeopardise the objectives of this Directive” (CEU, 1999, p.1). Summarily, in the 20th century, zoos have evolved worldwide at different levels (technical, biological and behavioural knowledge; the formation of international cooperation organisations; legislation), which has qualified zoos to integrate education, research and conservation into their purposes and improve their conditions taking into consideration animal welfare.

In the 21st century we come across the zoos of the Present, and although some new ones opened throughout the world, the large-scale builds are driven by conservation projects (Rees, 2011). Thus, in addition to conservation, zoos also claim education and research in their "mission declarations", that are a manifesto of the objectives/purposes of the zoo and their commitment to achieve said goals. The mission of the zoos of today, is achieved through a good management, which involves several aspects, such as budget management, fundraising (ticket sales, donations, etc.), short and long-term planning, maintenance of facilities, planning and records of the animal collection, management of the staff and the management of animals by the keepers (EAZA, 2013). The zoos of the 21st century consider these and many other recommendations, on top of the legislation both international and national. The legislation stipulates several basic principles and administrative procedures relating to animal welfare; licenses, ethics committee; registration of animals; veterinary care; acquisition, sale, exchange, transfer or donations of animals; maintenance of infrastructure, housing and transport; pedagogical and scientific activities; among others (CEU, 1999; DEFRA, 2012a, 2012b; MADRP, 2003). Moreover, zoos follow recommendations from organisations such as EAZA and WAZA regarding animal safety, welfare, accommodations, environmental enrichment and aspects related to visitors such as facilities dedicated to these, marketing, etc. (EAZA, 2013; Mellor et al., 2015). The recommendations of these organisations are made in Strategies and Guides that assist zoos to achieve ever higher quality standards, particularly in animal welfare which should be a priority in all activities carried out in zoos, including those in which the public actively

participates (WAZA, 2005). In addition to the specific recommendations for zoo management and animal welfare, the WAZA and the IUCN designed, in 2015, the “Committing to Conservation. The World Zoo and Aquarium Conservation Strategy” with the aim of creating better communication between zoos and visitors, highlighting the role of zoos in supporting conservation education and assisting their response to the lack of funding for conservation (WAZA, 2015a). These basic principles and requirements set a minimum standard for zoos, which should always be improved with animals as a priority. Additionally to these, the European Commission release the EU Zoos Directive Good Practices Document in 2015, as an informational document, with the aim of “summarise the current state of knowledge and highlight good practices to support practitioners and Member States with a view to helping them achieve the overall objective of strengthening the role of zoos in the conservation of biodiversity” (Rodríguez-Guerra et al., 2015). In short, the way zoos continue to evolve at the level of facilities, keepers, the collection itself, EE communication methods and others, allows them to achieve higher quality standards either by their conservation actions or by the way animals are treated, today.

In conclusion, the history of zoos is far more complex than one might think, the transformations of zoos have accompanied the evolution of society, scientific knowledge and how people interact with animals, making these institutions a current reference in animal conservation outside and within their facilities, EE and research, always with the aim of improving their actions and preserving biodiversity.

2.3.2. The Zoo Mission

The zoos of 21st century focus on four topics that are interconnected, forming four fundamental roles for them to fulfil their mission: Recreation, Conservation, Scientific Research and Education (EAZA, 2013; Mazur, 1997; Rodríguez-Guerra et al., 2015; Smith et al., 2008; WAZA, 2005). In this subchapter the role of recreation, conservation and research will be discussed, on the other hand the role of education will be approached in 3. Chapter II - The Education in Zoos, as a way to highlight it, since this is the main focus of the present dissertation.

The recreational role of zoos remains vital and significant, this being one of the reasons that leads people to visit these places (Smith et al., 2008) and one of the

means to generate revenue, however this role has been reviewed. Currently zoos try to innovate, through activities such as thematic and/or green spaces; facilities more suitable for animals but captivating for the public; interactive exhibitions about animals, habitats, conservation or research; educational presentations and interactions that do not affect animal welfare (EAZA, 2016; Mayes & Mastro, 2016; Mellor et al., 2015; Rasbach, 2016; Stanley, 2016; WAZA, 2005). The evolution of the recreational role, aims to make the public feel good and have fun, but also to have them acquire new knowledge and generate an interest in conservation, leading zoos to be in a unique position to influence behaviours through leisure and education (WAZA, 2005, 2015a).

Research is a fundamental role of zoos, since they have a privileged position for conducting multiple studies on different aspects of various species in an accessible way and in a controlled environment (Conde, 2013). The research carried out in this EEEq can address multiple subjects, such as operation and facilities of the institution, biological characteristics of a species or population, or knowledge applied to conservation (*in situ*) (WAZA, 2005). Therefore, the research directed to internal aspects of the zoo allows an improvement in their operations, such as evaluation of the visitor's learning and attitudes, effectiveness of facilities and programs, marketing, communication, among others (WAZA, 2005, 2015a). On the other hand, research on the biology of species and populations enables the acquisition of knowledge about animal welfare, nutrition, behaviour, reproduction, genetics, evolution, physiology, health, etc., and these can be applied to breeding programs, health treatments, environmental enrichment plans and conservation (Conde, 2013; Rees, 2011; WAZA, 2015a). Finally, the research can be carried out *in situ*, in order to be applied more directly to conservation (e.g. study of diseases, demographics, evolution and behaviour of populations in the wild) or for application in the zoo (e.g. study of habitat and ecology of the species and population) (Conde, 2013; WAZA, 2005). Given the relevance of the research, it should be noted that these studies are carried out by students, handlers, veterinarians or others, and many are not published although they are useful in order to avoid repetition of studies, provide fact-based information to guide global management decisions, increase public understanding of the complexities of wildlife management, and

provide evidence of the value of research to managers and colleagues, even on a smaller scale (Rees, 2011; Rodríguez-Guerra et al., 2015; WAZA, 2015a).

Conservation becomes progressively important today due to increased biodiversity loss, leading to this being one of the main roles of zoos, since they are in a privileged position for the realization of conservation activities of animals, plants and habitats (WAZA, 2005). Zoos care of many populations of various species that attract many visitors. This position and social power as well the political and economic power of zoos as all, allow them to impact conservation worldwide and engage the human population in these initiatives (WAZA, 2015b). This position of zoos allows them to carry out a set of activities that address *ex situ* and *in situ* conservation (Rodríguez-Guerra et al., 2015; WAZA, 2005). However, zoo conservation plans should be designed by taking into account both types in order to be more effective and create a conservation plan for the species as a whole, i.e., with an "integrated conservation" approach (Traylor-Holzer et al., 2013). The "integrated conservation" is achieved through conservation "activities of a zoo or an aquarium are linked to one another conceptually, and are strategically coordinated both externally and internally" (WAZA, 2005, p. 11). This activities could be adopting a more sustainable approach in the zoo itself, educating about and promoting conservation programmes among visitors, collecting funds for local conservation institutions, and collaborating with breeding and welfare institutions at the site of conservation project in programmes for the collection of injured wild animals and their release after treatment and/or harvesting of gametes from wild animals in order to be implanted in captive animals and release the offspring into the wild (Redford et al., 2013; WAZA, 2005). In a way, the conservation role engulfed all of the other roles of zoos, from recreation as conservation activities can be fun and interactive, to research since the conservation programmes allow the purchase of new knowledge and even to education as conservation programmes allow the transmission of new information and the change of attitudes and behaviours.

In short, these three roles allow zoos to accomplish their ultimate goals, which are conservation of biodiversity and shift the perspective of people about the environment and its challenges. However, zoos could not achieve these goals

without Education since this is the main way to alter attitudes and behaviours therefore this role will be discussed in the next chapter in a detailed way.

3. Chapter II - The Education in Zoos

3.1. The educational role

The educational role of zoos has not always been a priority in the history of these institutions, however in the 20th and 21st centuries EE has become a vital foundation and goal of zoos (EAZA, 2013; Rees, 2011), and a major part of conservation programmes. The educational purpose of zoos today starts from their privileged position for EE since this EEEq attract millions of visitors every year, including families with children and schools (Almeida et al., 2017; EAZA, 2013) and are a space in which students of all ages can have the first interaction with living wild animals and biology (Wagoner & Jensen, 2010). Zoos are also in a privileged position because they can use different types of education for distinct visitors, therefore according to Mazur (1997),

“Education in zoos takes place through formal curriculum-based schools’ programs and the informal learning experiences of zoos visitors. Both forms of education are purported to confer extensive knowledge about animals to zoo audiences, as well as to facilitate concern for animals and broader environmental matters” (p. 88).

According to Rodríguez-Guerra et al. (2015), zoos should create educational strategies

“to connect people to nature, to inspire curiosity, empathy, respect and awe for the natural world, to communicate effectively conservation, environmental and human-animal relationship issues, to raise the awareness of people to feel and undertake our role as stewards of nature, to provide information, experiences and opportunities to encourage positive changes of behaviour, to demonstrably educate and inspire visitors to make changes in their behaviour that contribute to the conservation of biodiversity”. (p. 30)

Zoos are required by law to have an educational role, and in the case of EU members it is the Article 3 of Directive 1999/22/EC that dictates this activity. Thereby, Article 3 states that zoos in the member states must implement the "promotion of education and public awareness regarding the preservation of biodiversity, namely through the provision of information on the species displayed and their natural habitats" (CEU, 1999, p. 2).

The communication of information can be done in various ways, such as "informative signs" with basic knowledge about the species and "interactive education" e.g. games on animals or exposure of skin, fur, feathers, etc. so that visitors can touch, scale structures that allow children to imitate movements of animals such as primates, among others (EAZA, 2013; Rees, 2011). Education can also be done by trained handlers or educators in a more appealing way, through conversations with the public about an animal, presentation during the feeding or training of animals, of "Touch Tables" (e.g. eggs, fur, bones, skin, feathers, etc.) accompanied by a lecture, demonstration of live animals (e.g. touching reptiles, amphibians, etc.), among other activities (EAZA, 2013), which tend to attract the public (Moss et al., 2010). In addition to these, guided visits to school groups and visitor groups are also an appealing way to educate the population for animals, habitats and conservation (EAZA, 2013; Rees, 2011).

Despite all these activities and the continued affirmation of their educational role, zoos have now been criticized for not demonstrating their effectiveness as conservation educators (Jensen, 2014). However, organizations such as WAZA continue to highlight the role of zoos in conservation education, stating "Zoological institutions are able to take advantage of specific emotional connections between animals and visitors to provide learning opportunities and information on conservation education and the broader sciences of environmental education and reforms such as activities in zoos and aquariums" (WAZA, 2015b, p. 45).

In short, education is one of the primary objectives of zoos, and can be achieved through appealing and playful activities, which need to be increasingly evaluated to demonstrate their value and the importance of the zoos in EE.

3.2. Zoos as Environmental Education Equipment - Literature Review

Zoos highlight education as one of their main roles being in a privileged position for conservation education (EAZA, 2013; WAZA, 2015a) as previously mentioned. The educational objective of zoos leads to this being considered an EEEq, with different perspectives, according to the classification of Serantes (2005): conservationist/institutional, educational/dynamic, and recreational/tourist. Furthermore, zoos are low or medium-impact EEEq (Serantes & Barracosa, 2008) and remains important to review their educational effectiveness so that it can be improved. Be that as it may, the lack of a study on the effectiveness of education in zoos has led to several critics to these institutions (Jensen, 2014).

The need to present evidence regarding the educational value of zoos has led to several researches by various authors and even institutions. However, this research faces some difficulties, namely the variables used to obtain information about the educational impact and the acquisition of knowledge, being the most used variables: the public's perception of animals, changes in behaviour and attitudes, "flow" of visitors, among others (Esson & Moss, 2014; Jensen, 2014; Macdonald, 2015). Since most studies use these variables only post-visit data or aggregates, it is not possible to identify learning patterns, which may lead to unrealistic results (Jensen, 2014). Moreover, one of the ways of verifying the impact is the evaluation of changes behaviours and attitudes, which consequently lead to failures associated with the method since it depends on the promises of the participants and not on direct observations (Esson & Moss, 2014). Zoos also face some challenges regarding the motivation and attitudes of their visitors, that is, even if the zoos make educational activities available the decision to enjoy them belongs to the public, and sometimes visitors do not have the desire to learn something new (Moss & Esson, 2013). Nevertheless, zoos continue to provide education activities, including presentations, which according to a study by Moss et al. (2010) at Chester Zoo, UK, attract many people even before they start what may indicate, according to the authors, that visitors planned the visit taking into account the presentation, which is positive from an educational perspective.

Despite the challenges, there are several studies with the point of verifying the impact of education on zoos with different perspectives and contrary results. Thus,

in this subchapter some studies are reviewed that indicate positive and negative results regarding the role of education in zoos.

The report by the Royal Society for the Prevention of Cruelty to Animals (RSPCA), "The Welfare State: Measuring animal welfare in the UK 2006" is one of the most mentioned articles in the study which found that zoos have no educational impact in the UK (Moss & Esson, 2013). The report is a review of published and peer-reviewed literature on zoo education in relation to the general public, and the studies analysed were conducted in the UK and the USA (RSPCA, 2006). Hence, the report concludes that zoos do not have an educational impact on their visitors and that zoos do not have education as an objective, but rather it is necessary to carry out studies to prove their value (RSPCA, 2006). In fact, the report also notes that zoos began to carry out these studies only a few years ago, in a quantitative way, in order to evaluate their educational programmes in visitors and whether their objectives are still being met (RSPCA, 2006).

In addition to the RSPCA Report 2006, Balmford et al. (2007) found no impact at the zoos where the study was carried out in the UK, in adult visitors (only one visit), in relation to knowledge about conservation, concern or ability to do something. Although, the same authors admit that the impact on visitors may only be visible after several visits or some time which is a valid counter-argument to their results according to them, however measuring long-term effects is difficult and repetitions of visits may lead to previous knowledge being replaced in the most recent visit (Balmford et al., 2007). Parenthetically, Balmford et al. (2007) acknowledges that their results do not mean that zoos do not have the capacity to educate informally, since adults (analysed in studies like this) tend to have other concerns when visiting, like how to take care of children (Balmford et al., 2007), so adult education can happen when they are exposed to more focused experiences such as animal presentation (Kreger & Mench, 1995) or exhibitions with a specific and direct conservation messages (Balmford et al., 2007).

Contrary to the RSPCA Report 2006 and the study by Balmford et al. (2007), there are several studies that corroborate the educational impact on zoos on their visitors, whether adults or children, and these studies evaluate several variables such as knowledge about animals and/or conservation, change of behaviours and

attitudes, among others. Most of the studies analysed in this review, which disseminate positive results regarding the impact of zoos, are related to children or young students, and the studies cover different methodologies and analyse different variables.

Studies conducted by Jensen (2010, 2014) and Wagoner & Jensen (2010) in the UK, using the comparative analysis of children's drawings before and after visits to the zoo in a quantitative and qualitative way, verified positive educational impacts on children regarding their attitudes towards conservation, the educational role of zoos and the knowledge acquired. Jensen (2010, 2014) also compared students who took guided tours and students on a free visit, both groups showing a positive impact. The most recent study of this author, that is, 2014, found that in free visits 34% of students show positive learning and 16% negative, however in guided tours these values were 41% positive and 11% negative. Hence, the author concludes that although the differences are not very high, the expectation of increasing the level of positive learning in the thousands of children who visit zoos in this proportion becomes very important (Jensen, 2014). In addition, relative comparison between free and guided visit Jensen's 2010 study found that students with a positive or neutral view of zoos before the visit acquired significant knowledge and positive changes in free visits, but students who started the visit with insufficient support benefited greatly from the guided tour as it provides context and customization to facilitate learning. Thus, these two studies demonstrate the importance of guided tours, since students are privileged with personalized monitoring, and therefore more focused on environmental education and conservation.

In addition to these studies, others that evaluate the acquisition and retention of before and after zoo interventions, either by guided, free or other types of specific educational programs, show a positive increase in students' knowledge, as well as their retention, in those who have intervention from the educational program compared with those who had only formal intervention in school (e.g. Collins et al., 2020; Randler et al., 2007, 2012; Seybold et al., 2014; Wünschmann et al., 2017). Seybold et al. (2014) and Wünschmann et al. (2017) also analysed the rate of knowledge retention of students who visited the zoo and those who did not visit, verifying that the retention rate was higher in students who visited the zoo. However,

Randler et al. (2007) found that the retention rate is the highest in students who carried out specific educational programs in the zoo, which shows that these can have a greater impact than just the environment of the zoo itself. However, the same author in a study conducted in 2012 found the knowledge of the students was higher after the visit but the retention rate was the lowest of the analysed groups, and the author suggests that the visit program should be treated after it in the classroom context through material provided by the zoo, in order to preserve the high level of learning (Randler et al., 2012). Regarding educational programs promoted by the zoo but carried out in schools, a study was found that shows that this program has a positive impact on knowledge (Moss et al., 2017). Thus, Moss et al (2017) found that the percentage of students who showed "some positive knowledge" about conservation went from 4.5% in the pre-test to 79.8% in the post-test, and that the percentage of students who could nominate a conservation action they could perform individually increased from 40.7% in the pre-test to 60.8% in the post-test, which shows a very positive impact of the program. The above-mentioned studies show the positive impact on students, however there are studies more focused on assessing this impact on adults and visitors in general. Moss et al. (2015) found that there was an increase (from 69.8% to 75.1%) of participants who demonstrated a positive knowledge about biodiversity after visits of zoos and aquariums, in a study conducted in 26 WAZA member institutions in several countries. In the same study, the authors also recorded an increase of 8.3% (from 50.5% to 58.8) of participants who were able to identify individual actions in favour of biodiversity (Moss et al., 2015).

Regarding perspectives on zoos, there is a positive impact, particularly after educational programs or visits, and Moss et al. (2017) found that after an educational program promoted by the zoo and carried out in schools the students had a more positive perspective on the role of conservation of zoo and Esson & Moss (2014) verified a positive impact on parents after a program carried out in the zoo in relation to the educational role and conservation of the same.

The motivation for the visit to the zoo is one of the variables that can be used to verify the impact of zoos on society, and although the general public increasingly considers the educational role of zoos, studies indicate that recreation,

entertainment and social aspect continue to be the greatest users for zoo visits (Briseño-Garzón et al., 2007). However, the educational perspective begins to be an important aspect for the public, which shows that they are receptive to the education provided by zoos as long as it is allied to their recreational and social perspective (Clayton et al., 2009).

In short, there is still no coherence on the educational roles of zoos and their impacts on the scientific community and society. However, several authors agree that the research should continue, albeit with a more scientific approach. The study on the impact of zoos is increasingly important in the society in which we live, and the existence of more studies with viable methodology, systematic and a multiple approach of variables and methods (qualitative and quantitative) is a positive sign in the advances of this theme and consequently in education in zoos.

Finally, it should be noted that in this review, the entire literature on the subject is not mentioned.

4. Methodology

The present study uses questionnaires to collect data on the scale of educational activities that are available to zoo visitors, in Portugal and in Europe. These questionnaires are useful in research and evaluation work like this, since they allow the standardizing of the sample's questions and answers, making the analysis more workable and the acquisition of a larger sample in a faster, more effective, and economically viable way (Brace, 2004).

The methodology of this dissertation can be summarized in the following phases:

- 1- Elaboration of a questionnaire and research.
- 2- Application of the questionnaire.
- 3- Analysis of the results.

The first phase will be focusing on the research of theoretical aspects referred to in Chapters 2 and 3, by reading and analysing articles, books, and other documents, so the basis of this dissertation can be better understood. This phase also includes the elaboration of a questionnaire in a PDF format and a Googleforms format. Therefore, the questionnaire includes three sections: framing text, characterization of the zoo and its educational activities. The first section, the framing text, includes an introduction to the goal of the survey and the study of the present dissertation. The second section refers to the characterization of the zoo that is participating in the survey, by quizzing the location (country), area, number of animals and species, source of revenue, number of visitors and expenses. The third section, in the questionnaire itself, includes questions about the educational activities available to the zoo visitors (if available) and which activities; if the zoo uses direct contact; if the zoo receives schools, and how many students; if the zoo carried out an assessment of the effectiveness of its activities, among others. The questionnaire uses questions that are brief, simple, clear, unambiguous and in a logical sequence, like suggested by Manzato & Santos (2012), and also uses both open and closed/multiple choice questions depending on their aim. Furthermore, the data collected in the questionnaire is anonymous and will be used for the present thesis only.

The second phase of the present dissertation was the application of the questionnaire by email and forms in the zoo's websites, being that these contacts were retrieved by multiple methods. In the Portuguese zoo cases, the list includes email and phone numbers, and these names were found not only through the list of the Directorate-General for Food and Veterinary, but also through the contacts on the website of each zoo. In the Spanish case, the names were found online and the contacts researched in the zoo's websites. In the European case the list was created based on the EAZA and BIAZA members list, specifically using the full, temporary, and member candidates, and researching the contact of each one in the zoo's website. It is noteworthy that in this case, not all zoos from the EAZA list were used, as some contacts were not found and the final list does not include all European zoos since it is based on the list mentioned before. The final list includes 10 Portuguese, 30 Spanish and 233 European zoos, such as described in Table 2, for a total of 273 contacted zoos in 31 countries.

Table 2 - Number of zoos contacted by country and group

Group	Country	Number of zoos
European Zoos	AUT	5
	BEL	3
	BUL	1
	CZE	13
	DEN	7
	EST	1
	FIN	2
	FRA	40
	GER	32
	GRE	1
	HRV	2
	HUN	6
IRL	3	

	ITA	10
	LAT	1
	LIT	1
	LUX	1
	NLD	12
	NOR	1
	POL	11
	ROU	2
	RUS	5
	SRB	2
	SUI	5
	SVL	3
	SVN	1
	SWE	9
	TUR	6
	UK	47
Spanish zoos	ESP	30
Portuguese zoos	POR	10

The application of the questionnaire itself was done in three stages: the first time on 5th May 2020 to Portuguese zoos, on 6th and 7th May 2020 to European zoos and on 8th May 2020 to Spanish zoos; the second on 8th June 2020 to all zoos, and the third on 21st July 2020 to all zoos. Furthermore, on 6th July 2020 the telephonic contact to the Portuguese zoos was done, with the aim of requesting the participation in this study, since there were no answers to the email sent in the first and second application. In the email applications, some zoos requested the filling of a form or certain documents for the approval of their participation in this study, which I replied with the appropriate documentation. Additionally, I received emails (automatic and personal) informing that some zoos were closed or understaffed due to the COVID-19 pandemic and could not participate in the study. Other zoos informed that they

could not participate for reasons such as having their own research, or the lack of data.

In the third phase of this dissertation, the data collected was analysed using Descriptive Statistics, therefore the data was analysed using raw data, and Excel, in particular Power Query, Dynamic tables and Graphics. It should be noted that all percentages used in the analysis were made using the number of responses in order to standardize the results. Therefore, in the case of the first part of the questionnaire, "Characterization of the Zoo", all percentages were acquired using the total number of questionnaires, since all zoos had access to the questions. In contrast, in the second part of the questionnaire, "Educational activities", the percentages were obtained, in some cases, by using the number of zoos that had access to the questions, since some were only available depending on the answer of the previous question. Participants data will be kept anonymous.

5. Results

In this chapter the results of the questionnaires are exposed and described using raw data, figures, and tables.

The first part of the questionnaire was about the Characterization of the Zoo, therefore the results from this part of the questionnaire are described next.

From 273 zoos out of 31 countries, the questionnaire was answered by 38 zoos out of 16 countries, being 7 Portuguese, 5 Spanish and 26 European, by 11th September 2020. Thus, using Figure 2, it was possible to verify how many questionnaires were answered by country and concluded that France was the country with more answers, and the second one was Portugal.

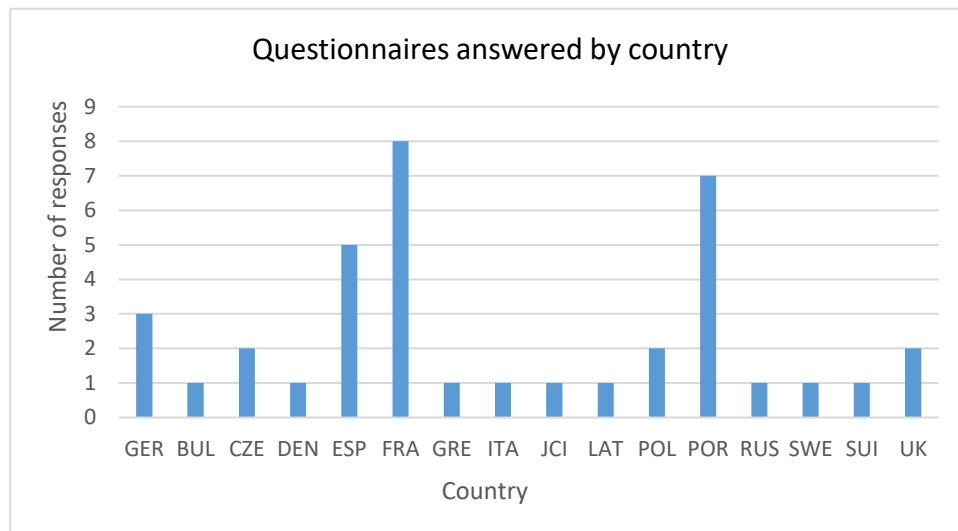


Figure 2 - Number of questionnaires answered by country

The next questions that are worthy of analysis in this part of the questionnaire are the total number of animals and species, hence it was found that the zoo with more animals has 7640 individuals, but the one with more species has 600 species. On the other hand, the zoo with fewer individuals and species is the same and has 250 individuals and 41 species. Besides, it was found that the average of the number of animals in 37 out of the 38 zoos that answered the questionnaire is 1343 and the average of species in all 38 zoos is 185.

Regarding the origin of the majority of zoos' revenue, it is clear by verifying the Figure 3 that 76% of the zoos answered, "Visiting Tickets" and only 3%, which correspond to one zoo, choose the answer "Others" specifying "Sponsorships".

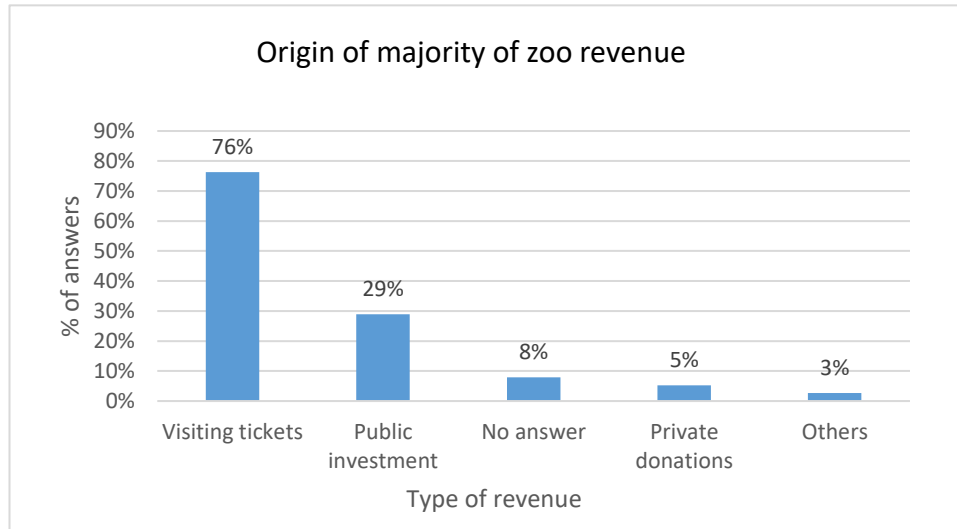


Figure 3 - Origin of majority of zoo revenue

In relation to the next question, "Number of visitors in 2019" it was verified that this may vary between 15 000 and 1 100 000 visitors. It is noteworthy that 8 zoos did not answer this question, and that the average number of visitors for the remaining zoos was 287 266.

The next question refers to the period of the year with the most visitors, however, in creating this question, it was not specific the type of answer, and because of that, some zoos answer by season and others by month. Therefore, it was needed to create a pattern for the data, hence the months were categorized by meteorological temperate seasons of the Northern hemisphere. Although 7 zoos did not answer this question, it was clear by analysing the data that "Summer" is the season with more visitors, with 74% of the zoos using this answer, on the other hand "Spring" corresponds to 42% of the answers and "Autumn" to 16%.

The second part of the questionnaire focuses on the Educational Activities available in zoos, thus, the next results are about this part of the questionnaire.

The first question was "Does the zoo carry out specific educational activities?", and all 38 zoos answer "YES". However, the next question requested that the zoos indicated the type of activities that they make available, and in this case the

responses varied. Ergo, the Figure 4, shows the percentage of answers to each type of activities, being that “Educational presentations” and “Species information panels” are present in all 38 responses.

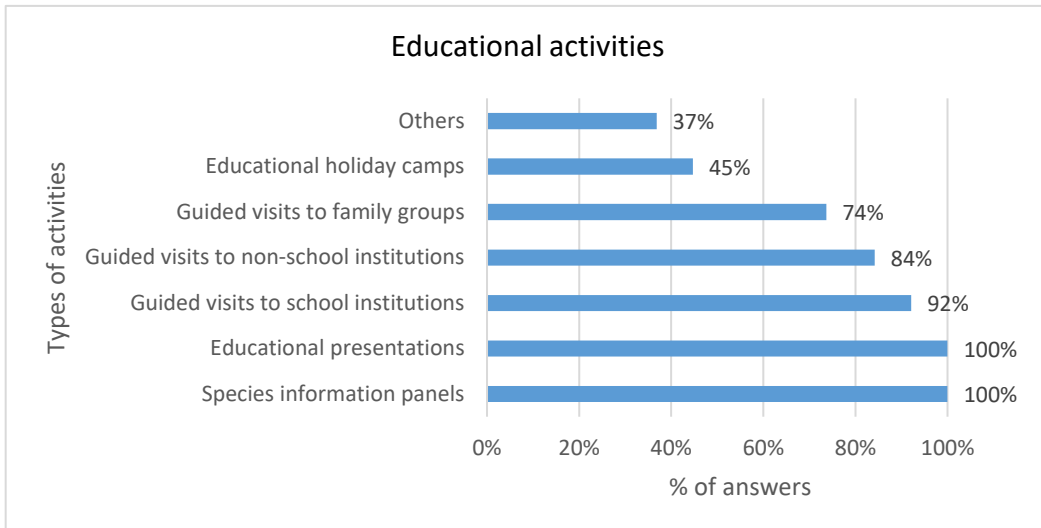


Figure 4 - Types of educational activities

The third question of this part particularizes a type of activity, the “Educational presentations”, hence the question requests that the zoo indicates the types of presentations executed. Figure 5 demonstrates that 79% of the answers include “Feeding activities”, but only 26% included “Others”.

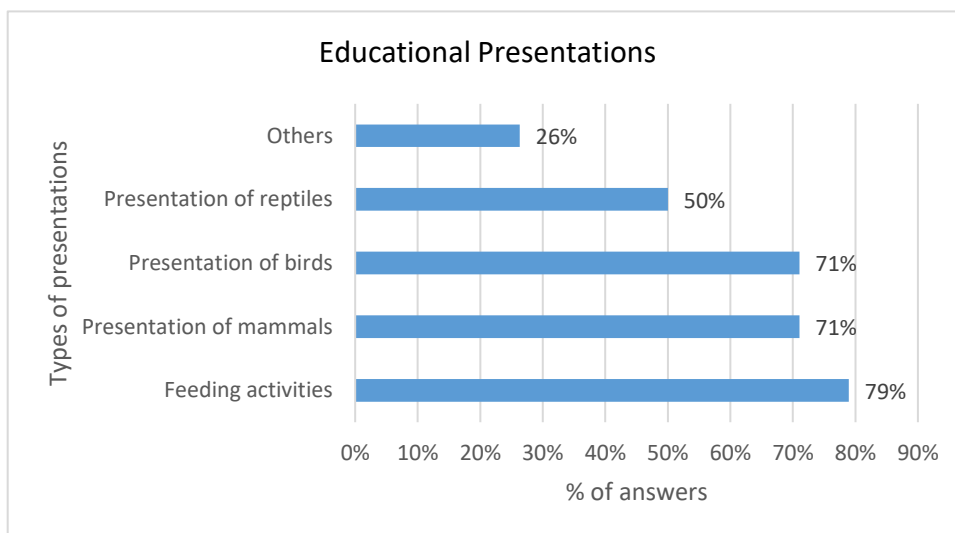


Figure 5 - Types of educational presentations

Direct contact between animal and visitor was the subject approached in the next questions, being that the first question about this theme was to know if the zoo

did this activity. Thereby, 55% of the zoos that responded to the survey answered “YES” to doing direct contact. With this in mind, the next question was about the type of direct contact used by these zoos, being that both “Supervised touch” and “Feeding” appears in 81% of the answers, like one can see in Figure 6.

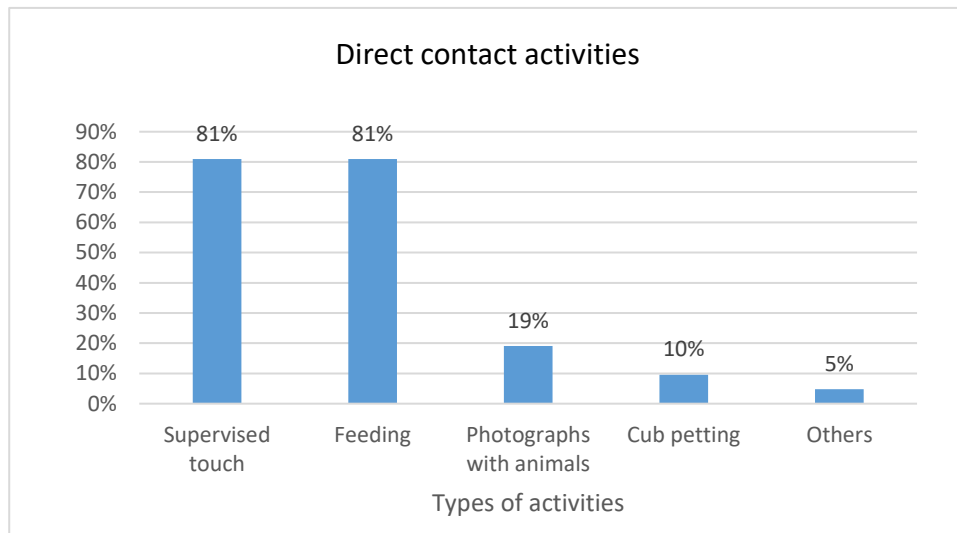


Figure 6 - Types of direct contact activities

The next question is still related to the direct contact activities, hence in this question the goal was to know the priorities of the zoo when doing these. Therefore, by observing Figure 7, it is clear that all zoos that do this type of contact have “animal and visitor safety” as a priority. 95% also considered “Animal welfare” an important aspect of the activity, and only 24% selected the “Other” option, giving examples like conservation and educational value, opportunity for the animal to choose to participate in the activity or not, using the right species and individuals.

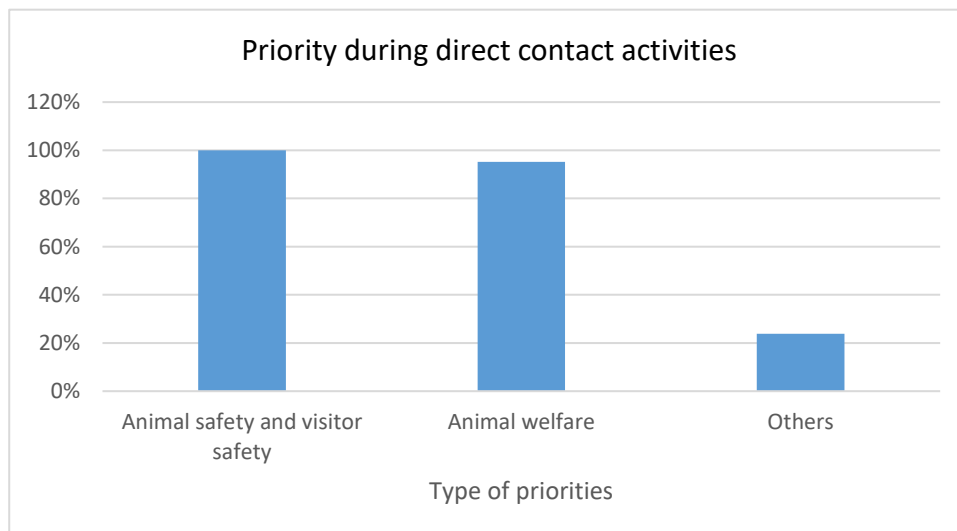


Figure 7 - Types of priorities during direct contact activities

The next question was about the use of “shows” as educational activities in zoos, being the goal of this question to understand if zoos considered this form of activities educational and important, thus, it was verified that 71% of the zoos answered “NO” to the question “Does the zoo consider activities in the form of “shows” as education?”, and the 29% answered “YES”.

The following questions focus on school visitations; hence the first question of this group was if the zoo receives school visits, being that all 38 zoos answered “YES” to this. The next question of the group refers to the number of students that visited the zoo in 2019. Since 31 zoos answered this question, it is possible to verify that the average of students is 20 945, and the zoo with more students received 138 803, and the one with less received 400. In addition, the questionnaire also included a question about guided school visits, where 95% of the zoos answered “YES”, with an average number of 9965 students between 25 zoos, a maximum of 75 000 students and a minimum of 400.

The next question was “Has the zoo ever carried out an assessment of the effectiveness of its educational activities?”, being that 34 zoos answered, with 58% answering “YES” and 32% “NO”. Regarding the type of assessment, most zoos used surveys about different activities according to the data, and most of the results were positive, satisfactory and the activities had some type of impact on visitors.

Concerning the questions about zoos participating in educational projects under protocols with other institutions/zoos, 68% answer that they do participate in other projects and protocols. Finally, the last questions were related to the use of social media as an instrument of communication and education, being that 95% of the zoos answered “YES” to using social media as an educational equipment. Moreover, it was found that 89% of the zoos used the publication of videos or photos on social media about animals as a mean of education, while only 14% used live streaming on social media and 8% on the zoo website as an educational activity, as demonstrated in Figure 8.

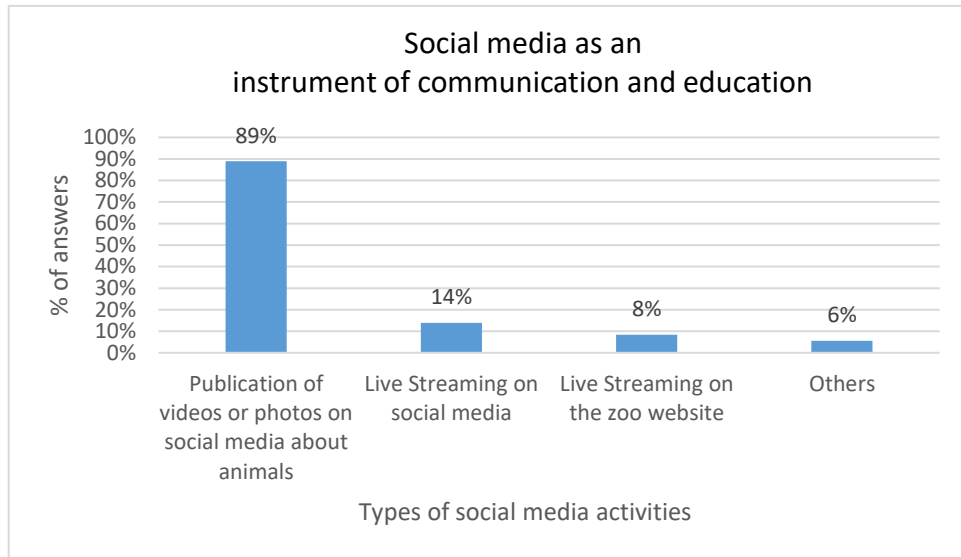


Figure 8 - Social media as an instrument of communication and education

6. Discussion

The present chapter focuses on the discussion of the results of the questionnaire, being that the main goal is to understand the scale of educational activities in zoos based on the 38 answered questionnaires.

The number of answered questionnaires was 14% of the 273 that were sent. The COVID-19 pandemic closed zoos and left them understaffed, which was one of the aforementioned possible reasons for this questionnaire receiving only 38 answers. Also, other reasons for the lack of answers could be related to zoos' internal protocols since some zoos have their own projects.

Related to the origin of the majority of revenue, the answer was that 76% of the zoos indicated that the main source of revenue was visiting tickets or public investment. This data is consistent with other authors like Davey (2007), Hosey (2008) and Turley (1998), being that these identify entrance fees as the main source of income, since most zoos are "self-financing" (Davey, 2007).

As the previous question, the answer about the period of the year with more visitors was that 74% of the answers were related with the "Summer" season, because this is the season for family holidays, and considering the month of the season, school visits also happened in this interval.

When it comes to the questions about the educational activities in zoos, all zoos did these activities, since education is one of the main roles of zoos (Carr & Cohen, 2011; EAZA, 2013; Rees, 2011) and the COUNCIL DIRECTIVE 1999/22/EC states, in Article 3 - Requirements applicable to zoos, that all zoos must promote "public education and awareness in relation to the conservation of biodiversity, particularly by providing information about the species exhibited and their natural habitats" (CEU, 1999).

Related to the type of educational activities, guided visits for schools, families or other institutions are present in high proportion in this question and, in further questions about the same subject, all zoos indicated that they performed visits for school groups and 95% do guided visits for this type of groups. The responses related to this question could be associated to a positive view about visits to zoos in general, both by families and schools, corroborated by several studies have showed

the usefulness of these activities, such as Jensen (2010, 2014), Wagoner & Jensen (2010), Seybold et al. (2014) and Randler et al. (2012), all mentioned in subchapter 3.2. of this dissertation.

Like this, all zoos that answer the questionnaire organize educational presentations and species information panels, as these are some of the most legally regulated (DEFRA, 2012b; MADRP, 2003), popular and effective activities (Mazur, 1997). The effectiveness of this type of activities comes from the increased attentiveness of visitors at animal enclosures with presentations (Moss et al., 2010) and the basic and simple transmission of information through panels about basic aspects of the species (EAZA, 2013; Mazur, 1997; Rees, 2011). Furthermore, the zoos that selected the option “Others” show that besides the activities mentioned in the questionnaire, zoos have other creative ways to educate, such as school lessons in the zoo, practical lessons, workshops, conferences, contests, special events, *ex situ* educational programs, teaching programs, outreach lessons in schools, formal lectures for university courses, general lectures, and so on.

Specifically, about the educational presentations, the results show that the most used ones by zoos were feeding activities and presentations of mammals and birds, since these are the most popular ones and attract more visitors. Nelson (2002) verified a positive outcome in adults learning at this type of activities, but the author also noted that “the more effectively the presenter communicates with the audience the more likely public animal feeding programs are to produce positive adult learning outcomes”. Besides this, other authors also noted that these activities have a pro-conservative and increased knowledge impact on visitors (Falk et al., 2007; Mazur, 1997; Skibins & Powell, 2013) and are approved by the EAZA, who has released the EAZA Guidelines on the use of animals in public demonstrations” in 2014 (updated in 2018) so zoos can use demonstrations with education and animal welfare as priorities (EAZA, 2018). The same document also encourages zoos to “focus on behaviours that are demonstrations of their natural intellectual or problem-solving ability and their physical attributes” (EAZA, 2018), so the information transmitted to the visitors is accurate and therefore contributing to a better understanding of the ecosystem and conservation. While zoos credibility as a EEEq has increased, they still have capacity to improve, such as making effort to train their

educators/zookeepers in communication skills to make the presentations more successful or using other types of activities/programmes beyond the traditional formats. Accordingly, some of the examples of other educational presentations given by zoos that participate in this study are pedagogical presentations in schools, project presentations and lectures on animal ecology and biology topics, lectures about environmental enrichment, “How to take care of your house pet” talks, empathy exercises for young children, presentations of not emblematic species (e.g., bees), among others.

Considering the direct contact between animal and visitors’ activities in zoos, and according to the data presented in this dissertation, a high portion of the zoos do engage in this type of activity. The data is corroborated by other studies like Cruze et al. (2019) that verify that most zoos across the globe practiced animal-visitor Interactions (AVIs). Some authors have shown that AVIs can have a negative impact in animal welfare, causing stress and abnormal behaviours in different species (Dans et al., 2017; Larsen et al., 2014; Salas & Manteca, 2017). In contrast, different studies in different species show that AVIs have a positive impact on animal welfare (Manciocco et al., 2009; Normando et al., 2018; Salas & Manteca, 2017; Wierucka et al., 2016). The positive impact on some animals, and the fact that this type of interactions increase the interest of the visitor (Hosey, 2005; Tofield et al., 2003), which can enhance the connection between humans and animals and contribute in the interests of conservation (Powell & Bullock, 2014), can be some of the reasons why zoos use AVIs. In fact, the WAZA has reported an increase in this type of activities in recent years (WAZA, 2020). The data collected in this study shows a tendency for activities like feeding and supervised touch, which is also corroborated by Cruze et al. (2019), since in this study “Petting” (or Supervised touch) is the most registered AVIs. Activities like Touch/Petting might increase the emotional connection to animals, but has been shown that these activities could be accounted for zoonotic transposition (e.g. *E.coli* see Stirling et al., 2008). The conflict between animal welfare and education by AVIs has led the WAZA to create the “WAZA Guidelines for Animal - Visitor Interactions”, which recommends practices to make interactions more educational and safer (WAZA, 2020). The priorities of safety and animal welfare are not only clear by the EAZA (2018) and WAZA (2020), but also by

the data in this dissertation, since most zoos considered this one of the most important parts of the interactions. The AVIs can be quite useful for educational and conservation. Nonetheless, it is necessary more research on its impact on animal welfare and how it is possible to mitigate the negative impacts that can occur.

Regarding “shows” as educational activities, it was clear that most zoos do not consider this type of activity as a contributor for a correct education about conservation and/or biodiversity. Even though the data corroborate what was expected, this particular question created some confusion about the definition of “shows” for the zoos, since some zoos that answered “YES”, specified aspects in the subsequent question that are consistent to the inconsideration of these activities as educational, e.g., one of the zoos responded that “show” like presentations are educational but “shows” in the form of entertainment performance are not. Since the goal of the question was to understand the position of zoos about “shows” in the form of entertainment performance, it is possible to conclude that all zoos that answer the questionnaire do not consider “shows” educational. But then again, because there is no empirical data about this, it is not possible to assess this subject in an objective and scrutinized way. Additionally, it is important to note that organizations like EAZA disapprove of this type of performances, and recommend the avoidance of “any practices that provide audiences with a misleading impression of the natural behaviours of wild animals, or makes claims about wild animal behaviour that are not substantiated by scientific evidence” or “the use of props where their use cannot be shown to demonstrate or replicate natural behaviour” (EAZA, 2018), since this type of practices do not reflect the educational goal of modern zoos.

The evaluation of the effectiveness of its educational activities in zoos is one of the most criticized aspects about these organizations (Jensen, 2014). While this is a very controversial theme, this study has shown that some zoos do evaluate their activities. Nonetheless, this evaluation is very subjective and does not show a statistical or standardized pattern, in fact, most used surveys of satisfaction that do not show the impact of their educational activities. However, more zoos are trying to improve this aspect, by using studies like the ones mentioned on subchapter 3.2. Zoos as Environmental Education Equipment - Literature Review, to progress and

verify the effectiveness of their educational activities and the impacts on visitors and, in some cases, on animals. The necessity of more studies is evident, so zoos can reach their educational goal in a more impactful way.

The majority of zoos in this study participate in educational projects under protocols with other institutions/zoos, such as Universities/Schools, conservation organizations like Instituto Jane Goodall and WWF, other conservation campaigns, zoos associations like EAZA, WAZA and BIAZA, work/educational centres, etc. The protocols created by zoos with different institutions can be a great advantage, since zoos have a privileged position, allowing for projects and/or campaigns to reach more people, ergo bringing an important contribution to conservation and EE (Redford et al., 2013; WAZA, 2005). In addition, zoos offer the opportunity of unique types of research, being that most of the time this is done by students (Rees, 2011; WAZA, 2015b). This allows for the creation of important protocols with schools/Universities that can improve the curriculum of students and increase/better the knowledge on different subjects for the zoo.

The use of social media in the 21st century is almost a daily thing for most people; thus, it was expected that zoos used this type of social interaction to educate and do marketing. A study conducted by Rose et al. in 2018 corroborated the results of the present dissertation, since the study shows that BIAZA-accredited zoos regularly engage in social media interactions. The fact that conservation has a social aspect shows the importance that zoos must put on social media as an educator, since some studies show that the public follows science organizations like zoos to be informed about science topics (Light & Cerrone, 2018). The publication of videos or photos on social media about animals or other social media posts, allows zoos to transmit an image of their animals to more people across the world besides their visitors (Light & Cerrone, 2018), and create a connection between the social media user and the animal that can increase the pro-conservation attitudes. However, Rose et al. (2018) verified that there was a tendency towards the publication of posts about mammals, new births and hatching, while conservation and research were subjects less addressed. Nevertheless, social media is an important tool for zoos to educate and connect with the public. This connection among people, zoos and animals was evident during the COVID-19 pandemic, when zoos used social media, namely live

streaming of the animals, to allow people in lockdown to appreciate animals and learn about them, their habitat and conservation (de Lucia, 2020; Lewis, 2020; Perrie, 2020).

Lastly, zoos had one of the biggest and most impressive advances in education activities (Mazur, 1997), and the present study aids to understand that. Therefore, the results of the present dissertation show that zoos make available traditional types of activities, but also innovative types, with the aim of improving the educational impact of zoo as an all. In Addition, this research demonstrates a positive panorama related to zoos' effort to evaluate and improve their educational activities, to study the impact of activities on visitors and on animal welfare, and finally to emphasize their educational role.

7. Conclusion

Zoos are in a very prominent position for education, being this one of their main goals, therefore, through this dissertation it was possible to verify the type of LAs available in zoos and their value for these EEEq. Ergo, the aim of this dissertation was accomplished since it was possible to identify the scale of LAs in zoos.

However, it is noteworthy that there were some limitations to the method used in the present dissertation. The questionnaires had limitations, since they did not have more open questions and more options in the multiple-choice questions, which could have helped to understand more a scale of LAs in zoos, since zoos could have given more details. Beside this, the lack of answers to the questionnaire also placed a restriction to the study, since the number of answers was not very high, creating a general scale that might not be realistic. Nevertheless, the lack of answers could be explained by the COVID-19 pandemic that affected zoos, closing them, and making them understaffed.

To overcome these limitations, it is recommended more research about this subject and it is also recommended to repeat the study in a more favourable and stable time to try and have more answers, hence create a more realistic scale about educational activities in zoos.

In conclusion, this dissertation allowed for the understanding of the positions of zoos as educators in a challenging and changing world, and their role in connecting humans and animals, moving people in a pro-conservation path, and hopefully changing their attitude and behaviours towards conservation, biodiversity, and the issues that the planet faces in the present.

8. References

- AIZA. (2020). *AIZA - Missão*. <http://www.aiza.org.es/pt/missao>
- Almeida, A., Fernández, B. G., & Strecht-Ribeiro, O. (2017). Children's opinions about zoos: a study of portuguese and spanish pupils. *Anthrozoos*, 30(3), 457–472. <https://doi.org/10.1080/08927936.2017.1335108>
- Amaral, M. L., Câmara, A. C., Castro, S., Freitas, H., Gil, H. I., Gomes, M., Gomes, M., Pinto, J. R., Proença, A., Soares, L., Teixeira, F., & Vieira, I. (2018). *Referencial de educação ambiental para a sustentabilidade* (Ministério da Educação (ed.)).
- Bakkenes, I., Vermunt, J. D., & Wubbels, T. (2010). Teacher learning in the context of educational innovation: Learning activities and learning outcomes of experienced teachers. *Learning and Instruction*, 20(6), 533–548. <https://doi.org/10.1016/j.learninstruc.2009.09.001>
- Balmford, A., Leader-Williams, N., Mace, G. M., Manica, A., Walter, O., West, C., & Zimmermann, A. (2007). Message received? Quantifying the impact of informal conservation education on adults visiting UK zoos. In A. Zimmermann, M. Hatchwell, L. Dickie, & C. West (Eds.), *Zoos in the 21st century: catalysts for conservation?* Cambridge University Press. <http://kar.kent.ac.uk/2832/>
- BCSD Portugal. (2020a). *Objetivos de Desenvolvimento Sustentável e o BCSD Portugal*. BCSD Portugal. <https://www.ods.pt/>
- BCSD Portugal. (2020b). *ODS4 - Garantir o acesso à educação inclusiva, de qualidade e equitativa e promover oportunidades de aprendizagem ao longo da vida para todos*. BCSD Portugal. <https://www.ods.pt/objectivos/4-educacao-de-qualidade/?portfolioCats=24>
- BIAZA. (2020). *History of BIAZA | BIAZA*. <https://biaza.org.uk/history-of-biaza>
- Brace, I. (2004). Questionnaire design. How to plan, structure and write survey material for effective market research. In *Business*. <https://doi.org/10.5860/CHOICE.42-3520>
- Briseño-Garzón, A., Anderson, D., & Anderson, A. (2007). Entry and emergent agendas of adults visiting an aquarium in family groups. *Visitor Studies*, 10(1), 73–89. <https://doi.org/10.1080/10645570701263461>

- Carr, N., & Cohen, S. (2011). The public face of zoos: Images of entertainment, education and conservation. *Anthrozoos*, 24(2), 175–189. <https://doi.org/10.2752/175303711X12998632257620>
- CEC. (2001). *Making a european area of lifelong learning a reality. [Communication from the Commission]*.
- CEU. (1999). Council Directive 1999/22/EC of 29 March 1999 relating to the keeping of wild animals in zoos. *Official Journal of the European Communities*, L94/24-L94/26. <https://doi.org/10.1017/cbo9780511610851.041>
- Clayton, S., Fraser, J., & Saunders, C. D. (2009). Zoo experiences: Conversations, connections, and concern for animals. *Zoo Biology*, 28(5), 377–397. <https://doi.org/10.1002/zoo.20186>
- Collins, C., Corkery, I., McKeown, S., McSweeney, L., Flannery, K., Kennedy, D., & O’Riordan, R. (2020). An educational intervention maximizes children’s learning during a zoo or aquarium visit. *Journal of Environmental Education*, 1–20. <https://doi.org/10.1080/00958964.2020.1719022>
- Conde, D. A. (2013). The role of zoos. *Grzimek’s Animal Life Encyclopedia*, June, 207–215. https://www.researchgate.net/publication/259863205_The_Role_of_Zoos
- Costa, C. (2019). *A eficácia da educação ambiental nos campos de férias em Portugal - O caso de estudo do ATL do Zoo*. [Master’s thesis, Universidade Nova de Lisboa]
- Courcy, C., Ellis, J. F. J., Ellis, G. A., Kawata, K., Keeling, C. H., Kisling, V. N. J., Labuschagne, W., Solski, L., Strehlow, H., & Walker, S. (2000). *Zoo and aquarium history: ancient animal collections to zoological gardens* (V. N. Kisling (ed.)). CRC Press LLC. <https://doi.org/10.1201/9781420039245>
- Cruze, N. D., Khan, S., Carder, G., Megson, D., Coulthard, E., Norrey, J., & Groves, G. (2019). A global review of animal-visitor interaction in modern zoos and aquariums and their implications for wild animal welfare. *Animals*, 4.
- Dans, S. L., Crespo, E. A., & Coscarella, M. A. (2017). Wildlife tourism: Uuderwater behavioral responses of south american sea lions to swimmers. *Applied Animal Behaviour Science*, 188, 91–96. <https://doi.org/10.1016/j.applanim.2016.12.010>

- Davey, G. (2007). An analysis of country, socio-economic and time factors on worldwide zoo attendance during a 40 year period. *International Zoo Yearbook*, 41(1), 217–225. <https://doi.org/10.1111/j.1748-1090.2007.00007.x>
- de Lucia, C. (2020, March 27). *Chester Zoo live stream and tour of the animal enclosures - how to watch - YorkshireLive*. Examiner Live. <https://www.examinerlive.co.uk/whats-on/family-kids-news/chester-zoo-live-stream-tour-17991033>
- DEFRA. (2012a). *Secretary of State's Standards of Modern Zoo Practice*. DEFRA.
- DEFRA. (2012b). *Zoo Licensing Act 1981 - Guide to the Act's provisions*. DEFRA.
- DGE. (2019). *Principais cimeiras internacionais e resoluções*. <https://www.dge.mec.pt/principais-cimeiras-internacionais-e-resolucoes>
- Earth Charter. (2000). *What is the Earth Charter?* <https://earthcharter.org/about-us/>
- EAZA. (2013). *The modern zoo: foundations for management and development*. <https://doi.org/10.1038/119675a0>
- EAZA. (2016). *EAZA - Conservation education standards. September 2016*, 1–6. <https://www.eaza.net/assets/Uploads/Standards-and-policies/EAZA-Conservation-Education-Standards-2016-09.pdf>
- EAZA. (2018). *EAZA Guidelines on the use of animals in public demonstrations*. 1–4. <http://www.eaza.net/>
- EAZA. (2020). *ABOUT US » EAZA*. <https://www.eaza.net/about-us/>
- EAZA Nutrition Group. (2020). *EAZA - Animal Nutrition*. <https://www.eaza.net/about-us/areas-of-activity/eaza-nutrition-group/>
- EC. (2020). *EU Biodiversity Strategy for 2030*. In *Journal of Chemical Information and Modeling*. European Commission.
- Esson, M., & Moss, A. (2014). Zoos as a context for reinforcing environmentally responsible behaviour: the dual challenges that zoo educators have set themselves. *Journal of Zoo and Aquarium Research*, 2(1), 8–13.
- EU. (2016). *Classification of learning activities (CLA) - Manual*. In *Office of the European Union*. <https://doi.org/10.2785/874604>
- EU. (2020). *Biodiversity Strategy - Environment - European Commission*. EU Website.

- https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm
- Falk, J. H., Reinhard, E. M., Vernon, C. L., Bronnenkant, K., Deans, N. L., & Heimlich, J. E. (2007). *Why zoos & aquariums matter: assessing the impact of a visit to a zoo or aquarium*. Association of Zoos & Aquariums. www.aza.org
- Fernandes, A., Gonçalves, F., Pereira, M. J., & Azeiteiro, U. M. (2007). Educação ambiental: características, conteúdos, objectivos e actividades práticas. O caso português. In *Actividades Práticas em Ciência e Educação Ambiental*. Instituto Piaget.
- Gohn, M. da G. (2006). Educação não-formal, participação da sociedade civil e estruturas colegiadas nas escolas. *Ensaio:Aval.Pol.Públ.Educ.*, 14(50), 27–38.
- Graetz, M. (1995). *The role of architectural design in promoting the social objectives of zoos. A study of zoo exhibit design with reference to selected exhibits in Singapore Zoological Gardens*. [Master's thesis, National University of Singapore]
- Guerra, J., Schmidt, L., & Nave, J. G. (2008). Educação ambiental em Portugal: fomentando uma cidadania responsável. *VI Congresso Português de Sociologia*, June, 16.
- Hosey, G. (2005). How does the zoo environment affect the behaviour of captive primates? *Applied Animal Behaviour Science*, 90(2), 107–129. <https://doi.org/10.1016/j.applanim.2004.08.015>
- Hosey, G. (2008). A preliminary model of human-animal relationships in the zoo. *Applied Animal Behaviour Science*, 109(2–4), 105–127. <https://doi.org/10.1016/j.applanim.2007.04.013>
- Itoh, M. (2010). Zoos in Europe and World War II. In *Japanese wartime zoo policy. The silent victims of World War II* (First, pp. 121–143). PALGRAVE MACMILLAN.
- IUCN;, & UNESCO; (1970). *The international working meeting on environmental education in the school curriculum*.
- Jardim Zoológico de Lisboa. (2018). *História - Jardim Zoológico*. <https://www.zoo.pt/pt/conhecer/historia/>
- Jensen, E. (2010). Learning about animals , science and conservation: Large-scale

- survey-based evaluation of the educational impact of the ZSL London Zoo formal learning programme. In *ZSL* (Issue September).
- Jensen, E. (2014). Evaluating children's conservation biology learning at the zoo. *Conservation Biology*, 28(4), 1004–1011. <https://doi.org/10.1111/cobi.12263>
- Kreger, M. D., & Mench, J. A. (1995). Visitor—Animal Interactions at the Zoo. *Anthrozoös*, 8(3), 143–158. <https://doi.org/10.2752/089279395787156301>
- Larsen, M. J., Sherwen, S. L., & Rault, J. L. (2014). Number of nearby visitors and noise level affect vigilance in captive koalas. *Applied Animal Behaviour Science*, 154, 76–82. <https://doi.org/10.1016/j.applanim.2014.02.005>
- Lee, L. S., Lin, K. Y., Guu, Y. H., Chang, L. Te, & Lai, C. C. (2013). The effect of hands-on “energy-saving house” learning activities on elementary school students' knowledge, attitudes, and behavior regarding energy saving and carbon-emissions reduction. *Environmental Education Research*, 19(5), 620–638. <https://doi.org/10.1080/13504622.2012.727781>
- Lewis, S. (2020, March 18). *These zoos and aquariums are live-streaming animals for people to enjoy during coronavirus isolation - CBS News*. CBS News. <https://www.cbsnews.com/news/coronavirus-zoos-aquariums-live-stream-animals-isolation-quarantine/>
- Light, D., & Cerrone, M. (2018). Science Engagement via Twitter: Examining the Educational Outreach of Museums, Zoos, Aquariums and Other Science Organizations. *Visitor Studies*, 21(2), 175–188. <https://doi.org/10.1080/10645578.2018.1560747>
- Loisel, G. (1912). *Histoire des ménageries de l'antiquité à nos jours (3vols.)*. Octave Doin et Fils and Henri Laurens.
- Macdonald, E. (2015). Quantifying the impact of Wellington Zoo's persuasive communication campaign on post-visit behavior. *Zoo Biology*, 34(2), 163–169. <https://doi.org/10.1002/zoo.21197>
- MADRP, (2003). Decreto-Lei n.o 59/2003 de 1 de Abril. *Diário Da República*, 2108–2118.
- Manciocco, A., Chiarotti, F., & Vitale, A. (2009). Effects of positive interaction with caretakers on the behaviour of socially housed common marmosets (*Callithrix*

- jacchus). *Applied Animal Behaviour Science*, 120(1–2), 100–107.
<https://doi.org/10.1016/j.applanim.2009.05.007>
- Manzato, A. J., & Santos, A. (2012). A elaboração de questionários na pesquisa quantitativa. *Departamento de Ciência de Computação e Estatística – IBILCE – UNESP*, 1–17. http://www3.ufpe.br/moinhojuridico/images/ppgd/8.5a_questionario_elaboracao.pdf
- Mayes, C. G., & Mastro, E. (2016). Showcasing science and research. *WAZA Magazine*, 17.
- Mazur, N. (1997). *Contextualising the role of zoos in conservation: an Australasian experience*. [Master's thesis, The University of Adelaide]
- Mellor, D. J., Hunt, S., & Gusset, M. (2015). *Caring for wildlife: the world zoo and aquarium animal welfare strategy* [D. J. Mellor, S. Hunt, & M. Gusset (eds.)]. World Association of Zoos and Aquariums (WAZA) Executive Office.
- Miller, D. L. (2007). The seeds of learning: Young children develop important skills through their gardening activities at a midwestern early education program. *Applied Environmental Education and Communication*, 6(1), 49–66.
<https://doi.org/10.1080/15330150701318828>
- Moss, A., & Esson, M. (2013). The educational claims of zoos: Where do we go from here? *Zoo Biology*, 32(1), 13–18. <https://doi.org/10.1002/zoo.21025>
- Moss, A., Esson, M., & Bazley, S. (2010). Applied research and zoo education: The evolution and evaluation of a public talks program using unobtrusive video recording of visitor behavior. *Visitor Studies*, 13(1), 23–40.
<https://doi.org/10.1080/10645571003618733>
- Moss, A., Jensen, E., & Gusset, M. (2015). Evaluating the contribution of zoos and aquariums to Aichi Biodiversity Target 1. *Conservation Biology*, 29(2), 537–544.
<https://doi.org/10.1111/cobi.12383>
- Moss, A., Littlehales, C., Moon, A., Smith, C., & Sainsbury, C. (2017). Measuring the impact of an in-school zoo education programme. *Journal of Zoo and Aquarium Research*, 5(1), 33–37. <https://doi.org/10.19227/jzar.v5i1.217>
- Muñoz, M. (2002). Planeación educativa en los Centros de Recreación, Educación y Cultura ambiental. *Tópicos En Educación Ambiental*, 4(10), 63–74.

- <http://ww.anea.org.mx/Topicos/T 10/Paginas 63-74.pdf>
- Nelson, S. C. (2002). *Food and Thought What are Visitors Learning During Animal Feeding Time at the Zoo ?*, [Master's thesis, Australian National University]
- Normando, S., Pollastri, I., Florio, D., Ferrante, L., Macchi, E., Isaja, V., & de Mori, B. (2018). Assessing animal welfare in animal-visitor interactions in zoos and other facilities. A pilot study involving giraffes. *Animals*, 8(9). <https://doi.org/10.3390/ani8090153>
- Oliveira, H. (2012). As potencialidades didáticas das visitas de estudo: a percepção dos alunos sobre a aprendizagem desenvolvida. *XIII Coloquio Ibérico de Geografía*, 857–866.
- Perrie, S. (2020, March 19). *Aussie Zoos Are Live-Streaming Their Enclosures Amid Coronavirus Pandemic - LADbible*. LAB Bible. <https://www.ladbible.com/news/animals-aussie-zoos-are-live-streaming-enclosures-amid-coronavirus-pandemic-20200319>
- Powell, D. M., & Bullock, E. V. W. (2014). Evaluation of factors affecting emotional responses in zoo visitors and the impact of emotion on conservation mindedness. *Anthrozoos*, 27(3), 389–405. <https://doi.org/10.2752/175303714X13903827488042>
- Randler, C., Baumgärtner, S., Eisele, H., & Kienzle, W. (2007). Learning at workstations in the zoo: A controlled evaluation of cognitive and affective outcomes. *Visitor Studies*, 10(2), 205–216. <https://doi.org/10.1080/10645570701585343>
- Randler, C., Kummer, B., & Wilhelm, C. (2012). Adolescent Learning in the Zoo: Embedding a Non-Formal Learning Environment to Teach Formal Aspects of Vertebrate Biology. *Journal of Science Education and Technology*, 21(3), 384–391. <https://doi.org/10.1007/s10956-011-9331-2>
- Rasbach, P. (2016). Zoo and aquarium design - yesterday, today and (the day after) tomorrow. *WAZA Magazine*, 17, 2–3. www.waza.org.
- Redford, K. H., Jensen, D. B., & Breheny, J. J. (2013). The long overdue death of the ex situ and in situ dichotomy in species conservation. *World Association of Zoos and Aquariums Magazine*, 19–22. <https://www.waza.org/wp->

content/uploads/2019/02/waza_mag_14.pdf

- Rees, P. A. (2011). An introduction to zoo biology and management. In *An Introduction to Zoo Biology and Management*. <https://doi.org/10.1002/9781444397840>
- Rio+20. (2012). *Sobre a Rio+20*. http://www.rio20.gov.br/sobre_a_rio_mais_20.html
- Rodríguez-Guerra, M., Muñoz, V. H., Galhardo, L., Hernández, M. F., Sikkema, R., Bacon, H., Smith, N., & Schrijver, R. (2015). EU Zoos Directive Good Practices Document. In D. J. Dewar & K. Meijer (Eds.), *EU Biodiversity Strategy for 2030*. Publications Office of the European Union. <https://doi.org/10.2779/247108>
- Rose, P. E., Hunt, K. A., & Riley, L. M. (2018). Animals in an online world; An evaluation of how zoological collections use social media. *Journal of Zoo and Aquarium Research*, 6(2), 57–62.
- RSPCA, R. S. for the P. of C. to A. (2006). *The welfare state: measuring animal welfare in the UK 2006 - Evaluation of the effectiveness of zoos in meeting conservation and education objectives in*. <http://weekly.cnbnews.com/news/article.html?no=124000>
- Salas, M., & Manteca, X. (2017). Visitor effect on zoo animals. *Zoo Animal Welfare Education Centre, December*, 1–2.
- Schloss Schönbrunn Kultur- und Betriebsges.m.b.H. (2018). *Zoo - Schönbrunn*. <https://www.schoenbrunn.at/en/about-schoenbrunn/gardens/tour-through-the-park/zoo/>
- Serantes, A. (2005). *Guía dos equipamentos para a educación ambiental na Galiza e doutras instalacións para a divulgación do patrimonio* (A. Serantes (ed.); 1º, Issue Setembro). A Coruña: CEIDA.
- Serantes, A. (2006). E aínda así, sobreviven. Os procesos de calidade nos equipamentos para a educación ambiental. *AmbientalMENTEsustentable*, 1(1–2), 193–208.
- Serantes, A., & Barracosa, H. (2008). Contributos dos equipamentos de educación ambiental para as estratégias de acción local. Estudos de caso na Galiza e no Norte de Portugal. In E. A. do N. Peninsular (Ed.), *Estratexias de educación ambiental. Modelos, experiencias e indicadores para a sostenibilidade local* (pp.

179–198).

- Seybold, B., Braunbeck, T., & Randler, C. (2014). Primate Conservation-an Evaluation of Two Different Educational Programs in Germany. *International Journal of Science and Mathematics Education*, 12(2), 285–305. <https://doi.org/10.1007/s10763-013-9405-0>
- Skibins, J. C., & Powell, R. B. (2013). Conservation caring: Measuring the influence of zoo visitors' connection to wildlife on pro-conservation behaviors. *Zoo Biology*, 32(5), 528–540. <https://doi.org/10.1002/zoo.21086>
- Smith, L., Broad, S., & Weiler, B. (2008). A closer examination of the impact of zoo visits on visitor behaviour. *Journal of Sustainable Tourism*, 16(5), 544. <https://doi.org/10.2167/jost817.0>
- Stanley, K. (2016). Zoo and aquarium design – The impact of experience. *WAZA Magazine*, 17.
- Stirling, J., Griffith, M., Dooley, J. S. G., Goldsmith, C. E., Loughrey, A., Lowery, C. J., McClurg, R., McCorry, K., McDowell, D., McMahon, A., Millar, B. C., Rao, J., Rooney, P. J., Snelling, W. J., Matsuda, M., & Moore, J. E. (2008). Zoonoses associated with petting farms and open zoos. *Vector-Borne and Zoonotic Diseases*, 8(1), 85–92. <https://doi.org/10.1089/vbz.2006.0639>
- Teixeira, F. (2012). Educação ambiental: um itinerário persistente e crítico de expansão de cidadania. *Philosophica*, 40, 95–122.
- Tofield, S., Coll, R. K., Vyle, B., & Bolstad, R. (2003). Zoos as a source of free choice learning. *Research in Science and Technological Education*, 21(1), 67–99. <https://doi.org/10.1080/02635140308342>
- Traylor-Holzer, K., Leus, K., & McGowan, P. (2013). *Integrating assessment of ex situ management options into species conservation planning*. *WAZA Magazine* 14, 6–9.
- Turley, S. K. (1998). Exploring the future of the traditional UK zoo. *Journal of Vacation Marketing*, 5(4), 340–355. <https://doi.org/10.1177/135676679900500404>
- UN. (n.d.-a). *Goal 4 .:. Sustainable Development Knowledge Platform*. Retrieved May 15, 2020, from <https://sustainabledevelopment.un.org/sdg4>

- UN. (n.d.-b). *Sustainable Development Goals ∴ Sustainable Development Knowledge Platform*. Retrieved May 15, 2020, from <https://sustainabledevelopment.un.org/?menu=1300>
- UN. (1992). *Declaração do Rio sobre Ambiente e Desenvolvimento. Agenda 21: programa de acção global para o desenvolvimento sustentável no século 21*.
- UN. (2000a). *United Nations Conferences, Meetings and Events*. United Nations Web Sites. https://www.un.org/en/events/pastevents/millennium_summit.shtml
- UN. (2000b). *United Nations Millennium Development Goals - Goal 7: Ensure Environmental Sustainability*. United Nations Web Sites. <https://www.un.org/millenniumgoals/environ.shtml>
- UN. (2012). *Report of the United Nations Conference on Sustainable Development* (Issue June).
- UNESCO-UIS. (2012). The International Standard Classification of Education (ISCED) 2011. In UNESCO-UIS. UNESCO Institute for Statistics. <https://doi.org/10.1007/BF02207511>
- UNESCO-UNEP. (1975). The Belgrade Charter. *Connect: UNESCO-UNEP Environmental Education Newsletter*. <https://doi.org/10.1007/BF02220144>
- UNESCO-UNEP. (1978). *Intergovernmental Conference on Environmental Education, Tbilisi, USSR: final report* (Issue Abril).
- UNESCO-UNEP. (1987). *International strategy for action in the field of environmental education and training for the 1990s*.
- UNESCO. (2019). *UN Decade of ESD*.
- United Nations. (2000). United Nation Millennium Declaration: resolution adapted by the general assembly. In *General Assembly* (Issue September). http://www.un.org/en/events/pastevents/millennium_summit.shtml
- Wagoner, B., & Jensen, E. (2010). Science learning at the zoo: evaluating children's developing understanding of animals and their habitats. *Psychology & Society*, 3(1), 65–76.
- WAZA. (2005). Building a future for wildlife. In *The World Zoo and Aquarium Conservation Strategy*. <https://doi.org/10.1002/zoo.20327>
- WAZA. (2015a). *Comprometendo-se com a conservação: a estratégia mundial de*

conservação dos zoológicos e aquários (World Association of Zoos and Aquariums (WAZA) Executive Office (ed.)).

WAZA. (2015b). WAZA: 80 Years of History at a Glance. *WAZA News*, 2–5.

WAZA. (2020). *WAZA Guidelines for Animal - Visitor Interactions*. April, 1–6.

Wierucka, K., Siemianowska, S., Woźniak, M., Jasnosz, K., Kieliszczyk, M., Kozak, P., & Sergiel, A. (2016). Activity budgets of captive cape fur seals (*Arctocephalus pusillus*) under a training regime. *Journal of Applied Animal Welfare Science*, 19(1), 62–72.
<https://doi.org/10.1080/10888705.2015.1106945>

Wünschmann, S., Wüst-Ackermann, P., Randler, C., Vollmer, C., & Itzek-Greulich, H. (2017). Learning achievement and motivation in an out-of-school setting — Visiting amphibians and reptiles in a zoo Is more effective than a lesson at school. *Research in Science Education*, 47, 497–518.
<https://doi.org/10.1007/s11165-016-9513-2>

9. Annex

9.1. Annex 1 – Questionnaire in English

Questionnaire

Mr./Mrs.

My name is Maria Santos and I attend the Master in Applied Ecology, at the University of Aveiro. Within my dissertation I intend to study the Educational Activities in Zoological Parks (Zoos), at Portuguese and International level. The success of this study depends on your participation and on filling this questionnaire as completely as possible. The data collected is anonymous and will be used for scientific purposes. Thank you in advance for your cooperation.

Part 1 - Characterization of Zoo

- A. Zoo location (Country): _____
- B. Zoo area (m²): _____
- C. Total number of animals in the zoo: _____
- a. Number of Mammals: _____
- b. Number of Reptiles: _____
- c. Number of Amphibia: _____
- d. Number of Birds: _____
- e. Number of Insects: _____
- f. Number of Fish: _____
- g. Number of Arachnids: _____
- D. Number of species in the zoo: _____
- E. Majority of zoo revenue:
- Visiting tickets
- Private donations
- Public investment
- Others: _____
- F. Number of visitors in 2019: _____

G. Period of the year with the most visitors: _____

H. Annual expenses for animal feed in 2019:

- Less than 18000€
- Between 18000€ and 30000€
- Greater than 30000€

I. Annual expenses for medical care for animals in 2019:

- Less than 18000€
- Between 18000€ and 30000€
- Greater than 30000€

Part 2 - Educational Activities

1. Does the zoo carry out specific educational activities?

YES NO

2. If you answered YES to question 1, please indicate which:

- Species information panels
- Educational presentations
- Guided visits to family groups
- Guided visits to non-school institutions
- Guided visits to school institutions
- Educational holiday camps
- Others: _____

3. If the zoo conducts educational presentations, indicate which:

- Presentation of birds
- Presentation of reptiles
- Presentation of mammals
- Feeding activities
- Others? _____

4. Does the zoo conduct educational activities with direct contact between animals and visitors?

YES NO

5. If you answered YES to question 4, indicate what kind of activities:

- "Cub petting"
- Feeding

- Supervised touch
 - Photographs with animals
 - Others:
-

6. If you answered YES to question 4, please indicate which aspects are a priority for these activities:

- Animal safety
 - Visitor safety
 - Animal safety and visitor safety
 - Animal welfare
 - Others:
-

7. Does the zoo consider activities in the form of "shows" as education?

YES NO

8. Why? _____

9. The zoo receives school visits:

YES NO

10. If you answered YES to question 9, what was the number of students who visited the zoo in 2019? (If you answered NO to question 9, proceed to question 13)

11. Does the zoo conduct guided school visits?

YES NO

(If you answered NO to question 11, proceed to question 15)

12. If you answered YES to the previous question:

a. How many students participated in these visits in 2019?

b. What age group (or school level) do the students belong?

c. What is the structure of the visit?

13. Has the zoo ever carried out an assessment of the effectiveness of its educational activities?

YES NO

14. If you answered YES to the previous question: (If you answered NO proceed to question 15)

a. Indicate Which activities

b. What were the results of the evaluation? (If the evaluation has been done for several activities, describe the result for each one)

15. Does the zoo participate in educational projects under protocols with other institutions/zoos?

YES NO

16. If you answered YES to question 15, indicate which:

17. Does the zoo use social media as instruments of communication and education?

YES NO

18. If you answered YES to question 17, please indicate which:

Publication of videos or photos on social media about animals

Live Streaming on social media

Live Streaming on the zoo website

Others?

Thank you for your collaboration.

9.2. Annex 2 – Questionnaire in Spanish

Cuestionario

Exmo./a.,

Mi nombre es Maria Santos y asisto al Máster en Ecología Aplicada, en la Universidad de Aveiro. En mi disertación tengo la intención de estudiar las actividades educativas en parques zoológicos (zoológicos), a nivel portugués e internacional. El éxito de este estudio depende de su participación y de completar este cuestionario de la manera más completa posible. Los datos recopilados son anónimos y se utilizarán con fines científicos. Gracias de antemano por su cooperación.

Parte 1 - Caracterización del zoológico

- A. Ubicación del zoológico (ciudad, distrito, país): _____
- B. Área del zoológico: _____
- C. Número total de animales en el zoológico.: _____
- a. Numero de Mamíferos: _____
 - b. Numero de Reptiles: _____

- c. Numero de Anfibios: _____
- d. Numero de Aves: _____
- e. Numero de Insectos: _____
- f. Numero de Peces: _____
- g. Numero de Arácnidos: _____
- D. Numero de especies existen en el zoológico: _____
- E. Origen de la mayoría de los ingresos del zoológico:
- Entradas de visitas
- Donaciones privadas
- Inversión publica
- Otros: _____
- F. Número de visitantes en 2019: _____
6. Período del año con más visitantes: _____
6. Cantidad del gasto anual de 2019 para alimentación animal:
- Menos de 18000€
- Entre 18000€ y 30000€
- Superior a 30000€
- I. Cantidad del gasto anual de 2019 en atención médica para animales:
- Menos de 18000€
- Entre 18000€ y 30000€
- Superior a 30000€

Parte 2 – Actividades Educativas

1. El zoológico realiza actividades educativas específicas.?
 Sí NO
2. Si respondió SÍ a la pregunta 1, indique qué:
- Paneles informativos sobre especies
- Presentaciones educativas

- Visitas guiadas a familias
- Visitas guiadas a instituciones no escolares
- Visitas guiadas a instituciones escolares
- Campamentos educativos de vacaciones
- Otras: _____

3. Si el zoológico ofrece presentaciones educativas, indique qué:

- Presentación de aves
- Presentación de Reptiles
- Presentación de mamíferos
- Actividades de Alimentación
- Otras? _____

4. ¿El zoológico realiza actividades educativas en contacto directo entre animales y visitantes?

SÍ NO

5. Si respondió SÍ a la pregunta 4, indique qué tipo de actividades:

- "Cub petting"
- Alimentacion
- Toque supervisionado
- Fotografías con animales

[_____] Otras:

6. Si respondió SÍ a la pregunta 4, indique qué aspectos se consideraron prioritarios para estas actividades:

- Seguridad animal
- Seguridad del visitante
- Seguridad animal y seguridad del visitante
- Bienestar animal

[_____] Otras:

7. ¿Considera el zoológico las actividades como espectáculos educativos?

SÍ [] NO []

8. ¿Porqué? _____

9. El zoológico recibe visitas a la escuela:

SÍ [] NO []

10. Si respondió SÍ a la pregunta 9, ¿cuántos estudiantes visitaron el zoológico en 2019? (Si respondió NO a la pregunta 9, continúe con la pregunta 13) _____

11. ¿El zoológico realiza visitas guiadas a la escuela?

SÍ [] NO []

(Si respondió NO a la pregunta 11, continúe con la pregunta 15)

12. Si respondió SÍ a la pregunta anterior:

1. ¿Cuántos estudiantes hicieron estas visitas en 2019?

2. ¿En qué grupo de edad (o nivel escolar) están los estudiantes?

3. ¿Cuál es la estructura de la visita?

13. ¿Ha realizado alguna vez el zoológico una evaluación de la efectividad de sus actividades educativas?

SÍ [] NO []

14. Si respondió SÍ a la pregunta anterior: (Si respondió NO, continúe con la pregunta 15)

a. Indique cuáles / qué actividades

b. ¿Cuáles fueron los resultados de la evaluación? (Si la evaluación se ha realizado para varias actividades, describa el resultado para cada una)

15. ¿El zoológico participa en proyectos educativos bajo protocolos con otras entidades / zoológicos?

SÍ [] NO []

16. Si respondió SÍ a la pregunta 15, indique qué:

17. ¿Utiliza el zoológico las redes sociales como instrumentos de comunicación y educación?

SÍ [] NO []

18. Si respondió SÍ a la pregunta 17, indique qué:

[] Publicación de videos o fotos en redes sociales sobre animales

[] Transmisión en vivo en redes sociales

[] Transmisión en vivo en el sitio web del zoológico

[] Otras?

Gracias por tu participación

9.3. Annex 3 – Questionnaire in Portuguese

Questionário

Exmo./a.,

O meu nome é Maria Santos e frequento o Mestrado em Ecologia Aplicada, na Universidade de Aveiro. No âmbito da minha dissertação pretendo estudar as Actividades Educativas em Parques Zoológicos (Zoos), a nível nacional e internacional. O sucesso deste estudo depende da sua participação e no preenchimento deste questionário da forma mais completa possível. Os dados recolhidos são de carácter anónimo e serão utilizados para fins científicos. Desde já o meu muito obrigado pela sua colaboração.

Parte 1 – Caracterização do Zoo

A. Localização do zoo (Cidade, Distrito, País):

B. Área do zoo: _____

C. Número total de animais existentes no zoo: _____

a. Número de Mamíferos: _____

b. Número de Répteis: _____

c. Número de Anfíbios: _____

d. Número de Aves: _____

e. Número de Insectos: _____

f. Número de Peixes: _____

g. Número de Aracnídeos: _____

- D. Número de espécies existem no zoo: _____
- E. Origem maioritária das receitas do zoo:
 Bilhetes de visitas
 Doações privadas
 Investimento público
 Outras: _____
- F. Número de visitantes no ano de 2019: _____
- G. Período do ano com mais visitantes: _____
- H. Valor da despesa anual de 2019 para alimentação dos animais:
 Inferior a 18000€
 Entre 18000€ e 30000€
 Superior a 30000€
- I. Valor da despesa anual de 2019 com cuidados médicos aos animais:
 Inferior a 18000€
 Entre 18000€ e 30000€
 Superior a 30000€

Parte 2 – Atividades Educativas

- O zoo realiza atividades educativas específicas?
SIM NÃO
- Se respondeu SIM à questão 1, indique quais:
 Placas informativas sobre as espécies
 Apresentações educativas
 Visitas guiadas a grupos familiares
 Visitas guiadas a instituições não escolares
 Visitas guiadas a instituições escolares
 Colónias de férias educativas
 Outras: _____
- Se o zoo realiza apresentações educativas, indique quais:
 Apresentação de aves
 Apresentação de répteis
 Apresentação de mamíferos
 Atividades de Alimentação
 Outras? _____
- O zoo realiza atividades educativas com contacto direto entre os animais e os visitantes?
SIM NÃO
- Se respondeu SIM á questão 4, indique que tipo de atividades:
 “Cub petting”

- Alimentação
 - Toque supervisionado
 - Fotografias com os animais
 - Outras:
-

6. Se respondeu SIM á questão 4, indique quais os aspetos considerados como prioritários para a realização destas actividades:

- Segurança do animal
 - Segurança do visitante
 - Segurança do animal e segurança do visitante
 - Bem-estar do animal
 - Outras:
-

7. O zoo considera as atividades em forma de “show” educativos?

SIM NÃO

8. Porquê?

9. O zoo recebe visitas escolares:

SIM NÃO

10. Se respondeu SIM á questão 9, qual foi o número de alunos a visitaram o zoo no ano de 2019? (Se respondeu NÃO á questão 9, prossiga para a questão 13)

11. O zoo realiza visitas escolares guiadas?

SIM NÃO

(Se respondeu NÃO á questão 11, prossiga para a questão 15)

12. Se respondeu SIM à pergunta anterior:

a. Quantos alunos realizaram estas visitas no ano de 2019?

b. De que faixa etária (ou escolar) são os alunos?

c. Qual a estrutura da visita?

13. Alguma vez o zoo realizou uma avaliação da eficácia das suas atividades educativas?

SIM [] NÃO []

14. Se respondeu SIM à pergunta anterior: (Se respondeu NÃO prossiga para a questão 15)

a. Indique Qual/Quais atividades

b. Quais foram os resultados da avaliação? (Caso a avaliação tenha sido feita a varias atividades descreva o resultado para cada uma)

15. O zoo participa em projectos educativos ao abrigo de protocolos com outras entidades/Zoos?

SIM [] NÃO []

16. Se respondeu SIM á questão 15, indique quais:

17. O zoo utiliza as redes sociais como instrumentos de comunicação e educação ?

SIM [] NÃO []

18. Se respondeu SIM à questão 17, indique quais:

Publicação de vídeos ou fotos nas redes sociais sobre os animais

Realização de *Live Streaming* nas redes sociais

Realização de *Live Streaming* no site do zoo

Outras?

Obrigado pela sua participação.