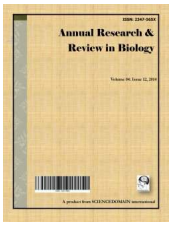

*Annual Research & Review in Biology*

***20(2): 1-5, 2017; Article no.ARRB.37018***
***ISSN: 2347-565X, NLM ID: 101632869***

# Environmental Enrichment in the Awareness of Zoo Visitors and the General Public

**Gardiánová Ivana[1*], Hartl Martin[1] and Štrachová Jitka[1]**

*[1]Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Czech Republic.*

***Authors' contributions***

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

***Article Information***

DOI: 10.9734/ARRB/2017/37018
Editor(s):
(1) George Perry, Dean and Professor of Biology, University of Texas at San Antonio, USA.
Reviewers:
(1) Eliane Barbosa Evanovich dos Santos, Federal University of Pará, Brazil.
(2) Papa Ibnou Ndiaye, Université Cheikh Anta Diop, Senegal.
(3) Robin Cook, University of the Witwatersrand, South Africa.
Complete Peer review History: http://www.sciencedomain.org/review-history/22012

***Original Research Article***

***Received 27th September 2017***
***Accepted 8th November 2017***
***Published 22nd November 2017***

## ABSTRACT

**Aim:** A questionnaire was designed to determine if the general public and zoo visitors are aware of environmental enrichment and its types, whether they have noticed enrichment of different types in zoo enclosures and exhibits, and how the respondents appreciate such enrichment.
**Materials and Methods:** A questionnaire was prepared with 19 questions about enrichment awareness, types of enrichment, use of enrichment types, and appreciation of enrichment. Another 4 questions were about the respondents themselves. The respondents were questioned directly at two zoos (zoo visitors) and in two cities (general public). The respondents were selected randomly. A total of 450 respondents answered the questionnaire.
**Results:** The results of the questionnaire show that both zoo visitors and the general public have very low awareness of environmental enrichment. Only one-third of the 450 respondents knew what enrichment means. For more than half of the respondents, seeing the questionnaire was the first time they had heard about environmental enrichment. Some respondents had obtained information from television, radio, or the press. The most visible and most frequently used types of enrichment were physical, sensory, cognitive, and feeding. Physical enrichment was the most interesting for the public. In comparing enrichment by animal groups, enrichment for primates was rated as the best,

**Corresponding author: E-mail: gardianova@af.czu.cz;*

whereas enrichment for felines was rated the poorest. The results indicate enrichment was regarded as positive for animals and interesting for the respondents.
**Conclusion:** Overall, the respondents rated environmental enrichment positively and the public had some sense of its existence. Although many people did not completely understand the term "enrichment," they said they had seen it but did not recognize it for what it was, taking enrichment elements as just a part of the enclosure. Many respondents had also seen different versions of enrichment.

*Keywords: Awareness; environmental enrichment; public; questionnaire; visitors; zoo.*

## 1. INTRODUCTION

The question of protection and welfare of animals under human care is frequently debated. It is interesting to determine whether the public is aware of the existence of environmental enrichment and whether zoo visitors or the public know that enclosures are intentionally enriched. A number of studies deal with ways to enrich animals' environments, but there are few studies examining whether zoo visitors and the general public recognize this term, know what it is, have seen it, or find it interesting. Environmental enrichment encompasses all efforts to improve the conditions of animals under human care [1]. According to Young [2], environmental enrichment indicates how the environment of animals under human care can change to conform to the animals' behavior. There are various types of enrichment: social, cognitive, structural, feeding, and sensory. Enrichment is a dynamic process. Its aim is to create changes in management and breeding practices to increase behavioral choices (to shape appropriate behavior and abilities for each individual species) and thereby to improve the animals' welfare. The most common objectives of environmental enrichment include to increase behavior diversity, prevent the development of abnormal behavior (or reduce its frequency or intensity), reduce the frequency of stereotypies (pacing, circling, twirling, restlessly running, self-biting, biting tail or foot, playing with tongue, mouthing fence, rocking, weaving, etc.), increase the range and number of species-specific behaviors, increase positive use of the environment, and enhance the animal's ability to deal with situations in its natural way [3]. According to Watters, Miller and Sullivan [4], environmental enrichment is widely used to stimulate the animals' use of "free time," which then seems more natural and more diverse than that of animals without an enriched environment. At the same time, Hare, Rich and Worley [5] argue that enrichment is currently recognized as a necessity and not a luxury. Enrichment is a good way to improve the environment the animals live in and, at the same time, better introduce the animals to the public, thereby encouraging the visitors to spend more time with the specific animal. The animals are more animated in an environment enriched with toys, puzzles, or food, and they engage in play which is more interesting for visitors [6]. Tofield et al. [7] indicate that adding enriching stimuli increases public interest in the zoo. Public interest is important, and visitors respond positively to an enriched habitat which stimulates species-typical behavior in zoos. This may lead to increased appreciation of the animals and improve public understanding, and it provides an opportunity for education. In recent years, there has been an exponential increase in the number of articles on enrichment [8]. Most of the literature on enrichment describes employee and zoo-wide procedures with a focus on increasing welfare for specific groups of animals. Enrichment elements may be placed in strategic locations to allow visitors to quickly spot the animals and to watch their active behavior and interaction with the enrichment elements [9].

## 2. MATERIALS AND METHODS

To evaluate enrichment awareness of the general public and zoo visitors, a questionnaire with 23 questions was prepared. Of these, 19 questions were concerned with the awareness of environmental enrichment, its use, level of interest, and types of enrichment. The 4 final questions were concerned with information about the respondents themselves. The questionnaire was filled out by zoo visitors and the general public in other places. A total of 450 people filled in the questionnaire. These included 109 respondents at Prague Zoo, 132 people at Zoo Ústí nad Labem, 100 people at various public locations in Prague, and 109 people at various places in Pardubice. The respondents were randomly selected. The results were aggregated using Microsoft Excel 2016 and converted to

percentages and sums of responses. Statistical evaluation was performed using SAS 9.2©. Significant differences among the means were determined using the Wilcoxon signed-rank test. All tests used $P < 0.05$ for establishing statistical significance. The questionnaire survey was conducted in July and August.

## 3. RESULTS AND DISCUSSION

Zoos endeavor to enrich the environment of their animals as much as possible in order to improve the animals' conditions and because the enriched environment and enriching activities increase the visitors' interest in the animals [6]. Raising public awareness about environmental enrichment for animals will result in an understanding of the animal-care processes used in the zoo and may even make private breeders apply similar enrichment for their farm animals. As zoo visitors get to know what environmental enrichment is and why it is used, this may improve the visitors' cooperation with the zoo. For example, the management of Pilsen Zoo asked the public to donate old balls for lions and tigers [10].

Our results show that only 35% of the respondents are significantly aware of environmental enrichment. The majority of respondents (75%) had never heard this term.

Each respondent had seen more than one enrichment type. About 90% of the respondents had seen physical enrichment, 75% sensory enrichment, 72% cognitive enrichment, 63% feeding enrichment, and 62% social/contact enrichment.

Fifty percent of respondents considered the physical type to be the most frequently used, followed by feeding enrichment (40%), social enrichment (6%), and cognitive enrichment (3%). Only 1% of respondents considered sensory enrichment to be the most frequently used.

Statistically the most interesting type for respondents (more than 55%) was feeding enrichment (Question 12), followed by cognitive and physical enrichment. Just over 5% preferred social enrichment, and the least interesting was sensory enrichment (see Table 2). Our results are similar to those of Hoy, Murray and Tribe, who found using a questionnaire that feeding enrichment was considered the most important category of enrichment, followed by tactile, structural, sensory (specifically olfactory), and social enrichment [8].

**Table 1. Questionnaire**

| Number | Question |
|---|---|
| 1. | Do you know the term "environmental enrichment"? – Yes/No |
| 2. | "Environmental enrichment" means: …….. |
| 3. | Where did you first see information about this term? – Internet / TV / Press / Zoo / friends / this questionnaire |
| 4. | Have you seen the use of enrichment in a zoo? – Yes/No |
| 5. | Have you seen feeding enrichment? – Yes/No |
| 6. | Have you seen physical enrichment (objects, toys)? – Yes/No |
| 7. | Have you seen social enrichment (animal, human)? – Yes/No |
| 8. | Have you seen sensory enrichment (scent, hearing, etc.)? – Yes/No |
| 9. | Have you seen cognitive enrichment (training, work)? – Yes/No |
| 10. | Which type do you think is most commonly used? – feeding/physical/social/sensory/cognitive |
| 11. | Which type have you noticed the most? feeding/physical/social/sensory/cognitive |
| 12. | Which type do you find the most interesting? feeding/physical/social/sensory/cognitive |
| 13. | At which enclosure did you like enrichment the most? |
| 14. | At which enclosure did you not like the enrichment? |
| 15. | For which group of animals do you think enrichment is used the most? mammals/birds/reptiles/fish |
| 16. | Are you perceptive of enrichment elements in enclosures? – Yes/No |
| 17. | Do you pay attention to the environments zoo animals live in? – Yes/No |
| 18. | Do you think enrichment has a positive effect on the animals? – Yes/No |
| 19. | Do you think enrichment in this zoo is - sufficient/insufficient? |
| Additional questions related to age, gender, number of zoo visits, and education. | |

**Table 2. Respondents' interest in enrichment types**

| Enrichment type | Mean (N) | Mean (%) |
|---|---|---|
| Feeding | 270[a] | 60[a] |
| Cognitive/work | 90[b] | 20[b] |
| Physical | 54[b] | 12[b] |
| Social | 27[bc] | 6[bc] |
| Sensory | 9[c] | 2[c] |

*Means within a column with different superscripts are significantly different at P < 0.05, (* P < 0.05, ** P < 0.001), df = 3*

A significant 92% of respondents stated that they considered enrichment to be beneficial, while 95% of respondents had seen enrichment used at a zoo and 83% considered the enrichment at the particular zoo to be sufficient.

This questionnaire had a positive effect on the respondents' knowledge. Significantly, most respondents (65%) learned about enrichment for the first time from the questionnaire, 12% had found information on a website, 7% in a zoo, 4% from television, 2% from the press, and 6% from other sources.

In terms of respondents' enjoyment, 43% of respondents stated that they liked the enrichment in primate enclosures best, while 27% favored enrichment for pinnipeds, 6% for ungulates, 4% for birds, and 2% for carnivores. One percent of respondents answered "I don't know."

A significant majority of respondents (95%) believed enrichment most frequently occurs in mammals while 4% of respondents answered birds and 1% reptiles. A significant majority of respondents (96%) noted enrichment in the enclosures and 90% of respondents paid attention to the animals' environments. Hoy, Murray and Tribe [8] report that enrichment is most frequently offered to primates and predators. According to our results, respondents enjoyed enrichment for primates the most (43% of the respondents), while enrichment for felines had the most negative responses. This may be due to the fact that although cats have enrichment elements at their disposal they do not use them frequently and spend most of the day relaxing. Unfortunately, this may give visitors very negative impressions.

Byrne [11] reports that 96% of visitors said the introduction of tools for games/work is very important for the welfare of the animals. This is consistent with our results. The vast majority of respondents (96%) indicated that enriched environments have a positive effect on the animals. Enrichment is also beneficial for people, because they spend more time looking at the animals [6]. It is much more interesting for people if the animals spend more time playing and feeding and with reduced stereotypies [12]. Multispecies enclosures can also be very attractive for visitors as well as for certain animal species. Such enclosures tend to be very dynamic, with many direct animal interactions [13]. Ross and Gillepsi [14] also determined that zoo visitors stay for a longer time, watching animals like crocodiles, hippos and giraffes [15]. Many people visit zoos for recreation, to relax, and for fun. Luebke and Matiasek [16] determined that active animals and a varied environment (in terms of visitors' distance from animals, high quality and diversity of the enclosures) may change and intensify the visitors' impressions, thereby prolonging the visitors' stays at the zoo. In this context, zoological gardens design exhibits and pavilions to promote the natural education of their visitors. At the same time, the visits are both a form of enrichment themselves and affect the other enrichment elements, although these also can be stressful for the animals [17]. Active animals are much more fascinating and exciting than stuffed animals in museums [18], and visitors leave the zoo with a positive impression of the zoo and the animals.

Most respondents were in the 27–45 age range (about 55%) while 15% were in the 46–60 range, 23% in the 18–26 range, 5% in the category over 61 years of age, and 2% were under 18.

The majority of respondents (60%) had completed secondary education, 25% were university graduates, 10% had completed elementary school, and 5% were tertiary technical school graduates.

About 56% of respondents visit a zoo once per year, 27% of respondents visit a zoo up to 5 times per year, 5% visit a zoo 6–8 times per year, and 12% of respondents visit a zoo 9 or more times per year. More than 90% of respondents had a pet at home (95%), and 72% of respondents were women.

## 4. CONCLUSION

The questionnaire results showed that most zoo visitors and the general public are not familiar with the concept of "environmental enrichment" or its meaning. A very positive finding was that people do in fact take notice of

the animal enclosures and the individual components and equipment therein. Even though they were not familiar with the term, they stated that they had seen it without having known it was enrichment. After the term “enrichment” was explained to them, the people began to take more notice of other enrichment in the animal enclosures. Only a minority of respondents stated that they first learned about enrichment at a zoo. Unfortunately, certain zoos inform visitors about enrichment only in lectures concerning the individual animals, such as in the case of providing commentary at feeding time. Although few people are aware of enrichment, almost every visitor had seen one or more forms of enrichment without having known it to be environmental enrichment and an improvement of the animals’ environment. The respondents most frequently recognized physical, sensory and cognitive enrichment, and they enjoyed feeding and cognitive enrichments most.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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*The peer review history for this paper can be accessed here:*
*http://sciencedomain.org/review-history/22012*