Introduction

Zoos and aquariums are usually seen as recreational or entertainment centers. In fact, recent market research conducted by Fundación Botánica y Zoológica de Barranquilla, rated the Barranquilla Zoo as a space for recreation and entertainment over its educational potential (FUNDAZOO, 2014). This situation has led us to question the needs, expectations, behaviours and real learning opportunities that visitors have when visiting the Zoo. It is important to note that of the many definitions of learning, we have selected one inherent to modern constructivism that extracts three prototypical traits of good learning, which would imply a long-lasting change, transferable to new situations as a direct consequence of the experience (Pozo, 1996).

But, where to begin? Certain authors include the dwell time in zoos as one of the factors that influence learning (Hein, 1998; Serrell, 1998; Serrell, 2000; Ross and Lukas, 2005) and given that the average dwell time of a visitor in an area of the Zoo (exhibit, path, station, point of interpretation) can be very brief, the learning opportunities could also be very limited (Serrell, 1998). In other words, the experiences provided to visitors must impact and be effective in very little time to attain learning that can be evidenced and assessed; in this way, one could learn the behaviors associated to the efficient use of educational resources by the Zoo, looking into the major characteristics of visitors during their visit.

This article presents part of the results of two Timing & Tracking studies, a technique that consists of observing visitors during visit to the Zoo, conducted during 2010-2011 and 2014–2015. The purpose was to determine whether the improvements implemented as a result of the findings of the first study made a difference in the behavior and dwell time of the visitors that took part in the second study. In addition, it was also researched whether the Zoo facilitated conditions to promote learning.

Standardized Study of Visitors

Developing standardized methods for assessing visitor experiences is one of the main challenges of modern zoos and aquariums. Their purpose is to explore motivations, interests, expectations, attitudes and behaviors of the public in order to relate them with compliance of the educational objectives of said centers (Ross & Lukas, 2005). Tracking techniques and time
spent at an exhibit (dwell time) are mechanisms that presently allow for a detailed recording of where they go, how much time they spend at an exhibit or area and, overall, what visitors do at an informal education center (Yalowitz, Bronnenkant, 2009). Melton (1935), was the pioneer of these observations that record visitor movements in museums (Tracking), to which others highlight the importance of measuring the time that visitors spend in observing the exhibits (Timing) such as Serrell (1998), Ross and Lukas (2005) and Yalowitz and Bronnenkant (2009).

According to Ross & Lukas (2005), research indicates a positive relation between the time visitors spend observing the elements of an exhibit and the learning produced. Hence, the more time a visitor spends at an exhibit, one expects he or she has more opportunities of learning and building knowledge from the questions, comments and inquiries that result from the messages one wants to communicate or from his/her own concerns. Similarly, if visitors do not observe, interact or read at the exhibits, it is little likely that learning will result based on them (Surrey, 1998).

**First Steps: Evaluation of the Time Spent and Behavior of Visitors at the Barranquilla Zoo**

The first study on time spent performed at the Barranquilla Zoo enabled exploration of the attractiveness (the capacity or force each exhibit has to attract visitors) and holding (dwell time of people) of the exhibits (animal identification label, devices) and areas (rest, contact with animals and animal feeding), and hence implementing changes that could result in more significant experiences for visitors (FUNDAZOO, 2011). The main results of this first study allowed us to reach three main conclusions (Sierra & Olmos, 2012):

1. On average, visitors spend 111 minutes in their visit to the Zoo.
2. Talking to others and taking photographs are the most frequent behaviors in a visit to the Zoo.
3. Visitors use interactive devices more than signs that only display information.

Hence, the study resulted in the need to “provide less for more”. It was then decided to provide greater interaction in less time. In addition, the amount of information on the animal identification labels, signs and devices were reduced and, in turn, these resources were used to encourage attitudes and behaviors that promoted greater connection between visitors’ prior concepts and the messages one wants to convey through said channels. It was also concluded that a visit to the Zoo is more of a social experience than a contemplative one. Therefore, it was also concluded that group experiences and exchanges between Zoo educators and visitors should be encouraged.

Based on the conclusions, new informative signs for animal identification were designed, which purpose was to improve access, the time spent in front of them, and interactions, thus encouraging greater and better learning opportunities at the Zoo. This process favored design criteria of animal identification label consistent with the literature associated to learning in informal educational contexts, especially in museums and zoos.

Given the need to continue with the research processes and build new knowledge, the proposal was made to undertake a second study that would assess the effects of the new animal identification label on the time spent by visitors at the Zoo.

### Methodology

A quantitative research was conducted for seven months using the Timing and Tracking technique. The study was non-experimental, descriptive and crossover, and done in a natural context, it considered independent and dependent variables. The sample consisted of 327 subjects who were segmented based on gender and age.

To calculate the time spent at the Zoo a distribution format of the species per area was used, which had been made for the 2010 study and updated, taking into account the changes implemented.
consideration the changes that took place between 2010 and 2014.

The data collection stage lasted a total of four months. Three observers made records (data collection) and one additional observer took care of the replacements required during the observations. Three daily samples were collected on average, during the week and on weekends. Researchers would observe the visitor throughout his entire visit at the zoo, from arrival through exiting and, subsequently, would input the data in the WorkStudy +5 program.

### Results

As to the time spent by visitors at the Zoo (per exhibit, area or activity performed), when compared with the previous study, we found significant differences in time spent per exhibit, area, and activity performed invested by visitors. The foregoing was determinant on the 22 minutes increase (approximately) in the total time spent at the Zoo.

Table 1 shows that average time at the Zoo in 2014-2015 is of 131 minutes, underscoring the average time per Area, which is 8 minutes. On the other hand, with respect to exhibit attractiveness differences were found both in dwell time and in the position held by the first five species, eg. tigers having 4 min 6 secs in 2010-11 and 4 min 49 secs in 2014-15

Regarding the time spent with the new labels, we found out that the label with longest time is the tiger, with 40 seconds in total; representing 14% of the time a visitor stays at the exhibit. Likewise, during that time there are an average 22 interactions per visitor. This means that with the tiger animal identification label eight of the nine possible behaviours with the label happened.

According to the above, the number of general average interactions with the animal identification label is 16 interactions. The label with the higher interaction average is the jaguar (*Panthera onca*), with 31 interactions per visitor. This indicates that even though there is a relation, the number of interactions is not directly proportional to the interaction time.

Finally, there were 5431 behaviors with animal identification labels, among which “observe” had the highest number (1872), followed by read (1809). While actions such as using the QR code (that the animal identification label has), lead to only two interactions only. (The nine possible behaviors are listed in the table above right).

### Discussion & Conclusions

Visitor studies show a route or plan to undertake actions that are aimed at improving visitor experiences from a cognitive, social and emotional standpoint.

Considering the data found, it is possible to draw certain conclusions about the visit, animal identification labels, exhibits, and visitor characteristics.

Furthermore, one can identify how the changes made based on the prior Timing & Tracking study results had a significant impact on the time spent and experience of visitors at the Zoo and to compare them with theories or studies in similar contexts.

The results obtained enabled a better understanding of visitors. What they do. What they like. Where they go and how much time they take, are questions that allow us to identify elements that foster significant experiences of visitors during the time spent at the Zoo.

Hence, one of the most important findings is that visitors prefer to see exotic species. We find that exotic animals overall, have greater attractiveness than endemic animals (exclusive of one region in Colombia) and native animals (that can be naturally found in the country.) Similarly, one finding that is not surprising is that large animals are of greater attractiveness to visitors and receive greater attention than smaller animals (Bitgood and Benefield, 1987; Ward et al, 1998 quoted in Francis, Esson and Moss, 2007); this is reflected in comparisons of the time spent per exhibit.

Contrasting with this, we find that interactive devices such as the new animal identification labels or other devices present in the exhibit have an important impact on the general public because they are attention-catching and promote multiple benefits relating to learning, entertainment and group activities that bring families together (Brody, 1981; White and Marcellini 1986 quoted in Clark-Ridgway, Livingston and Smith, 2005). To the same extent, considering the text and images (Brennan, 1977 and Serrel, 1977) in the design of the new animal identification label and other devices, fostered greater learning experiences for visitors, a larger number of elements explored within the exhibit and a significant increase in time spent by visitors inside the zoo (Derwin and Piper, 1988 quoted in Clark-Ridgway, Livingston and Smith, 2005).

The most common actions by visitors with the animal identification label include observing, reading and...
manipulating (making them turn; using them). This is consistent with the purpose of an exhibit device. On the other hand, actions like reading out loud of the information on the sign was more common than photographing it or following one of its instructions; however, elements like the use of QR codes are not taken into account by visitors.

Lastly, Timing and Tracking studies enable an understanding of visitor behavior and enriching their experiences, considering that their needs and expectations are more aligned with their experience based on changes made as a product of the results of such studies. Further studies will be set in motion in the future with the purpose of assessing visitor experiences, not only in quantitative terms but also in qualitative terms.

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References