Abstract

Interpretation is a critical aspect of any zoo or aquarium’s educational mission. This study evaluated the impact of Tiger Trail, a new habitat for Sumatran tigers at the San Diego Zoo Safari Park featuring an immersive environment where the visitor’s journey unfolds through a storyline narrative. The study measured visitor knowledge of key messages, recall of interpretive elements, and reaction to the exhibit, and found that Tiger Trail visitors demonstrated significantly more knowledge of the exhibit’s key messages relative to a matched comparison group. The study also found that visitors who interacted with an interpreter or keeper exhibited slightly more knowledge relative to exhibit visitors who did not, and that those visitors expressed significantly more positive ratings of the exhibit and their self-assessed learnings. There is increasing interest in measuring the results of interpretive efforts in zoological settings (Li, 2014; Falk, Reinhard, Vernon, Bronnenkant, Deans & Heimlich, 2007). The International Zoo Educators Association (2015) states that “[e]valuation can be in many forms such as needs assessments or exhibition evaluations. It can also be used to gauge things such as the effectiveness of informal education or education techniques” (para. 1).

This article presents results from an impact evaluation of the Tiger Trail exhibit at the San Diego Zoo Safari Park. The study was commissioned to understand visitors' reactions to the exhibit and their activities within it, and investigated reception of key messaging. As interaction between visitors and zoo personnel has been established as a positive influence on visitor outcomes that include increased knowledge, conservation understanding and potential action (Anderson, Kelling, Pressley-Keough, Bloomsmith & Maple, 2003; Broad & Weiler, 1998), the study also compared outcomes between visitors who interacted with zoo personnel, and those who did not. The results of this evaluation were one important component that helped Tiger Trail receive the Association of Zoos & Aquarium’s 2015 Top Honors Exhibit Award.
Defining the Interpretive Experience

Tiger Trail is the new habitat for Sumatran tigers (*Panthera tigris sumatrae*) and an immersive story-framed experience for guests at San Diego Zoo Safari Park. Opened in May of 2014, the exhibit focuses on the critical role predators play in any ecosystem, highlights the Sumatran tiger’s endangered status, and presents multiple reasons for why the species is “on the edge” of extinction.

Initially, three key messages were developed to frame the interpretive experience:

1. **Forests:** Forests have amazing biodiversity
2. **Predators:** Predators are essential to the balance of any habitat
3. **Conservation:** Tiger populations have decreased to only 3,000 animals over the last 100 years; recent conservation efforts have helped prevent extinction

Secondary messages under each of the three areas further defined the information guests would receive through the various interpretive elements. Systematic design ensured that each of the developed interpretive elements aligned with the key messages, and contributed to educating Tiger Trail visitors.

The Resulting Visitor Experience

The Tiger Trail narrative attempts to engage the visitor from the moment he or she steps foot into the exhibit.

- Emerging from a bamboo forest, visitors traverse trails to encounter a logging camp (*photo left*). This camp of felled trees is actually a play area for children designed to demonstrate and relate conservation messaging based on established research (Worch & Haney, 2011; Chermayoff, Blandford, & Losos, 2001).

- The Tiger Trail Pondok (*photo below*) represents a small market stand in which wildlife products, some from poaching, are sold. A conservation volunteer talks with visitors about the role of such markets and what can be done to prevent the illegal killing of tigers and other species.

- A log walkway allows visitors to view the tigers while receiving key messages from interpretive panels and volunteers.

- An interactive wall provides visitors with keeper-guided, close-up experiences with Sumatran tigers. At various times, keepers open the large glass panels and interact with the tigers through only wire mesh, and allow visitors to interact as well. Additional opportunities for interaction, like this tug of war game, are available (*photo at start of article*).

- The Sambutan Longhouse includes interpretive panels and shaded seating for extended viewing is available.

- The Waterfall Grotto offers more tiger viewing and interpretive panels that address diet and the Sumatran tiger’s fight for survival (San Diego Zoo Safari Park, 2014).

Based on previous evaluation results (Marshall & Erickson, 2014), text panels are short and headlines convey key messages (*photo*). Artifact displays are used to capture the visitors’ attention and reinforce how poaching for animal parts and deforestation impacts tiger populations. Throughout the exhibit, visitors may encounter interpreters (San Diego Zoo Global volunteers) and tiger keepers who share interpretive information.
Materials and Methods
The evaluation featured a quasi-experimental, post-only design with a combination “Key Message Assessment” (assessment) and visitor reaction survey. The survey contained 24 assessment questions (aligned to each of the defined key messages), three visitor reaction questions (exhibit rating, self-assessment of knowledge gained), and demographic questions.

Over a five-day period during the 2014 summer season, an equal number of visitors were approached: (a) at the Safari Park entrance (the “comparison” group), and (b) following a viewing of the exhibit (the “Tiger Trail” group). Visitors were recruited with the purpose of balancing the two groups based on demographics of gender, age, and San Diego Zoo Global membership. Respondents completed the assessment/survey instrument using an iPad device. The final sample contained 600 individuals in each of the two groups (comparison, Tiger Trail visitors) that were statistically determined to be equivalent based on the demographic variables of interest.

Findings & Interpretation
Exhibit evaluation findings are presented in the following three key areas: (1) visitor recall of key messages; (2) impact of interpretive elements viewed and read; and (3) impact of interaction with interpreters and keepers.

1. Visitor Recall of Key Messages
Tiger Trail visitors demonstrated more knowledge of key message-related content and ideas than those who did not experience the exhibit. Figure below presents the average assessment scores between the two groups.

A t-test for independent groups proved the observed difference in scores between the two groups to be statistically significant ($p < .000$), suggesting essentially no possibility that observed differences are the result of random chance.

Chi-square analysis of responses on a question-by-question basis was used to investigate correct/incorrect response patterns.

For all 24 questions covering the three key messages and 18 secondary messages, a greater percentage of Tiger Trail visitors provided correct answers relative to the comparison group, and all differences proved to be statistically significant ($p < .000$ to $p < .013$).

The greatest differences between the two groups were specific to knowledge about: (a) the Sumatran tiger’s distribution; (b) illegal logging giving way to palm oil plantations; (c) why tigers are illegally sold on the black market and what body parts are in demand; and (d) conservation actions visitors can take—specifically the use of sustainable palm oil and woods.

Given the positive and reliable difference in recall, relationships between assessment scores and exhibit elements were investigated next.

2. Impact of Interpretive Elements Viewed and Read
On average, Tiger Trail visitors indicated that they had viewed and/or read 2.48 of the 7 key exhibit interpretive elements. In this analysis, the Tiger Trail group was split into two sub-populations: (1) those who had viewed three or more interpretive elements (50.5%); and (2) those who had viewed two or fewer (49.5%). Figure below depicts the resulting difference in performance between the two groups.

On average, Tiger Trail visitors who viewed/read at least three interpretive elements scored 2.79 points higher relative to those who viewed/read two or fewer. This difference proved statistically significant ($p = .000$).

Additional analysis of knowledge assessment scores by exhibit element demonstrated that, for the majority of exhibit elements, reading the interpretive panel text gave visitors an advantage on the assessment. This was especially true for visitors who had visited one or more of three interpretive-intensive key elements: the Pondok, Waterfall Grotto Area, and the Sambutan Longhouse. These visitors scored between 2.12 and 4.58 points higher relative to those who had not (all differences are statistically significant based on the t-test for independent groups procedure).
It should be noted that visitors are more likely to encounter an interpreter or keeper in these three areas.

3. Impact of Interaction with Interpreters & Keepers

Visitors who interacted with a keeper or interpreter had higher scores. However, these advantages were relatively small and did not prove statistically significant. An interesting trend was revealed in the visitor self-report survey data. For each of the three self-report questions, visitors who interacted with an interpreter and/or keeper indicated more positive perspectives about their visit experience. Figure below illustrates this trend through visitor ratings of the overall Tiger Trail exhibit. Analysis of Variance (ANOVA) procedures indicated that ratings from visitors with no human interaction differed to a statistically significant degree when compared to those who interacted with an interpreter (p < .008), and those who interacted with an interpreter and a keeper (p < .001).

Additionally, these same visitors were more likely to indicate learning something new about tigers (statistically significant difference, based on Chi-square analysis) and about tiger conservation.

Conclusion

With statistically significant differences, study results favor the Tiger Trail group’s performance across all key-message aligned questions. Further, there is a direct association between the number of exhibit elements read and viewed and the amount of key message-specific knowledge a visitor demonstrated following his or her Tiger Trail experience. Visitors also reported favorable overall ratings of their exhibit experiences, which are reliably higher for guests who interacted with a keeper or interpreter. Interestingly, guests who reported these interactions were more likely to indicate that they learned something new.

We conclude that the defined key messages delivered through a compelling storyline, diverse interpretive elements, and encounters with tigers, exhibit interpreters and keeper staff support reliable acquisition of targeted knowledge and concepts among Tiger Trail visitors.

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