The efficacy of delivery of the 'Intrepid Explorers' educational programme to improve student knowledge at Knowsley Safari

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INTRODUCTION

Annually, thousands of children participate in educational programmes created by zoos. Evaluating the learning outcomes of these informal conservation education programmes is a legal requirement under the Zoo Licencing Act 1981, but methods of evaluation are understudied. Using retrospective pre-testing and only post-testing have been shown to be unreliable methods, but using a repeated-methods questionnaire may eliminate those biases in some instances. In 2023, Knowsley Safari (KS) in Prescot, England created a new curriculum for "Intrepid Explorers", a summer day camp for students between the ages of eight and ten. The programme aimed to educate the students about native and non-native species, sustainable living, and how KS is involved with *in-situ* conservation projects. These methods of interpretation are aligned with the British and Irish Association of Zoo and Aquariums' education policies. By promoting KS' involvement with *in-situ* conservation projects, they are also following a requirement as laid out in the Secretary of State's Standards of Modern Zoo Practice.

By evaluating this programme, it allowed for weaknesses in the curriculum to be identified so that it could be improved upon if the programme were to be run again in the future.

Objective

The objectives of this study were to create a questionnaire that could be filled in once at the beginning of the week and again at the end of the week by each child. A Likert-scale analysis was also used at the beginning and end of each week to determine whether the children had any behaviour changes towards the end of the week.

METHODOLOGY

- The dates of the "Intrepid Explorers" programme included July 24-28, July 31-August 4, August 7-11, August 14-18, and August 21-25. The final sample size was 49 students.
- A 10-question questionnaire was given to the students at the beginning and end of the week (Table 1)
  - Using mixed methods was used to benefit participants who may not have been at the same literacy levels as others or who just preferred to draw over expressing themselves through words (Leigh & Heid, 2008). Educators also read questions out loud to assist children who struggled with reading.
- An additional 6-question Likert-scale was given with the questionnaire to measure behaviour change towards conservation and the programme that students could either strongly disagree, disagree, remain neutral, agree, or strongly agree with (Table 2).
- During analysis, all qualitative data was transformed into quantitative data by assigning a number to each answer. All non-responses were omitted and each question was then analysed in RStudio using a Wilcoxon signed-rank test following a Shapiro test of normality.

RESULTS

- Only question 2 (Figure 1), question 6 (Figure 2), question 7 (Figure 3) on the 10-question questionnaire relating to the curriculum's content showed a significant increase in knowledge gained before and after attending the programme.
- Only 1 question on the Likert-scale analysis showed a significant increase in agreement towards pro-environmental behaviors (Figure 4).

DISCUSSION

- Overall, there was a little to no increase in knowledge in most areas of the programme. This contradicts a study by Mayer (2003) that indicated that using multiple interpretation methods could be related to an increase in knowledge. This means that the experiences offered by the programme were inconsistent and should be improved in future years.
- Answers in the pre-questionnaires showed a high level of base knowledge in two main topics the programme covered: extinction and endangerment. The lack of an increase in knowledge over the week suggests that the programme was not challenging enough because it appeared that the students already harboured an interest in conservation prior to participating, which also aligns with previous studies (Cheeseman & Wright, 2019; Counsell et al., 2020; Spooner et al., 2019).
- Interpretation methods throughout the covered topics were similar, so it is assumed that the main factor contributing to the lack of learning was actually the number of topics covered. Studies have shown that focusing on a subject over a period results in more information being retained in the long-term memory (Cepeda et al., 2008; Sisti et al., 2007; Smolen et al., 2016; Vlach & Sandhofer, 2012).
- Other zoological institutions around the world run programmes surrounding one topic in further detail that have been successful (Cheyenne Mountain Zoo, n.d.; Bexell et al., 2013; Cheeseman & Wright, 2019).
- KS spent little time on several different subjects, which could have lead to confusion or complete lack of remembrance. One solution would be to split the current programme into two.
  - One camp surrounding native species conservation
  - One camp surrounding extinction and endangerment in species globally
- Only one Likert-scale statement showed an increase in students who agreed, presumably also due to the amount of time spent on certain subjects. If more time had been spent delving into extinction, sustainability, and endangerment, it is possible that more students would have agreed with the statements.

Limitations
- Researcher was not present at the time of data collection and is unable to verify or control the atmosphere the questionnaires took place in, which could have resulted in unreliable data.
- During data analysis, non-responses were omitted completely. Any results found may not be an accurate representation of the entire group if not every student answered a question.

Future Research
- More studies surrounding the evaluation of conservation education programmes should be conducted to fill the current gap in research.
- Studies evaluating specific methods of scientific interpretation and their effect on the amout of knowledge gained would be beneficial to maximise the effectiveness of conservation programmes.

CONCLUSION

Based on a qualitative and quantitative analysis of the pre- and post-questionnaires, it can be concluded that little knowledge or positive behaviours were gained as a group of the course of each week. The results indicated that the curriculum may have covered too many topics over a short period of time, and it would be beneficial to the students' learning to split the programme into two seperate programmes to maximise the chance of learning. While the researcher being absent may limit the reliability of the results, evaluating the programme by the means of pre- and post-questionnaires provides insight into how education programmes are structured and what could be done to improve them.

VISUALS

Table 1.
Questionnaire questions.

1. What does it mean if an animal is endangered?
2. Can you name up to three endangered species on the line below?
3. What is a big threat to tigers in the wild?
4. What does it mean if an animal is extinct?
5. Can you draw one animal that is extinct?
6. Can you name one thing can you do to prevent an animal from going extinct?
7. Can you describe what "native species" means?
8. Can you draw one native species in the UK in its natural habitat?
9. Does Knowsley Safari have projects helping animals in the wild?
10. If you said "Yes" for question 9, can you describe how Knowsley Safari helps animals in the wild?

Table 2.
Likert-scale statements.

1. I love being in nature.
2. I want to help animals.
3. I am worried about animals going extinct.
4. I feel like it is my job to help animals.
5. I like making new friends.
6. I like working as a team.
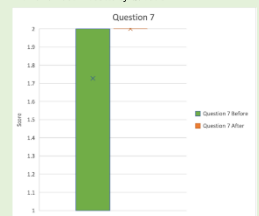
Figure 1.
Pre- and Post-Results of Question 2
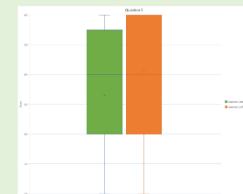
Note. In question 2 (n=40) there was a significant increase of correct answers in the post-questionnaire from the pre-questionnaire [W(39) = 97.5, Z = -2.02, p = 0.02].

Figure 2.
*Pre- and Post-Results of Question 6*
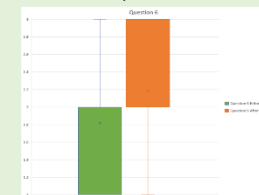
Note. In question 6 (n=33) there was a significant increase of correct answers in the post-questionnaire from the pre-questionnaire [W(32) = 15, Z = -2.565, p = 0.005].

Figure 3.
Pre- and Post-Results of Question 7

Note. In question 7 (n=22) there was a significant increase of correct answers in the post-questionnaire from the pre-questionnaire [W(21) = 0, Z = -2.06, p = 0.019].

Figure 4.
Pre- and Post-Results of the Likert-scale Analysis Using the Means
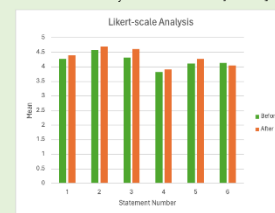
Note. Statement 3 (n=44) was the only Likert-scale question with a significant difference [W(43) = 48, Z = -1.941, p = 0.026].

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