

Turtles in the Dust: Effects of Hands-on Scientific Training on a Group of Behaviorally At-risk Students' Knowledge and Empathy

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Photographs by the senior author.

Abstract.—We taught a group of behaviorally at-risk students lessons on box-turtle biology and natural history before translocating hatchling Ornate Box Turtles (*Terrapene ornata ornata*) to a nature area adjacent to their school. The students then assisted with data collection and ultimately used telemetry to re-locate the turtles and independently collect data. Each student in the experimental group was given a questionnaire prior to beginning and again after completion of the program, with questions covering box-turtle biology, natural history, and empathy toward animals. Students in a control group were given the same questionnaire at similar times. Students in the experimental group felt they improved their knowledge concerning box-turtle biology and natural history after training, whereas control group students did not. Neither group, however, showed a change in empathy between the pre- and post-questionnaires. Incorporating behaviorally at-risk students in research projects may enable researchers to complete projects while at the same time involving an often-neglected portion of the population.

Introduction

Interactions with animals at a young age improve social development and attitudes toward nature in children (Myers and Saunder 2002). In addition, companion animals in the classroom are known to increase sensitivity toward humans and possibly decrease aggression (Hergovich et al. 2002). Gender, animal ownership, and attitudes toward animals also affect empathy toward humans (Taylor and Signal 2005). However, no consensus links interactions with animals and increased empathy toward humans (Paul 2000, Taylor and Signal 2005). We also are unsure whether involving students in intensive, hands-on science programs with animals might also increase empathy toward nature.

The goals of this study were to increase scientific knowledge and foster empathy toward animals in a group of behaviorally at-risk students by engaging students in a hands-on research project. We predicted that as a result of personal involvement in box-turtle research, the experimental group of students would show increased knowledge and empathy when compared to a control group that received neither classroom lessons nor an opportunity to participate in field research.

Study System

The Juvenile Justice Alternative Education Program (JJAEP) is an alternative education program for students who have been expelled from any of the eight school districts in Lubbock County, Texas. The program focuses on discipline and attempts to bring students' knowledge up to their current grade level. More information can be found at www.lubbockisd.org/JJAEP/. A 0.6-ha nature area is adjacent to the school and is bisected by a nature walk.

The Ornate Box Turtle (*Terrapene ornata ornata*) ranges from southern Texas to South Dakota and from Colorado to Indiana. It is the state reptile of Kansas (Dodd 2001) and is often well-liked wherever it is found near people. Like most members of the genus, the Ornate Box Turtle has declined throughout much of its former range. However, urban Lubbock holds large populations that have received some attention in recent years (Sosa 2009).



Hatchling Ornate Box Turtle (*Terrapene ornata ornata*).



JJAEP students and a hatchling Ornate Box Turtles.

Methods

We worked with students enrolled in the JJAEP from April 2008 to October 2009. One of us, the acting principal of JJAEP (OR), selected male students between the ages of 13 and 17 who met minimum requirements (good attendance and behavior) to participate in the hands-on experiment. Before training, the selected students were given a short questionnaire with questions on box-turtle biology, natural history, and attitudes towards animals. Upon completion of the questionnaire, one of us (JAS) met with the students twice weekly for 45 minutes each time. During the initial three weeks, we lectured the students on box-turtle biology and natural history with the assistance of books and articles. We also demonstrated the proper techniques employed by scientists in the study of box turtles, such as radio telemetry and thread trailing, to the experimental group of students. Beginning on the fourth week, we translocated hatchling Ornate Box Turtles, which had been given to the South Plains Wildlife Rehabilitation Center, to the nature area adjacent to the JJAEP campus. Two hatchlings in 2008 and three hatchlings in 2009 were translocated to the nature area. The experimental group of students aided in the attachment of radio transmitters and measurements of each turtle prior to translocation.

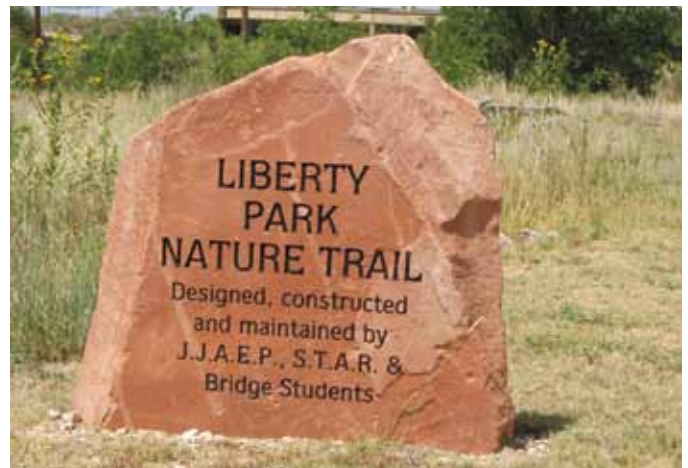
We relocated each hatchling two to five times a week for the remainder of the active season. The students assisted with relocations biweekly during the school year. For each relocation, we recorded date, time, GPS coordinates, weather data, habitat, and activity of the turtles. Before students were dismissed for summer break (approximately six weeks following administration of the initial questionnaire), each student completed the questionnaire again. A control group of students was given the questionnaire twice during 2009, with a six-week interval, but received no training. The questionnaire consisted of factual questions, as well as some about

individual attitudes. For questions 1–11, which focused on students' perceptions of their knowledge (e.g., "how much do you know about box turtles?") answers ranged from 1 ("nothing") to 5 ("everything"). Questions 13–15 offered a range of answers (e.g., for the question "the best place for a box turtle is?" answers were "in nature"; "in a zoo"; "in a cage as a pet"; "there is no good place"; and "none of the above").

We used an analysis of variance to test for changes in knowledge between the answers on pre- and post-questionnaires for the two groups (experimental and control). Significant differences between pre- and post-surveys were then explored further with an independent samples t-test for each group. We tested for differences between qualitative pre- and post-survey questions (13–15) with a chi-square analysis. Results were considered significant at $\alpha = 0.05$.

Results

Five students in 2008 and five in 2009 began in the experimental group. At the recommendation of the JJAEP principal, however, two students did not complete the entire training program in 2009. In addition, 12 students in 2009 were part of the control group and received no training. After training, all students in the experimental group had seen a turtle, whereas no difference in box-turtle sightings existed between pre- and post-questionnaires for the control group. We found a significant difference between control and experimental groups for questions 1–9 and question 11 ($p < 0.05$), all of them box-turtle specific, but not question 10, which involved factors responsible for environmental degradation. Within the experimental group, we found a significant improvement between pre- and post-responses on questions 1–11 ($p < 0.05$ in all cases). In contrast, we detected no improvement for the control group for questions 1–11 ($p > 0.05$ in all cases). No



JJAEP nature trail marker and representative habitat.



JJAEP students using radio-telemetry to relocate translocated turtles.

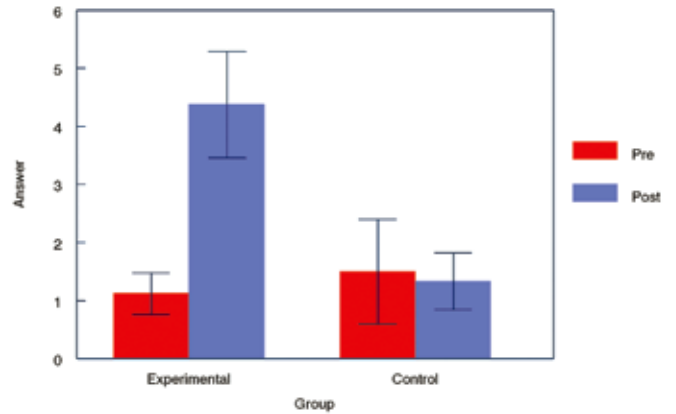
statistically significant differences existed between the pre- and post-answers for questions 13–15 ($p > 0.05$) for either group.

Discussion

Our results indicate that students in the experimental group improved their knowledge on box-turtle biology and natural history. Questions 13–15, however, were an attempt to determine if training impacted students' empathy toward box turtles. The answer choices might have been at the extremes, either a positive or negative response with no neutral choices. If students had a more diverse array of answer choices and we worked with a larger sample of students, we believe the resolution of whether students' empathy changed would improve because empathy is expected to increase when direct contact with animals is provided (Thompson and Gullone 2003).

At-risk students are capable of independently collecting scientific data when given training, despite the fact that some procedures were complex (radio-telemetry) and others required meticulous attention to detail (data recording). The experimental group of students is now trained in advanced scientific procedures that most high school students do not have the opportunity to learn.

In conclusion, our training program was effective in teaching at-risk students biology and natural history of box turtles as well as scientific skills.



Asked “What is your knowledge on how big a box turtle can grow?” experimental-group students showed significantly greater improvement after working with turtles than did control-group students. Similar patterns were seen on all natural history questions (questions 1–11 on the pre- and post-surveys).

Future studies should focus on framing questions on empathy in order to improve resolution. Studies also should examine whether students who participate in training have increased confidence compared to students who do not receive specialized training. Because JJAEP is a school for students expelled from traditional schools, the extra attention could provide students with more confidence and increase their marketability later in life. At a minimum, students were exposed to novel ideas and a potential career path.

Acknowledgements

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Literature Cited

- Dodd, C.K., Jr. 2001. *North American Box Turtles: A Natural History*. University of Oklahoma Press, Norman.
- Hergovich, A., B. Monshi, G. Semmler, and V. Zieglmayer. 2002. The effects of the presence of a dog in the classroom. *Anthrozoös* 15:37–50.
- Myers, O.E., Jr. and C.D. Saunders. 2002. Animals as links toward developing caring relationships with the natural world, pp.153–178. In P.H. Kahn and S.R. Kellert (eds.), *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations*. MIT Press, Cambridge, Massachusetts.
- Paul, E.S. 2000. Empathy with animals and humans: Are they linked? *Anthrozoös* 13:194–202.
- Sosa, J.A. 2009. Effects of urbanization on movements, activity, and translocation site fidelity of Ornate Box Turtles (*Terrapene ornata ornata*) in the southern high plains of Texas. Unpublished M.S. Thesis, Texas Tech University, Lubbock.
- Taylor, N. and T.D. Signal. 2005. Empathy and attitudes to animals. *Anthrozoös* 18:18–27.
- Thompson, K.L. and E. Gullone. 2003. Promotion of empathy and prosocial-behaviour in children through humane education. *Australian Psychologist* 38:175–182.



Management of habitats for target species, such as the Yellow Anaconda (*Eunectes notaeus*) in Argentina, can be beneficial to many other species, such as these Neotropical Cormorants (*Phalacrocorax brasilianus*) at Banyado la Estrella.