Engaging Diverse Young People in Climate & Natural Resource Action

A Comparison of Field Trip Delivery Strategies

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Project Team:

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- Patuxent Research Refuge, USFWS (Jason Cangelosi, Josh Emery)
- Prince George County Schools
- Agents of Discovery (Mary Clark, Nada AlMubarak)

Research Objective:

To Assess Differences in Field Trip Delivery Methods

- Compare student learning outcomes and connection to place between three environmental learning modalities:
  1) traditional walks guided by rangers/interpreters
  2) self-guided walks utilizing brochures and signs
  3) mobile technology (AoD app)

- Students were randomly assigned to one of three modalities upon arriving at the refuge

Data Collection and Analysis

- Approximately 600 Prince George County Public School students from six schools in Grades 4-6

- Field trips at Patuxent Research Refuge (Laurel, MD), April - May, 2024

- Pre-post onsite surveys used to compare outcomes using established scales and methodologies to measure:

  a) Enjoyment
  b) Conservation knowledge
  c) Connection to Nature
  d) Stewardship Intentions

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Survey Demographics

- 570 useable paired pre-post surveys

Grade 4	Grade 5	Grade 6
60%	19%	21%

Male	Female
43%	53%

Race	
White	4.6%
African American	44%
Hispanic or Latino	39%
Asian	4%
Preferred not to say	5%
More than one race	74%

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Overall Results: *Students experienced a high level of enjoyment on the field trips*

"*How much fun did you have on the field trip today?"* (Post only, scale from 1-5)

- Mean was 4.35
- Median and Mode were 5

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Overall Results: *Knowledge levels increased, both self-reported and actual*

- ***Self-reported*** learning (post-only)
  - "*How much do you think you learned from this field trip, on a scale from 0 to 10?"*
  - Mean = 7.55
  - Median = 8
  - Mode =10

- ***Factual*** learning (pre-post change on six test items)
  - See results on next slide

Table 1. Overall Knowledge gain by students, by item (* p < .001)

Specific Knowledge items	P value (McNemar test)	% Correct PRE	% Correct POST
The goal of the US Fish and Wildlife Service agency is to protect fish, wildlife, plants and their habitats. (T/F)	.701	98	97
Patuxent Research Refuge is unique among U.S. Fish and Wildlife Service refuges—it is the only refuge established to… (M-C)	.057	46	51
What special plant do Monarch butterfly caterpillars eat that makes them taste bad to the animals that try to eat them… (M-C)	.001*	48	**74**
The Endangered Species Act helps protect animals and plants that are in danger of going extinct. (T/F)	.475	85.6	87.3
Buying a fishing or hunting license is one way to support wildlife conservation programs. (T/F)	.001*	40	**54.5**
Species like crayfish and certain insects that live in freshwater water are often important indicator species, which means they are very sensitive to changes in the environment and can help tell us about the health of that environment. (T/F)	.105	74	77

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Overall Results: *Connection to Nature Increased*

- 82% of items showed statistically significant positive increases in their:
    - Connection to Nature
    - Affinity with Nature
    - Connection to Patuxent Research Refuge

Comparison between Learning Modalities

Comparison between Learning Modalities: *Enjoyment*

Group	Sample size (N)	Mean (out of 5)
1 Guided	213	4.32
2 Agents of Discovery	180	4.46
3 Self-guided	148	4.25
Total	541	4.35

-Item measured on a five-point scale from “no fun” to “tons of fun”

- One-way Analysis of Variance (ANOVA) was used to compare mean scores across the 3 different types of learning delivery.
- No statistically significant difference between the 3 groups.

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Comparison between Learning Modalities: *Self-Reported Knowledge*

Group	Sample size (N)	Mean (out of 10)
1 Guided	211	7.85
2 Agents of Discovery	175	7.35
3 Self-guided	147	7.41
Total	533	7.56

-Item measured on a scale of 0 to 10 from “nothing” to “a huge amount”

- One-way Analysis of Variance (ANOVA) was used to compare mean scores across the 3 different types of learning delivery.

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Comparison between Learning Modalities: *Actual Knowledge*

Group	Sample size (N)	Mean (out of 6)
1 Guided	215	**4.65**
2 Agents of Discovery	180	4.2
3 Self-guided	149	4.2
Total	544	4.4

- One-way Analysis of Variance (ANOVA) was used to compare mean scores across the 3 different types of learning delivery.

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Comparison between Learning Modalities: *Connection to Nature*

Group	Sample size (N)	Mean (out of 5)
1 Guided	210	4.18
2 Agents of Discovery	172	4.19
3 Self-guided	142	4.25
Total	524	4.2

-Items measured on scale of 1 = Strongly Disagree, 3 = Neither Agree nor Disagree, 5 = Strongly Agree

- One-way Analysis of Covariance (ANCOVA) was used to compare mean scores across the 3 different types of learning delivery.

Comparison between Learning Modalities: *Affinity for Nature*

Group	Sample size (N)	Mean (out of 5)
1 Guided	216	4.184
2 Agents of Discovery	182	4.275
3 Self-guided	150	4.196
Total	548	4.217

-Items measured on scale of 1 = Strongly Disagree, 3 = Neither Agree nor Disagree, 5 = Strongly Agree

- One-way Analysis of Covariance (ANCOVA) was used to compare mean scores across the 3 different types of learning delivery.

Comparison between Learning Modalities: *Connection to Patuxent Research Refuge*

Group	Sample size (N)	Mean (out of 5)
1 Guided	214	4.34
2 Agents of Discovery	180	4.38
3 Self-guided	149	4.37
Total	543	4.36

-Items measured on a scale of 1 = Strongly Disagree, 3 = Neither Agree nor Disagree, 5 = Strongly Agree

- One-way Analysis of Covariance (ANCOVA) was used to compare mean scores across the 3 different types of learning delivery.

Comparisons between Learning Modalities: *Stewardship Intentions*

- One-way Analysis of Variance (ANOVA) was used to compare mean scores across the 3 different types of learning delivery.
    - See results on next slide

Comparisons between Learning Modalities: *Stewardship Intentions*

Environmental Stewardship items (POST only)	Guided	AoD	Self-guided
9a. Going on this field trip made me want to visit other places like this.	4.20	4.27	4.22
9b. Going on this field trip made me want to take better care of this place.	4.32	4.34	4.27
9c. Going on this field trip made me want to protect the environment and nature more.	4.26	4.31	4.26
9d. Going on this field trip increased my appreciation for the environment and nature.	4.27	4.24	4.21
9e. Going on this field trip increased my interest in learning more about the environment and nature.	4.36	4.30	4.33
Stewardship Scale (5 items)	4.41	4.37	4.28

-Items measured on scale of 1 = Strongly Disagree, 3 = Neither Agree nor Disagree, 5 = Strongly Agree

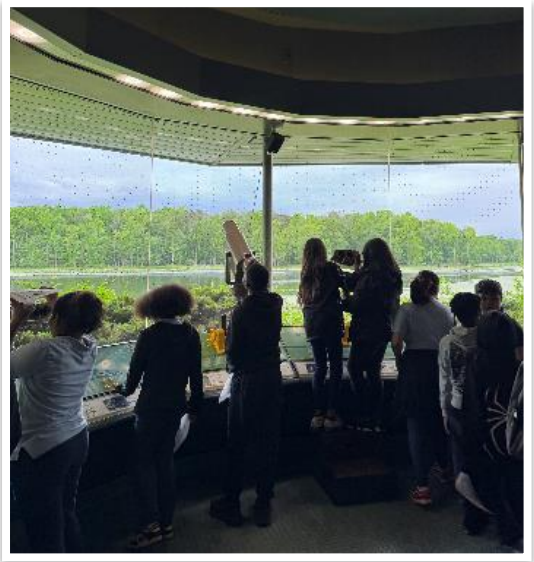
Anecdotal Results

- Short online survey sent to teachers (6 responded).
  - Most students enjoyed their visit, and wanted to return to the Refuge.
  - Five of six teachers said students really enjoyed being outside, walking around exploring nature, regardless of the delivery method.
  - *Improvements recommended*: Reading difficulties related to language

Anecdotal Results

- Onsite anecdotal discussions with teachers and students
  - Most students and teachers had never visited the Refuge before

- Students who did not speak English enjoyed opportunity to play AoD Mission in Spanish.
  - One female student who had recently come to PG County Schools felt excluded until she was able to enjoy the Mission in Spanish.



Summary of Major Findings

- Well planned and delivered fields trips are enjoyed by students and teachers, regardless of type of delivery.
- An important outcome across all modalities was learning, both self-reported and actual.
- Connection to Nature and care for the site increased across all modalities.
- The major difference across modalities was Guided groups reported slightly higher knowledge outcome than the other two learning approaches

Conclusions

- No clear best approach to delivering quality field trips.
- Using multiple learning methods helps optimize staff time and funding.
  - Technology isn't meant to replace guided tours, but enhances and expands onsite programming.
  - Digital programming is a time-effective, affordable way to educate visitors.
- Findings dispel worries that a technology and nature divide exists.
- There are multiple pathways to achieving desired conservation outcomes

Questions?

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Literature Review and Future Research

- Time outdoors and in nature has many beneficial results, especially for children.
- Critical question has shifted from *“should tech be allowed in nature learning experiences?”* to *“how can we best use tech to facilitate a connection to nature?”.*
- In the last 20+ years, has been a decrease in children spending time outside or in natural areas, and a concurrent rise in screen usage.
- Limited research has examined differences between outdoor education and interpretive teaching modalities on outdoor enjoyment and conservation learning.
- Need to examine use of digital tech and connection to nature.