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Using Geocaching to Teach Environmental Awareness to Youth

Abstract

Increasingly, youth are raised in urban settings with limited natural environments. Natural resource-centered training becomes challenging for educators vying with electronic technologies, team sports, and limited parental involvement. Geocaching, an outdoor game using GPS technology to guide players to pre-determined locations, can be used to create educational opportunities focusing on natural resources topics. Educators can utilize the game in a variety of ways to lead students along an educational experience. Starting in July 2019, 52 *Geocaching: Fun with Forests Around Us* workshops have been held across Mississippi. Nearly 1,400 youth have cycled through these trainings. Pre- and post-training assessments indicated that knowledge scores increased, participant satisfaction was positive, and multiple students had started geocaching by the end of training.

Introduction

Parents, natural resource professionals, and youth coordinators often find themselves struggling to teach youth natural resource sciences in the 21st century. Pastimes centered on electronic technologies and team sports, combined with limited time availability of parents in today's two-income households, can limit involvement of youth in more traditional outdoor activities. Directly learning about nature and how it works is often omitted in modern classrooms. However, there are still opportunities to maintain or

increase youth involvement through learning about nature in non-traditional environments. Geocaching provides one of these opportunities (Harmon, 2008).

Geocaching is a game that promotes learning and fun while spending time outside. The activity uses modern technology to immerse participants in nature. Global Positioning Systems (GPS) are used to guide players to general locations where individual geocaches are hidden. Written clues or puzzles are then used to guide players in their search for exact locations of caches. Educators can use geocaching to place emphasis on learning about nature by selecting themed geocaches or through creation of caches to learn about forests, wildlife, or other natural resource topics (Smith et al., 2021). The overall objective of the process is to guide people to places of interest where they can learn something about a particular location, topic of interest, or information along the way (Rosier and Yu, 2011).

This project was developed to create a natural resource curriculum that outreach professionals can use to increase outdoor involvement of upper elementary-aged children through geocaching. The overall objective was to use this curriculum to gauge its success from increased knowledge and participant satisfaction standpoints.

Methods

Geocaching.com offers free basic and paid premium memberships with additional game features and geocaches available to premium members. Due to our focus on elementary-aged youth who may not be able to purchase premium memberships, we designed our caches to be searchable under both levels of membership. While the typical geocacher uses GPS enabled smartphone technology to play the game (Ihamäki, 2011), dedicated handheld GPS units can simplify techniques in some cases. In addition, school policies limited smartphone use by our participants. Consequently, we provided GPS units (Garmin eTrex 10) with preloaded geocache coordinates for use during each workshop. These coordinates were selected to highlight points of interest that provided educational opportunities matching our selected theme for that portion of the workshop.

With extended use and concealability in mind, a themed set of ten geocaches were created using military surplus ammunition cans (approximately \$18 each) for cache containers. Geocache themes were designed to offer information in three areas of natural resource interest: forestry, wildlife management, and invasive species. A collection of small tradable items was placed inside each geocache (e.g., inexpensive toys, foreign coins, 4-H items, etc.) totaling \$12 - \$15 per container. Participating students were given a resealable sandwich bag containing four additional items with instructions that these were tradeable for items inside geocaches. Additional geocache items included a written script detailing natural resource information specific to that individual geocache location and a small notebook log for participants to sign.

Two *Geocaching: Fun with Forests Around Us* pilot workshops were offered July 2019 in northern Mississippi. These workshops provided a learning experience for 4-H youth and were used to gather feedback to help refine future offerings. Fifty additional workshops, held during April 2021 and 2022, involved individual classrooms of third-, fourth-, and fifth-grade students in central Mississippi. These four-week workshops taught students geocaching basics during the first week and compass use and pacing exercises in the second week. During weeks three and four students explored the pre-established geocache tour. For logistical reasons, each class was separated into two groups and assigned different sets of geocaches along the tour route.

Opinions and knowledge related to the geocache tour were assessed through pre-and post-program surveys. Participant satisfaction and information adoption data were collected at the end of each workshop using a “yes,” “no,” or “maybe” answer format.

Results and Discussion

In pre- versus post-workshop comparisons, participants indicated a substantial gain in knowledge for all five general pre- and post-workshop questions (Table 1). An increase, ranging between 21.2 to 81% was noted for students answering “yes” to questions showing an increase in knowledge. Notably, while an increase in agreement was found for each question, responses show an 81% increase in students believing prescribed fire offers potential benefits to wildlife management efforts. In the past, natural resource

managers have found public “anti-fire” campaigns have been successful to the point where most people believe all fires in the environment to be detrimental (Jacobson et al., 2001). Helping the public understand that controlled prescribed fire has a net positive management benefit and can be beneficial to land managers is important. This is one example of a natural resource topic that youth can explore using our geocaching curriculum.

Table 1. Pre- and post-workshop response data for basic natural resources questions posed to students attending 2021 and 2022 workshops.

| Question | Average responses for total attendees (%) | | | | | |
|--|---|-------|------|---------------|-------|------|
| | Pre-workshop | | | Post-workshop | | |
| | Yes | Maybe | No | Yes | Maybe | No |
| Is it okay to cut trees? (n=1384) | 45.2 | 20.7 | 34.1 | 94.1 | 3.2 | 2.7 |
| Do trees provide things other than wood? (n=1354) | 74.2 | 23.1 | 2.7 | 98.3 | 1.6 | 0.1 |
| Is hunting a useful tool for managing wildlife? (n=1356) | 56.1 | 20.7 | 23.2 | 77.3 | 15.4 | 7.3 |
| Can fire be helpful to animals? (n=1390) | 3.6 | 1.1 | 95.3 | 84.6 | 2.0 | 13.4 |
| Are invasive plants bad? (n=1343) | 68.9 | 29.6 | 1.5 | 96.5 | 0 | 3.5 |

Post-workshop assessments were conducted to gauge participant satisfaction with the workshop and whether they were likely to continue geocaching on their own (Table 2). Overall student satisfaction appeared excellent, with 94.1% of students indicating that they had a fun experience and 88.2% indicating that they felt as though they had learned a lot. When posed with the question, “Would you come to another program like this?” a combined 98.4% of surveyed youth either stated “yes” or “maybe.”

The ultimate measure of success for any outreach program is whether participants adopt and implement the information presented. In the case of the *Geocaching: Fun with Forests Around Us* workshop, two thirds of surveyed attendees indicated that they thought they would try to start geocaching on their own time. An additional 27.9% of attendees stated that they might try to undertake geocaching in an at-home setting. Of

particular interest, during the four-week program 7.3% of total participants indicated that they had started to geocache away from school.

Table 2. Post-workshop program satisfaction and adoption assessment for students attending 2021 and 2022 *Geocaching: Fun with Forests Around Us* workshops.

| Program Assessment Question | Average responses of total attendees (%) | | |
|---|--|-------|------|
| | Yes | Maybe | No |
| Did you have fun with this program? (n=1345) | 94.1 | 0.1 | 5.8 |
| Do you feel like you learned much? (n=1350) | 88.2 | 6.1 | 5.7 |
| Would you come to another program like this? (n=1345) | 54.8 | 43.6 | 1.6 |
| Do you think that you will try to go geocaching on your own? (n=1337) | 66.7 | 27.9 | 5.4 |
| Have you started geocaching because of this workshop? (n=1341) | 7.3 | 0.0 | 92.7 |

Conclusions

Geocaching can serve as an educational tool to increase knowledge of natural resources and environmental awareness. Today's youth are increasingly less conscious of our environment and how nature works. Knowledge of these systems is integral to continued management and conservation of our natural resources. Geocaching provides an entertaining educational opportunity to familiarize youth with nature through firsthand experiences in outdoor settings.

Through careful use of existing geocaches, or creation of natural resources themed geocaching tours, educators can construct a tailored natural resources educational experience specific to areas of interest. Given the construct of a gaming experience, geocaching can attract youth to an educational experience where they receive information on a voluntary basis on topics which they might not be interested in otherwise. The game can be used to provide environmental knowledge in a manner that is both entertaining and educational. The responses detailed in this study demonstrate

that geocaching can be a successful way to increase youth knowledge of our environment and increase their willingness to continue learning on their own.

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