

Using Mobile Technologies and ArcGIS Online in Preservice Science Teacher Education

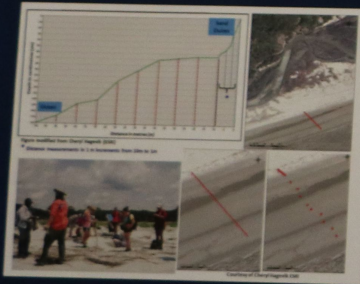
Rita Hagevik, Graduate Director, Science Education, rita.hagevik@uncp.edu

Improving Understanding of Visual Data Using ArcGIS Online on Your Smartphone or Tablet



Collector
ArcGIS Online
Snap2Map
Apps

Beach Profile Group Activity by Student



Graduate Course, including Field Trip to Bald Head Island and the Bald Head Island Conservation Corridor from Beaufort, NC

ArcGIS Online and Org Accounts

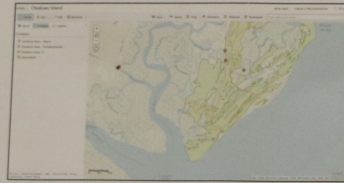


Fig. 1 Ossabaw Island in ArcGIS Online Org Account

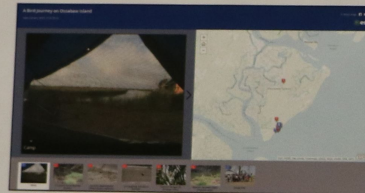


Fig. 2 Story Map by student using ArcGIS Online Org Account

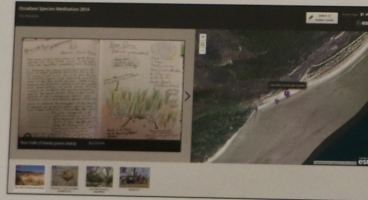
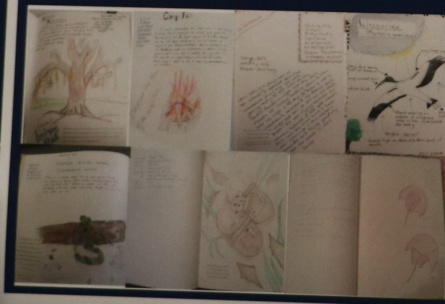


Fig. 3 Story Map in ArcGIS Online Org Account

Nature Journals with GPS Coordinates



Science in the Natural Environment Course Using ArcGIS Online

Goals: The focus of the course is to understand science and inquiry-based instruction in the natural environment through experience. A focus is on performances of authentic science practice in both instruction and assessment. Participants develop inquiry-based units and lessons that focus on the use of the natural environment and wetlands to be used immediately in their classrooms. Participants use technology tools as a part of inquiry-based instruction.

General Concepts: history of science, inquiry, mapping, data collection and analysis, argumentation, nature journaling, classification

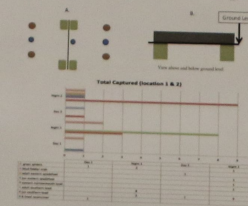
Specific Concepts: global positioning systems, geospatial technologies, birding, astronomy, geology, maritime forests, wetland plants and animals – vertebrate and invertebrate, coastal ecology.

Materials: camping equipment, Last Child in the Woods by Richard Louv, Nature Journaling by Claire Leslie Walker, various field guides.

Assessments: nature autobiography and photovoice, Last Child in the Woods book summary and small group discussion, nature journal, species meditation/GPS and podcast, collection, group experiment, nature teaching improvement plan. Participants present the results of their experiments and write a written report, teach a portion of the nature teaching improvement plan to the class, and submit the nature journal, unit and lesson plans and collection for assessment. Students learn how to set-up and use ArcGIS online Org accounts in their schools.

Group Experiment #1

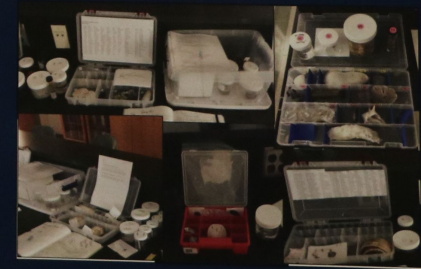
Drop Bucket Survey of Coastal Transition Zones of Ossabaw Island, Georgia



Conclusions and Insights

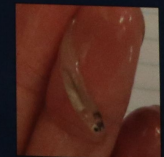
Lessons Learned: Participants in the course were overall pro-environmental before the course began as measured by an Environmental Attitudes Survey. Participants exhibited a slightly increased attitude toward behavior change regarding the environment after the course. Participants remarked that they were unaware of all the garbage generated in a day until handling and disposing of it themselves. Participants learned how to use geospatial technologies and maps in science instruction and were more comfortable “switching” between different technologies. Overwhelmingly the course participants favorite activity was nature journaling and secondly the mapping activities. Using geospatial technologies not only taught participants how to use them in instruction but assisted with data collection and analysis as well as navigation and measuring changes over time on the island.

Student Collections



Group Experiment #2

- Effects of Fluctuating Tides on the Salinity and Biodiversity of Organisms in the Big Slough, Ossabaw Island, Georgia
- Qualitative Data-Observations with descriptions of organisms in seining net
- Example: Baby Fish 1: Tiny and slender, shiny on its side with three black dots on its head
- Quantitative Data-Weather Data (temperature, humidity, pressure, latitude, and longitude), Seining Data (# of organisms and salinity)
- Example: Salinity was 18.4 ppt on the 1st day of high tide on June 13, 2014 at 9:45am



The University of North Carolina at Pembroke

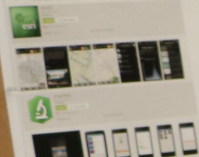
Department of Biology

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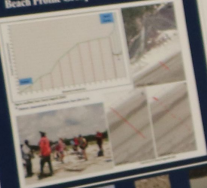
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Improving Understanding of Visual Data Using ArcGIS Online on Your Smartphone or Tablet

Collector ArcGIS Online Snap2Map Apps



Beach Profile Group Activity by Student



ArcGIS Online and Org Accounts



Science in the Natural Environment Course Using ArcGIS Online

Goals: The focus of the course is to address content and practice-based competencies in the natural environment through experiences. A focus is on performance of students across practice in both interactive and assessment. Participants develop regional area and knowledge that focus on the use of the natural environment and activities in the local community in their classroom. Participants use technology such as a part of regional interaction.

General Concepts: Science of nature, spatial mapping, data collection and analysis, measurement, data processing, classification.

Specific Concepts: global positioning systems, geographic information systems, mapping, measuring, mapping, distance, elevation, terrain, and spatial analysis.

Materials: various resources, GIS/Map to the World, ArcGIS Online, Snap2Map, Collector, and other mobile devices.

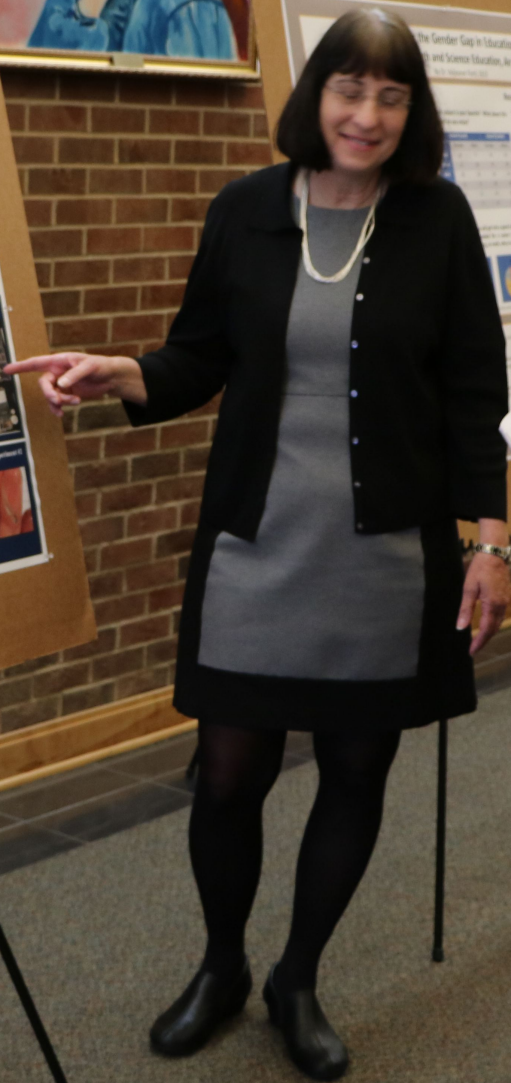
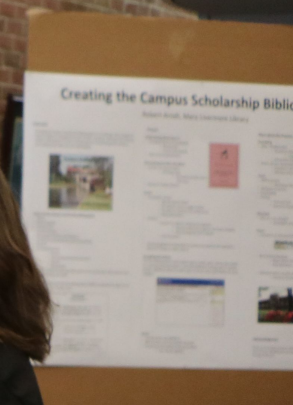
Assessments: various assessments and projects. Use GIS in the field, local projects, and small group projects, student projects, group presentations, student projects, and other projects. Participants present the results of their assignments and write a reflection paper at the end of the course. Students also present their projects and attend the course project and assessment. Students may also use and collect the assessment. Students may also use and collect the assessment. Students may also use and collect the assessment.

Group Experiments #1



Conclusions and Insights

Lesson Learned: Participants in the course were overall knowledgeable before the course began. Participants utilized a variety of mobile devices to collect data and map it to ArcGIS Online. Participants were able to use the data to create maps and presentations. Participants were able to use the data to create maps and presentations. Participants were able to use the data to create maps and presentations.





Using Mobile Technologies and ArcGIS Online in Preservice Science Teacher Education

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Bird Profile Group Activity by Student



Nature Journals with GPS Coordinates



Group Experiment #1

Deep Back Survey of Coastal Transition Zones of Oahu Island, Georgia



Group Experiment #2



- Effect of Changing Aids on the Study and Fieldwork of Students in the Back Survey of Coastal Transition Zones of Oahu Island, Georgia
- Quantitative Data Collection with ArcGIS Online
- Example: Bird Profile Group Activity by Student
- Example: Nature Journals with GPS Coordinates
- Example: Deep Back Survey of Coastal Transition Zones of Oahu Island, Georgia

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Science in the Natural Environment Course Using ArcGIS Online

Goals: The focus of the course is to understand science and inquiry-based instruction in the natural environment through experience. A focus is on performance of authentic science practice in both instruction and assessment. Participants develop inquiry-based units and field studies to be used immediately in their classrooms. Participants use technology such as a part of inquiry-based instruction.

General Concepts: history of science, inquiry, mapping, data collection and analysis, argumentation, nature journaling, classification

Specific Concepts: global positioning systems, geospatial technologies, hosting, arcmap, geology, marine invertebrates, natural plants and animals - vegetation and invertebrates, coastal ecology

Materials: camping equipment, Lost Child in the Woods by Richard Leo, Nature Journaling by Claire Leslie Walker various field guides

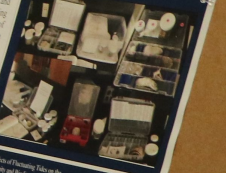
Assessment: nature autobiography and photojournal. Last discussion, nature journal, species mediation GIS and improvement plan. Participants present the results of their experiments and write a written report, teach a portion of the nature tracking improvement plan to the class, and submit the nature journal, unit and lesson plans and collection for assessment. Students learn how to set up and use ArcGIS online City accounts in their schools.

Conclusions and Insights

Lessons Learned: Participants in the course were overall pro-environmental before the course began as measured by an Environmental Attitudes Survey. Participants exhibited a slightly increased attitude toward behavior change regarding the environment after the course. Participants remarked that they were unaware of all the garbage generated in a day and handling and disposing of it themselves. Participants learned how to use geospatial technologies and maps in science instruction and were more comfortable "switching" between different technologies.

Overwhelmingly the course participants favorite activity was nature journaling and secondly the mapping activities. Using geospatial technologies not only taught participants how to use them in instruction but assisted with data collection and analysis as well as navigation and measuring changes over time on the island.

Student Collections



Group Experiment #1



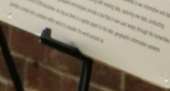
Group Experiment #2



Mapping personal impacts of Matthew

personal messages in the geography classroom

Matthew is a 10-year-old boy who lives in the coastal town of Beaufort, North Carolina. He is a member of the local Boy Scout troop and has been involved in various community service projects. This project focuses on mapping his personal experiences and the impact of these activities on his community.



10th Annual 'Jupiter Art Summit' in Jupiter, Rajasthan, India



Gap in Education: The Education, An Ethnographic Study

Ford, E.D.

Results

Where are you introduced to STEM fields in elementary, middle or high school?

What about this?

Why are you introduced to STEM fields in elementary, middle or high school?

What are the reasons for the gap in education? Why are you not introduced to STEM fields in elementary, middle or high school?

What are the reasons for the gap in education? Why are you not introduced to STEM fields in elementary, middle or high school?

What are the reasons for the gap in education? Why are you not introduced to STEM fields in elementary, middle or high school?



Preliminary Analysis of NC and Store Honey Samples for Pollen Content and Purity

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¹University of North Carolina—Pembroke, ²Tar Heel Middle School, ³West Bladen High School

Introduction

Honey is a vital part of the U.S. agriculture economy because it is a sweetener that is used in a wide variety of products. The approximately 12 million pounds of honey produced in 2011 are used for human food in a variety of "topical" or medicinal applications. The amount of pollen in honey depends on the source of the flowers that the bees visit throughout the season.

Consumers are concerned with the quality and purity of honey that is available for sale in the U.S. The USDA has been regulating since 2008 (2008) but these are not mandatory programs compared to other countries. We used several simple ways to evaluate the quality of honey and pollen content from honey to understand the source of the honey from which the bees obtained the pollen and water.

As part of a larger project to address science education for middle and high school students in North and South Carolina, we have begun evaluation of honey. All the samples of honey obtained and the results of the pollen analysis have been given to the producer of the honey or our contact. In our initial phase, we have examined three honey samples from North Carolina and one from South Carolina.

Methods

11 Raleigh, North Carolina 12 Raleigh, North Carolina

Pollen Extraction

Pollen extraction used the procedure of Jones & Brown (2014). Briefly, 50 g of honey is placed with 200 ml of 70% ethanol and the suspension is stirred. The resulting mixture is filtered through a 25 µm sieve and the supernatant decanted until all the honey is 70% ethanol and the residue is concentrated at the bottom of the jar.

This mixture is then processed with 100% water-ethanol (100% concentration) for 12 hours in a hot water bath. After centrifuging and washing three times with water, the residue is stored with ethanol (1) mixed with glycerol (1), and the supernatant is dried.

Colony-Level Identification

This is a standard approach for adding marker pollen to that the consumer can identify. The pollen grains are identified, counted, and present in the honey. The pollen grains are identified and identified that have 100% coverage of the pollen grain and identified that have 100% coverage of the pollen grain (standard deviation = 0.05). The formula to determine the number of pollen grains is:

$$N = \frac{C \times V}{V_p} \times \frac{1}{P}$$

where N is the number of pollen grains, C is the concentration of pollen grains, V is the volume of the pollen grain, and P is the probability of pollen grain being found. Table 1 shows results of the pollen analysis.

Sample	Concentration (grains/ml)	Standard Deviation
Sample 1	100	10
Sample 2	200	20
Sample 3	300	30

Table 2. Preliminary Pollen Abundance by Morphological Analysis

Sample	Monoculture	Polyfloral	Monoculture	Polyfloral
Sample 1	10	10	10	10
Sample 2	20	20	20	20
Sample 3	30	30	30	30

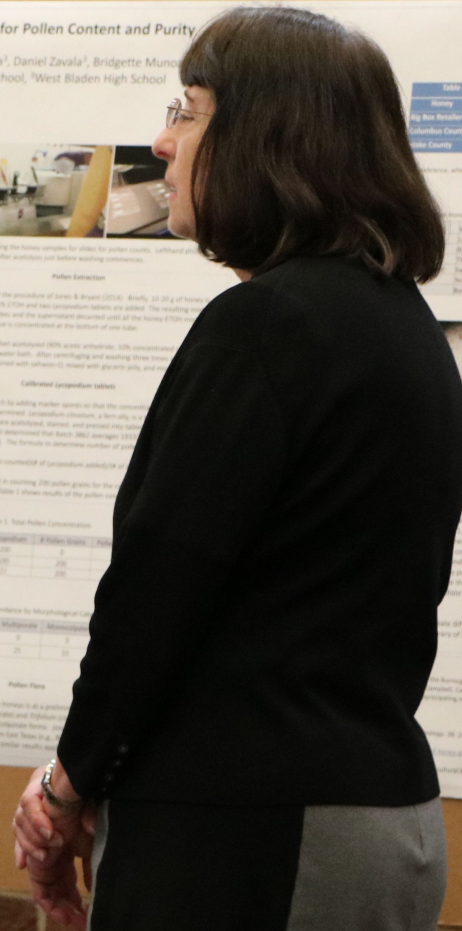
Pollen Purity

Statistical analysis of the pollen from the honey in all 4 samples identified significant differences (p < 0.05) between the samples. Further work to investigate the abundance of pollen from the honey will be reported in a future publication. The results of the pollen analysis will be reported in a future publication. The results of the pollen analysis will be reported in a future publication.

Table 3. Total Pollen Purity

Sample	Purity (%)
Sample 1	85
Sample 2	90
Sample 3	95

Figure 2. Preparing the honey samples for pollen analysis. Left panel shows honey being stirred in ethanol, and right panel shows the resulting mixture being filtered through a 25 µm sieve.



Overview

Creating the Campus Scholarship Bibliography may be added or changed. Additional information is a form and creating the index are a form.

Overview

- Books
- Book Chapters
- Journal Articles
- Newsletters, Articles and Reports
- Conference Presentations and Proceedings
- Reviews
- Accomplishments
- Grants
- Awards/Achievements
- Scholarship
- Mentorship

Last year's editors had over 400 entries from the UNC-WR faculty and staff!

The first Campus Scholarship Bibliography (2002) of editors and was a page long.