Internship Successes and Education Research

PINEMAP's Integrating Education Projects

John Seiler, John Kidd, Martha Monroe,
Annie Oxarart, Stephanie Hall from Aim 5

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

An update from the Internship Program Team

John Seiler and John Kidd
VT
Aim 5

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

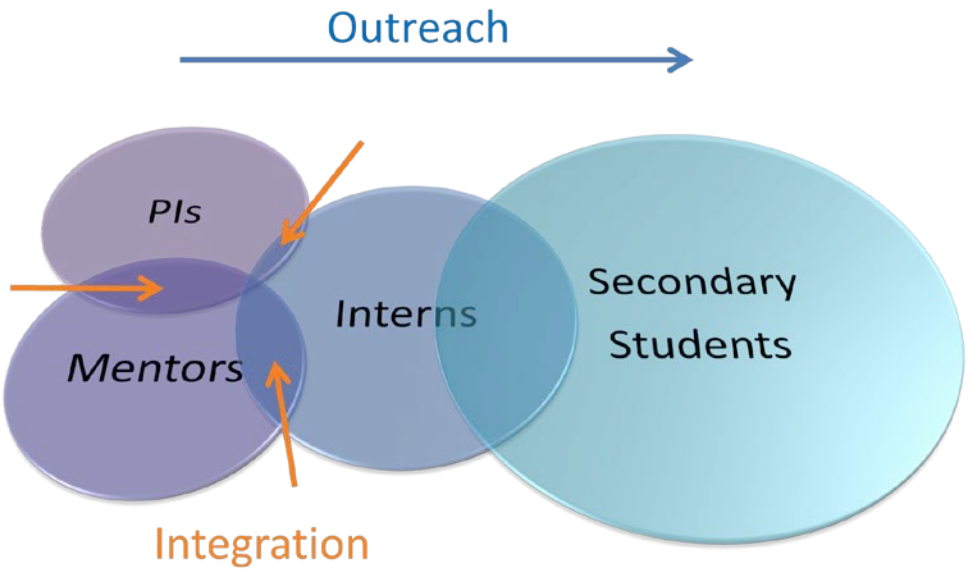
Internship Overview - Structure

Intern eligibility :

- sophomore or junior status
- southeastern US institution
- any major

Mentor eligibility:

- PINEMAP graduate students



Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship Overview - Distribution

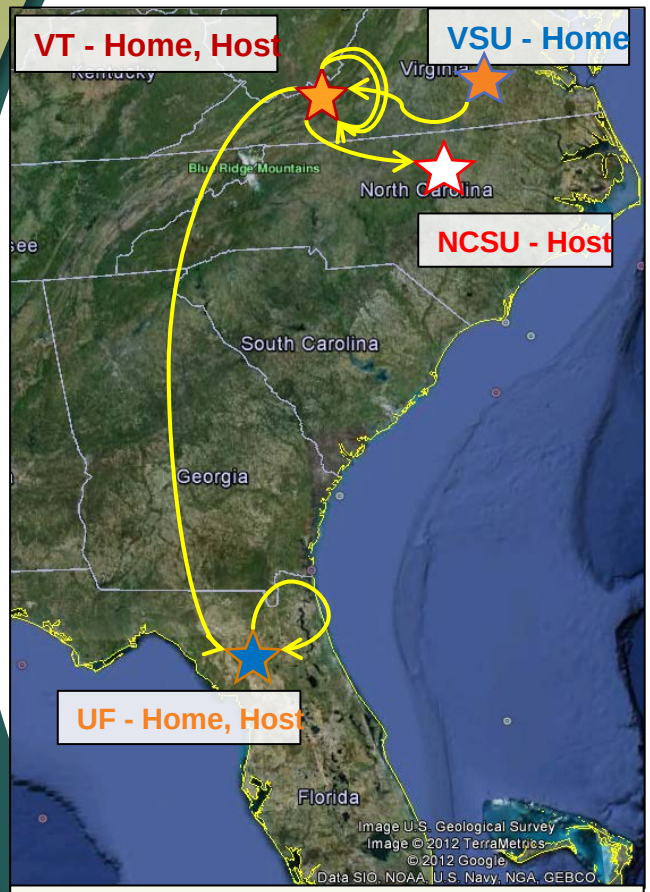
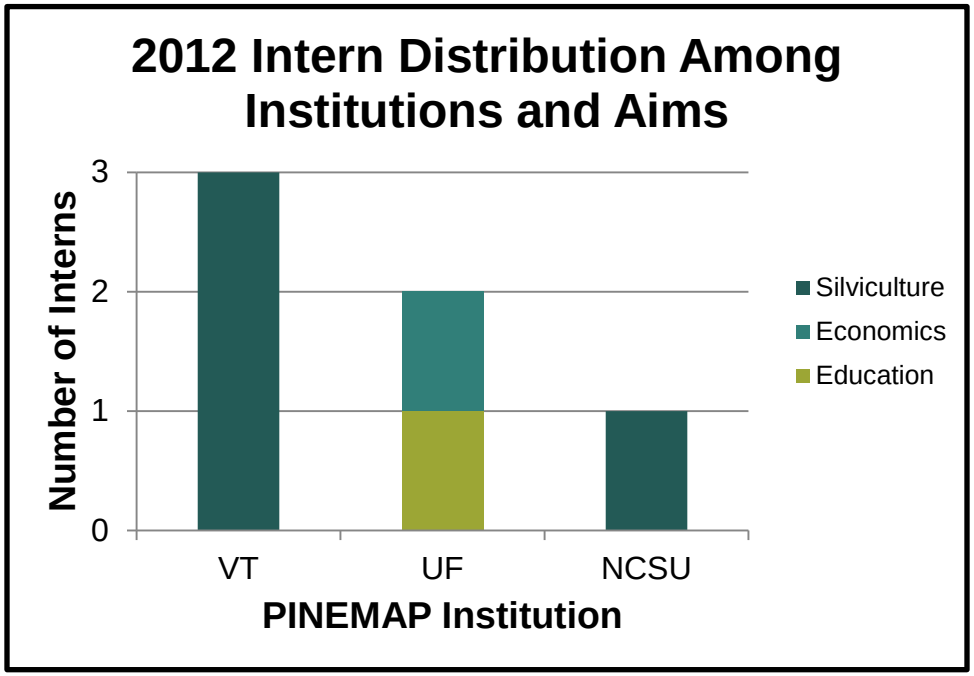


Fig. 1. Distribution of PINEMAP Interns for summer 2012; University of Florida = 2, North Carolina State University = 1, Virginia Tech = 3.



Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

Internship Overview - Students

2012 Intern Cohort

Paul Decker (UF)

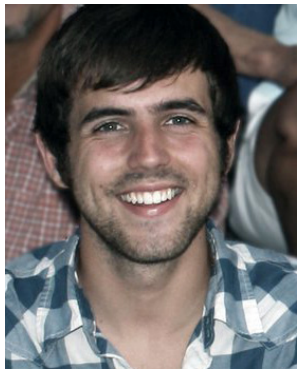
Andrew Faison (VT)

Bethany Gregory (VT)

Photo not available

Rebecca Jarvis (NCSU)

Will Kennerly (VT)



Justin Soto (UF)

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship Overview - Fall Class

Distance-delivered course

- Meet once per week on Wednesday evenings,
- Additional meeting times to practice/critique,
- Discuss each others' ideas, practice presentations,

The course includes 3 units where students:

- learn principles of communication and science education,
- create inquiry-based science presentations, and
- deliver multiple presentations to nearby public secondary schools and groups,
- Prepare a scientific abstract, poster and power point presentation.

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship Overview - Fall Class

Teachers evaluate presentations for constructive feedback and as a grade.

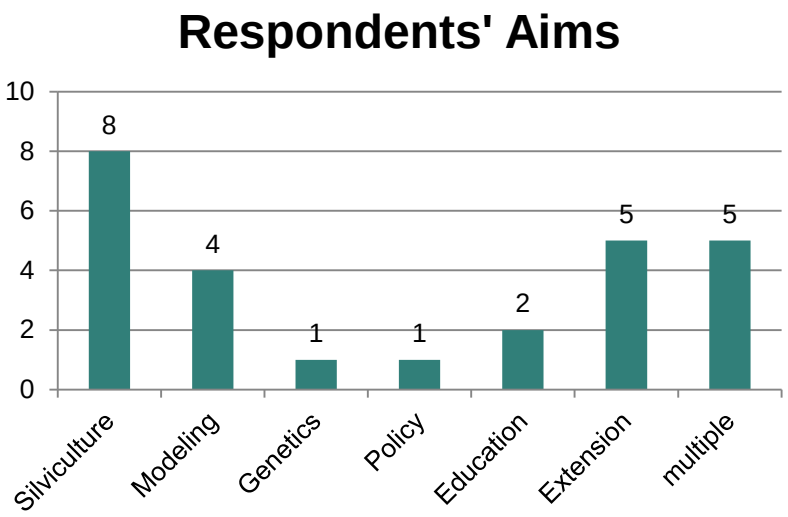
Students will also create poster presentations for the 2013 Annual Meeting

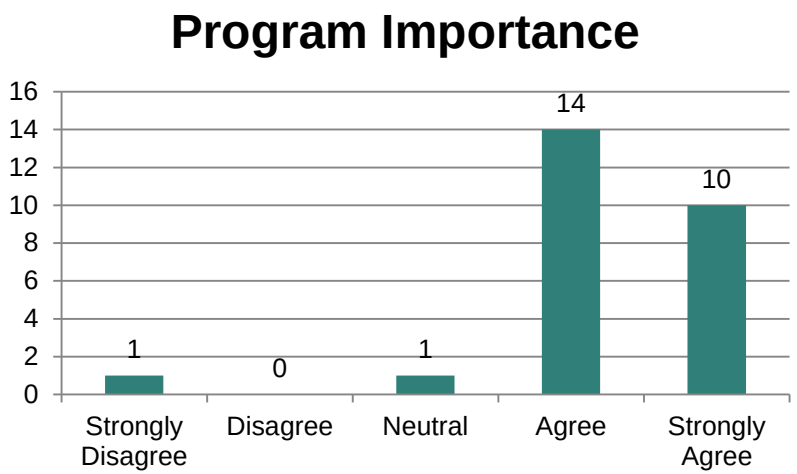
Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Annual Mtg Survey

26 responses from Annual Meeting participants



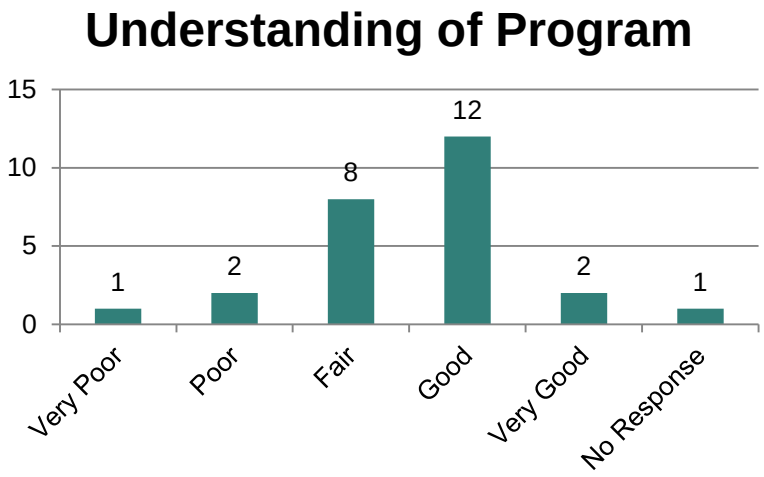


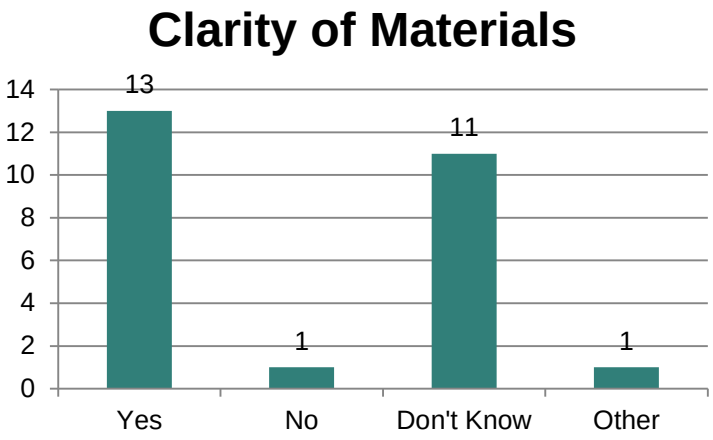
Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Annual Mtg Survey

Communicating about the program





Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

Internship - Annual Mtg Survey

Common barriers noted:

- "Poor timing relative to the beginning of research activities,"
- "Initial time investment getting interns up to speed on research," and
- "Type or amount of work to occupy an intern full-time."

Overcoming barriers:

- "Early notification so planning for training and supervision can occur"
- "PI's help in mentoring process, and proper time planning & management"
- "Summarize the activities of current crop of students completed. Have grad students who had intern talk to other grad students about the value of the program."

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Attitudes Survey

Attitudes toward research

- Research is a large component of the internship
- Only 2 of 5 respondents had previous research experience
- How does the internship influence interns' attitudes?
- Modified from a survey for education students
  - Five-factor model with constructs:
    - Usefulness of research in a career
    - Research anxiety
    - Positive attitudes toward research
    - Research relevance to life
    - Research difficulty
  - 5 point Likert scale

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Attitudes Survey

Preliminary results from year 1

- Five respondents (3 completed both pre-/post-surveys)
- Shifts in mean values
- Students may see research as being useful in their career
- Seem to disagree less with negative aspects of research
  - Anxiety
  - Difficulty understanding concepts
  - Research is difficult

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Personal Experience

Jay Raymond

- PhD candidate at VT under Tom Fox
- Research Focus: N uptake efficiency of enhanced efficiency N fertilizers using 15N stable isotopes.
- Mentored Andrew Faison from VSU

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Personal Experience

Valuable Aspects of the Internship

- “Probably getting my first real experience with scientific research and the first time I've applied many things (scientific theory, laboratory procedures, nutrient cycling) to life outside of the classroom ; these both really helped all of these lessons sink in.”
- “I think all of the work I did put me into a position to be able to decide on where I want to go in the future and what I want to focus on as a career.”

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Internship - Changes for 2013

- 12 Internships available
- Name change “interns” to “undergraduate fellows”
- Mentoring positions
  - Grad students
  - Post-docs & Staff
  - USDA, USFS scientists
- Heavier marketing to non-PINEMAP institutions
- Participants can re-apply for 2013

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

An update from the PINEMAP/PLT Module Team

Martha Monroe and Annie Oxarart
UF

Aim 5

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

PLT Secondary Module

Partnering with Project Learning Tree to develop secondary module on

- Climate change impacts on southern forest ecosystems,
- Forest impacts on climate, and
- Ways people can affect these relationships.

- Designed for use in high school science classes
- About 12 activities, divided into 4 sections
- Hands-on, interactive learning

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

United States Department of Agriculture | National Institute of Food and Agriculture

PLT Secondary Module

Module Development Activities

- Needs assessment (n=746)
- Drafted 9 of the 12 activities
  - EEPD course, Fall 2011; students, faculty and staff
- Bimonthly conference calls with Education Advisory Committee
- Working with PINEMAP graduate students
  - Elizabeth Wilson, Adam Maggard, Wade Ross
- Hosted summer PINEMAP intern
  - Paul Decker, Virginia Tech
- UF Center for Precollegiate Education and Training
  - Summer research and pilot test
- EE professional development with the nat'l EE Capacity project

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

PLT Secondary Module

What's Next

- Finalize draft – January 2013
- Expert review (you!)
- Develop training workshop
  - Pilot workshop – March 2013
- Online training workshop – Summer 2013
- Regional formative evaluation –Fall 2013

Yep YOU!

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

Needs Assessment

Climate education is often taught in earth science courses.

- We are interested in life science.

Purpose

- To learn from secondary science educators in Southeast how to best design module and activities

Research Questions

- How do secondary science teachers in the Southeast currently cover climate change in their classrooms?
- How interested are secondary science teachers in teaching about this topic?

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

United States Department of Agriculture National Institute of Food and Agriculture

Needs Assessment

Methods

- Online survey
  - Reviewed and pilot tested
- Email invitation distributed
  - 13 email lists
  - Exact population size unknown
- 746 surveys returned; 675 complete
  - Mostly high school educators
  - More than 75% from FL, NC, OK, and VA
- Likely over-reported those interested in climate change
  - Cannot generalize to all secondary science teachers

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

Needs Assessment

How do educators currently teach climate change?

77% of respondents already teach about climate change

Time spent	Courses
Informal discussions	Agriculture, chemistry, and physical science
Planned lessons < 1 week	Biology (regular and AP), earth science, integrated science, marine science
Planned lessons > 1 week	Environmental science (regular and AP), ecology, environmental issues

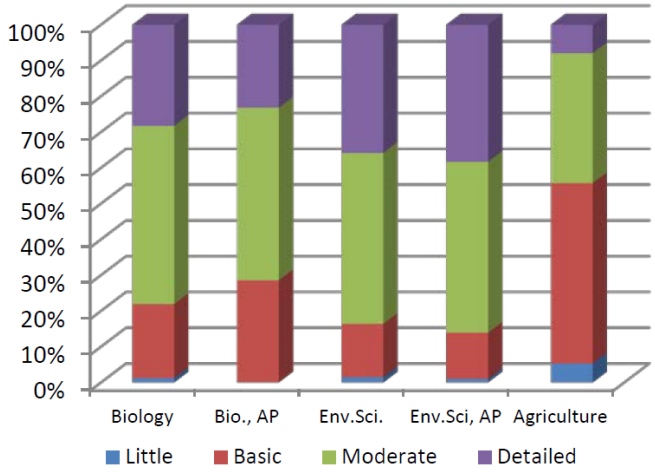
Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

Needs Assessment

How interested are secondary science teachers in teaching about this topic?

- 82% interested in continuing to cover climate change in future
- 70% report having a moderate or detailed understanding of the issue
- 72% are somewhat to very comfortable teaching about the issue
- Self-reported knowledge and comfort levels suggests Ag Ed are significantly different

Figure 1: Respondent's level of knowledge about climate change



Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

United States Department of Agriculture | National Institute of Food and Agriculture

Needs Assessment

How can we meet their needs and interests?

It is very or somewhat important to the largest percentage of respondents for the module to help them meet the following goals:	
Connecting science to students' everyday lives	98%
Emphasizing critical thinking	98%
Developing data analysis skills	94%
Emphasizing choices that affect sustainability	92%
Emphasizing systems thinking	92%

85% of the respondents would use activities to teach students about life cycle analysis

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

United States Department of Agriculture National Institute of Food and Agriculture

Needs Assessment

Teaching Approaches

- Over 85% believe it is appropriate or very appropriate to:
  - Explain scientific uncertainty
  - Present rationale for how people interpret climate change differently
  - Discuss advantages and disadvantages of climate related policies
  - Discuss the history of climate change science
- More variation for "Presenting all perspectives as valid, even those that most scientists disagree with"
  - 36% inappropriate or very inappropriate
  - 41% appropriate or very appropriate
- Address multiple perspectives, but focus on the science

> *"It is also very important for students to learn about and ANALYZE different perspectives. This allows them to interpret and separate media hype from sound science."*

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Needs Assessment

Conclusions

- Focus on life science and environmental science classes
- Provide professional development through trainings to increase knowledge and comfort
  - Reach out to interested agriculture educators
- Create activities that
  - Connect to daily life and sustainability
  - Teach critical thinking, data analysis, and systems-thinking skills
- Explore issues through the nature of science

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

And now for some research results…

Stephanie Hall
MS student at UF
Aim 5

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

Summer Research and Pilot Test

Context

- Climate Change is a controversial issue that may affect student interest and learning

Research Question

- Does connecting a carbon lesson to climate change affect student knowledge?

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

United States Department of Agriculture | National Institute of Food and Agriculture

Summer Research and Pilot Test

Activities

- Carbon on the Move
  - Students become carbon atoms
  - Move through biological part of carbon cycle
  - Discuss geological portion
  - Map entire cycle in groups
- Counting the Carbon
  - Students measure pine trees
  - Determine amount of carbon stored in tree
  - Calculate sequestration rate for forest and state
  - Compare it to state emissions rate

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Summer Science Camp

- Rising 10th graders
- Random assignment to week
- 23 students during Week 1
- 24 students during Week 2
- Organized by CPET at UF

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Week 1 Treatment

- Activities in context of climate change
  - Pre-test
  - Activities
    - Carbon on the Move
    - Counting the Carbon
  - Post-test
  - Interviews

Week 2 Treatment

- Activities not in context of climate change
  - Pre-test
  - Activities
    - Carbon on the Move
    - Counting the Carbon
  - Post-test
  - Connection to climate change
  - Interviews

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Feedback

- Both weeks, students enjoyed the hands-on parts of the activities
- Students liked going outside (except for the mosquitos)
- Students did well overall, some difficulty understanding how the geological part fit into the entire carbon cycle
- They thought the calculations were boring but cared about the results

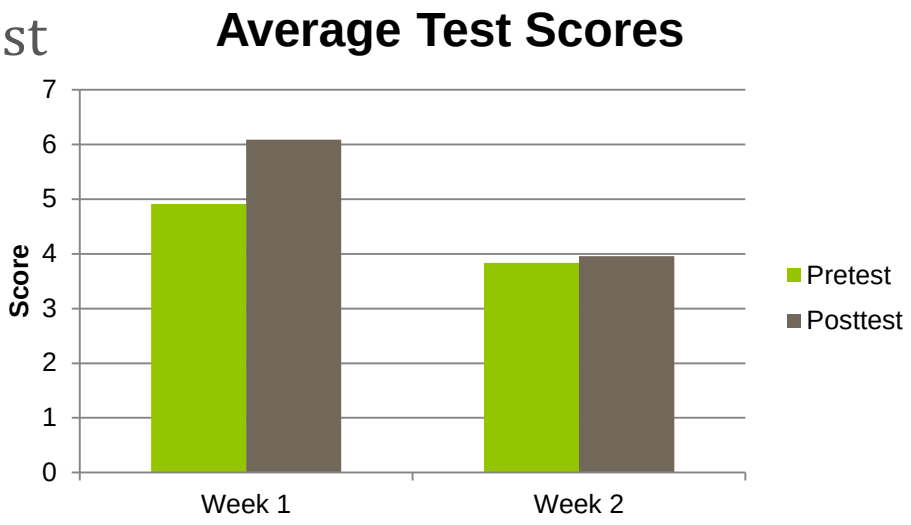
Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Knowledge about Carbon Findings (p<.05)

- No significant differences between pretests
- Significant difference between Week 1 pretest and posttest
- No significant difference between Week 2 pretest and posttest
- No significant difference between Week 1 and Week 2 posttest



Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Qualitative Data from Week 1

- "It was less interesting because I'm not a person who's into all the climate change, but also more interesting because the amount of trees and carbon that we put out affects that."
- "Impacts always increase the ability to understand what you're learning."
- "In school we're learning about the carbon cycle but here we're actually learning the importance of it."
- "It definitely makes it more interesting because the first step in solving the problem is knowing what's causing it."

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Qualitative Data from Week 2

- "It made it much more interesting because then you could actually relate to the carbon cycle and how it really does affect the environment."
- "I liked it at the end because that was the last thing to stick with us."
- "I just need to know what I should wear for the day, that's the only reason why I think about climate; if I should wear jeans or shorts. So it doesn't really matter to me."
- "I think it would've been more relevant when you were taking the measurements if you knew you were trying to figure out how we can slow down or reverse the climate change."

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

Summer Research and Pilot Test

Summary Thoughts

- Both groups said that relating the activities to climate change made them more interesting
  - Even the students that were not concerned about climate change
- Connecting the activities with climate change also appears to be linked with an increase in knowledge
- More studies are needed with more representative students to generalize findings

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture

PINEMAP

Questions

Pine Integrated Network: Education, Mitigation, and Adaptation project (PINEMAP) is a Coordinated Agriculture Project funded by the USDA National Institute of Food and Agriculture

USDA United States Department of Agriculture National Institute of Food and Agriculture