22. Secondary Teachers Test PINEMAP Classroom Activities

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A recent formative evaluation of the PINEMAP secondary teacher module to meet education-related outcomes will help improve the activities and support materials. This module is designed to assist high school teachers engage and strengthen students' capacity to make informed, practical decisions related to climate, forest ecosystems, and forest management.

The new resource for teachers, *Southeastern Forests and Climate Change* (see Chapter 21, page 46), has been developed through a partnership with the national environmental education program Project Learning Tree® (PLT). The module includes 14 activities that focus on climate change impacts on southeastern forest ecosystems; strategies for managing forests in an uncertain climate; life cycle assessment to explore how consumers can affect atmospheric carbon; and opportunities to practice data analysis, critical thinking, and systems thinking skills in the context of forests and climate change.

Objectives

To test the usefulness and effectiveness of this module, we conducted a formative evaluation during fall 2013. Formative evaluation is used to improve programs by pilot-testing materials with intended audiences and incorporating feedback and suggested revisions into the final program (Ernst et al. 2009). The formative evaluation plan was developed and revised with input from the PINEMAP Education Advisory Committee and designed to answer the following questions:

a. What are teachers' perceptions of the secondary teaching module?
b. How can the activities be improved?
c. What are teachers' perceptions of the online training resources and module website?

Procedure and Instruments

An invitation was sent through several email lists to recruit pilot testers. From 123 applicants, 64 teachers were accepted to represent regional and grade-level diversity. Of those, 28 teachers (46.4% high school and 53.6% middle school) agreed to use two activities and complete the online teacher evaluation form, and 36 high school teachers agreed to use four activities, complete the online teacher evaluation form, and involve their students in pre- and post-activity surveys. Teacher evaluation forms were developed, reviewed by ten experts, revised, and pilot tested with two teachers. Student pre- and post-tests were developed, reviewed by nine experts, revised, and pilot tested with 89 students who participated in the University of Florida's Center for Precollegiate Education and Training Student Science Training Program over the summer of 2013.

Results

As of January 24, 2014, 44 pilot testers had completed their evaluation forms, and about half (53%) of the teachers had used the activities in environmental science and advanced placement (AP) environmental science classes. About 15% used the activities for middle school integrated science classes and 14% used the activities in biology and AP biology classes. The remaining teachers (8%) used the activities in courses such as earth science, land resources, economics, and ecology (Figure 22.1). The pilot testers were from Florida (45%), Kentucky (16%), Virginia (14%), Arkansas (11%), North Carolina (9%), and Georgia (5%) (Figure 22.2). Although the activities were designed for high school students, we involved middle school teachers in the pilot test and asked them how the materials could be adapted for their students.

High school students diagram the carbon cycle as part of the PLT Secondary Module activity Carbon on the Move. Photo by Jessica Ireland.

"I loved it (activity 2)! This activity taught me a lot about different perspectives and viewpoints from other people and opened my eyes to new horizons!" —HIGH SCHOOL STUDENT FROM FLORIDA

Pilot testers provided positive comments about the organization and detail of the materials and online supplemental resources. About 90% of high school teachers said the activity they pilot tested was ready for classroom use. On average, high school teachers agreed that their students were able to meet the activity's stated objectives (*Mean* = 4.27, *standard deviation [SD]* = 0.78 on a scale of 1 to 5, with 5 = strongly agree) and the activity procedure was appropriate for their students (*Mean* = 4.27, *SD* = 0.80). As expected, data from middle school teachers suggested that the activities were a little more challenging (*Mean* = 3.76, *SD* = 1.2) and the students were slightly less able to meet stated objectives (*Mean* = 3.91, *SD* = 0.90) as compared to high school students. Pilot testers indicated that the online training resources and module website effectively prepared them to use these activities (*Mean* = 4.58, *SD* = 0.58) and built their confidence to teach about climate science topics (*Mean* = 4.54, *SD* = 0.56). The results of the formative evaluation suggest that these activities are written in an appropriate tone and provide sufficient background information for teachers to effectively use them in their classrooms.

Recommendations

Teachers provided many excellent suggestions for improving the materials. After reviewing the teachers' feedback and recommendations on all the activities, the module development team is focusing on the following overall changes:

a. Include a section that offers an adaptation of each activity for middle school students or basic high school classes.
b. Provide multiple-choice questions to allow teachers to develop a student quiz and include writing prompts for assessments on each activity.
c. Add comments from teachers about their classroom experiences and suggestions for using the materials to both the printed document and website.

Many pilot testers indicated that they would like to implement the lessons with future classes and that were very pleased with the formative evaluation process. After the PINEMAP education team completes revisions and updates the website, we will begin plans for regional teacher workshops.

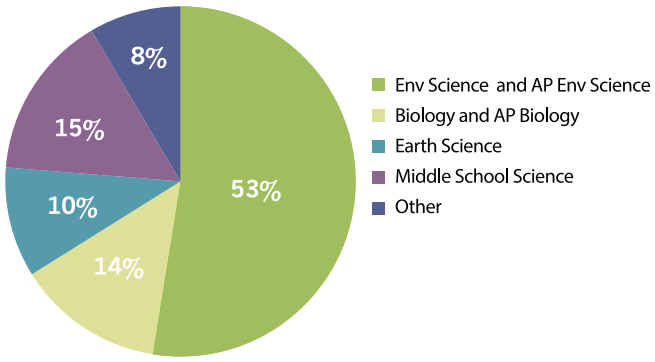

Figure 22.1. Course distribution of responding teachers.

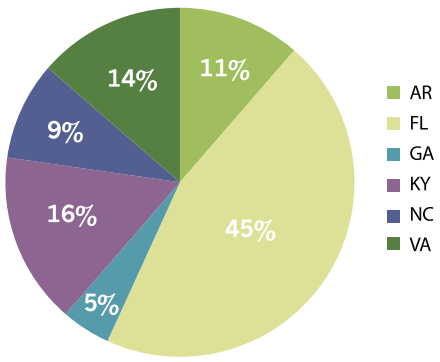

Figure 22.2. State distribution of responding teachers.