We report results from pre-post testing of students and make sense of results based on metadata about individual students, their teacher’s content knowledge and classroom-level implementation of the teaching unit.

**Teaching Training, Support, and Feedback:** Teachers who implemented the teaching unit attended a week-long summer institute. During the school year, teachers kept a detailed log of which specific activities they used, when they used them, how they used them, and why they used them or omitted specific activities.

**Written Assessments:** We administered written assessments to students (N = 3393) in five states (CA, CO, MD, MI, and NY) before and after their participation in a two-week teaching unit. Items asked students to address recognition of biodiversity and three concepts that ecologists view as the drivers of community assembly: biotic interactions, abiotic constraints, and dispersal of organisms. We used a subsample of student answers to examine student post instruction EAP as a function of student-level and classroom level variables including the following:

- **Interest**
- **Student pre-test EAP**
- **Teacher EAP**
- **% of all lessons implemented**
- **Version (2012 or 2013)**
- **grade level**

**Data Analysis:** We used data for classes (N = 40) in which students completed both the pre and post assessments. We used a paired t-test to compare the mean EAP scores for student pre and post testing. We used multi-level modeling in R (n = 23 classes) to examine student post instruction EAP as a function of student-level and classroom level variables including the following:

**Student Level Variables:** grade level, pre-test EAP

**Class Level Variables:** teacher experience, teacher leadership (EAP), whether teacher attended a pre-test, whether students participated in a field trip, whether the unit was linked to a local environmental issue, % of core lessons implemented, % of optional lessons implemented, % of total lessons implemented

In the two-level model, class accounted for 32% (ICC = 32.12%) of the variation and the student-level variables accounted for an additional 16% of the variation in post-test scores. Student pre-test score, student grade level, and percentage of all lessons implemented were the significant factors that accounted for the bulk of variance in post-test score. Teacher ability estimate was not a significant factor.

**Conclusions and Implications**

An understanding of the structure and function of ecological communities is critical because humans are altering ecosystems to an unprecedented extent, resulting in both press and pulse disturbances. We believe we have made significant progress in:

- describing how students reason about communities and ecosystems
- developing useful ways of assessing this complex subject

We have demonstrated that a learning progression framework can be a powerful tool for designing teaching units. Questions remain about how to help students at different levels learn from the same contextual experience, teachers’ motivations for implementation decisions, and how to help teachers understand the links between the LP and the lessons.