



Tying Words to Images of Science Teaching (TWIST)



Kathy Roth, BSCS: kroth@bscs.org | Meike Lemmens, Lemmens Associates: meikelemmens@gmail.com
Helen Garnier, Garnier Associates: hgarnier@sasdatalink.com

Project Goals

- » Develop and field test a words-to-video images tool for analyzing selected features of science teaching
- » Produce a *Guide to Video Analysis of Science Teaching* that includes a coding manual for the selected lesson features, a training guide for achieving inter-rater agreement, and a CD/DVD containing video segments for use as examples and for practice

Project Rationale

Word-based descriptions of science teaching are not now linked to shared visual images, leaving the science education field with no shared descriptive language. This leads to confusions about research findings when people across the science education community (researchers, teachers, teacher educators, administrators) use the same words to describe science teaching but have very different images in mind of what those words look like in action in a classroom.

The *Tying Words to Images of Science Teaching* project (TWIST) addresses this problem by engaging science education experts representing diverse points of view in developing a shared words-to-images language and analytic tools for analyzing selected aspects of science teaching.

Expert Panel Members

Angela Calabrese Barton, Michigan State University
Hilda Borko, Stanford University
Rodger Bybee, BSCS (Retired)
Daphne Minner, Education Development Center
Jim Minstrell, Facet Innovations
Mike Piburn, Arizona State University
Jo Ellen Roseman, AAAS Project 2061
Kathy Roth, BSCS
Sean Smith, Horizon Research
Carla Zembal-Saul, Pennsylvania State University

Step 1: Literature Review

Identified features of science teaching that:

- a) Are commonly coded for in observational or video studies of science teaching
- b) Are supported by research evidence of links to student learning

Step 2: Expert Panel Selected Target Features of Science Teaching

- » Coherence of science content storyline
- » Scaffolding of student thinking/teacher questioning
- » Reasoning with evidence
- » Sensemaking
- » Use of representations
- » Learning community

Step 3: Expert Panel Defined Coherence of Science Content Storyline

Six key aspects:

1. Establishing a main learning goal
2. Selecting and sequencing activities to align with the learning goal
3. Linking science ideas within lessons
4. Connecting science ideas across lessons
5. Adapting to students' contributions
6. Presenting accurate and age appropriate science content

Step 4: Collaborative Analysis of Science Teaching Videos for Coherence

Step 5: Development, Testing, and Revision of the Coherence Video Coding Manual

USING A SHARED VIDEO CODING TOOL

Title	Video Case	Author
Japanese lesson CLIP 1	191	meikelemmens
Japanese lesson CLIP 2	257	meikelemmens
Japanese lesson CLIP 3	256	meikelemmens
Japanese lesson CLIP 4	192	meikelemmens
Japanese lesson CLIP 5	255	meikelemmens
TWIST Lesson 1	254	meikelemmens
TWIST Lesson 1 (mp4)	319	meikelemmens
TWIST Lesson 3 (mp4)	340	meikelemmens
TWIST Lesson 4a (mp4)	337	meikelemmens
TWIST Lesson 4b (mp4)	336	meikelemmens

Video Player: ROLE001-2-284-LVTF

Code Marker: Mark In, Mark Out, Add, Update, Delete, Choose Column Values, Clear Column Values, Col Code List, Values, Notes

In	Out	CLIP	Notes
00:00:03.00	00:01:37.00	CLIP 1	Video Clip 1
00:02:24.80	00:08:35.00	CLIP 2	Video Clip 2
00:09:30.00	00:11:07.90	CLIP 3	Video Clip 3
00:12:34.50	00:23:58.90	CLIP 4	Video Clip 4

Future Steps

- » Repeat Steps 3-5 for new feature of science teaching: Scaffolding student thinking
- » National field test of the coding manuals
- » Create and publish *Guide to Video Analysis of Science Teaching*

