Secondary Mathematics Video Catalog

A Catalog of Publicly Available Video of Secondary Students and Teachers Engaging with Mathematics, and with the Teaching and Learning of Mathematics

Rob Wieman and Ben Freeburn

Table of Contents

Template for Resource Entries

This shows the structure of each entry and the kind of information that is presented there.

Name of Resource:

Author/sponsor:

Accessibility (URL, or place to buy it):

Type of video (Individual task based interview, small group, whole class, teacher reflection):

Length of videos:

Number of videos:

Level (HS, MS, Elementary):

Content domains (CCSS-M Content Standards):

Description of the Videos :

Usefulness of the Videos:

Ancillary Materials (i.e. transcripts, tasks):

Classroom Discussion: Seeing Math Discourse in Action

Name of Resource: Classroom Discussion: Seeing Math Discourse in Action
Author/sponsor: Anderson, Chapin, and O'Connor
Accessibility: DVDs that are a component of a purchasable ($149.99) "multimedia professional learning resource" published by Math Solutions (www.mathsolutions.com).
Type of video: Excerpts from 12 classroom lessons that involve small group and whole class discussions
Length of videos: Individual videos range in length from 30 seconds to 16 minutes.
Number of videos: 75 videos
Level: Grades K - 6
Content domains: Counting and Cardinality, Operations and Algebraic Thinking, Number and Operations in Base Ten, Measurement and Data, The Number System
Description of the Videos:

- The videos on the DVDs are organized in two ways - by the chapters in the accompanying facilitator's guide and by grade level
- The videos include representations of teacher's "talk moves" (e.g. wait time, revoicing) in classroom lessons with small groups and whole classes, of teachers establishing classroom talk norms, and of teachers' and students' talk focused on developing students' understanding of mathematical concepts and processes.

Usefulness of the Videos:

- Videos illustrate particular "talk moves" and combinations of "talk moves"
- Videos afford opportunity to view students doing mathematics as they engage in problems, as the students interact with other students, and as the students interact with teachers.
- Videos demonstrate instructional practices consistent with the mathematics teaching practices (NCTM, 2014). These practices include but are not limited to: posing purposeful questions, eliciting and using evidence of student thinking, supporting students' productive struggle, and orchestrating mathematical discourse.

Ancillary Materials:

- Facilitator's Guide
    - From the product description, "The 240-page guide offers twenty professional development sessions centered on video clips illustrating best talk practices in action."
    - The guide is organized into three sections. The first section provides an overview for classroom discussions in students' mathematics learning. The second section focuses on different mathematical content and processes

involved in classroom discussions. The third section focuses on implementing classroom discussions.
    - The guide includes facilitation materials for professional learning sessions, how each of the videos are involved in the sessions, descriptions of the 75 videos, and an alignment of the lessons of the videos with the Common Core State Standards for Mathematics Correlations.
- CDs of reproducibles
    - Lesson Planning Template
    - Professional learning session handouts
    - Lesson plans for the twelve classroom lessons in the videos

Inside Mathematics

Name of Resource: Inside Mathematics
Author/sponsor: Inside Mathematics is copyrighted by the Noyce Foundation
Accessibility: These videos are available for free streaming on the internet.
www.insidemathematics.org
Type of video: Excerpts from classroom lessons and teacher reflections - prior to and following lesson. NOTE:The videos are separated into four collections: Public Lessons, Number Talks, Problem of the Month, Formative re-engaging lessons.
Length of videos: 5-25 minutes
Number of videos :

- Number Talks: 5 different classroom lessons, 3 videos for each classroom
- Problem of the Month: 9 videos
- Public Lessons: 14 different classroom lessons, 10 - 20 videos for each classroom
- Formative re-engaging lessons: 5 video

Level: Grades 1 - 12
Content domains:

- Elementary: Operations and Algebraic Thinking; Number and Operations in Base Ten; Numbers and Operations - Fractions; Measurement and Data; Geometry
- Middle Grades: Ratios and Proportional Relationships; The Number System; Expressions and Equations; Geometry; Statistics and Probability; Functions
- High School: Number and Quantity; Functions; Geometry; Statistics and Probability; Algebra

Description of the Videos:

- All videos include a closed caption feature
- Public Lesson
    - 14 sets of videos for entire Grade 2 - 12 classroom lessons, many of which include pre-lesson conversations and post-lesson debriefing with mathematical coaches, fellow teachers, and/or students
    - Most of the classroom lessons involve tasks created by the Mathematics Assessment Resource Service (MARS)
    - The videos of the classroom lesson are separated into temporal segments - usually 10-15 video segments per lesson. Nearly all the lessons follow a launch, explore, and summarize structure. All the lessons include whole class and small group activities. The videos of the small group activities include different groups of students working on mathematics.
- Number Talks

    - The following is the website creators' description of number talks: "Number talks were developed for classroom teachers to engage students in "mental math" through grappling with interesting mathematics problems. Educators can use number talks regularly as introductions to the day's mathematical practice, as "warm ups" for other lessons, or as stand-alone extended engagements with mathematical concepts."
    - 5 sets of 3 videos for each Number Talk. Most of the sets of videos include a pre-lesson conversation between the teacher and coach, the Number Talk enacted in a classroom, and a post-lesson debriefing between the teacher and the coach.
    - Most of the Number Talk classroom videos focus on a whole class discussion, but some include small group, pair and share interactions.
- Problem of the Month
    - The following is the website creators' description of the videos in the Problem of the Month collection: "Anna Yates School launched their schoolwide conversations about mathematics teaching and learning using the Problems of the Month. In the videos below, you'll see how classrooms of different grade levels worked separately and together on different levels of the Problem of the Month "Party Time," which requires logic, deductive reasoning, counting principles/strategies, and a variety of mathematical representations (depending on the grade level) such as tree diagrams, Venn diagrams, tables, charts, and matrices. Teachers and principals describe how they collaborated together on the problem-solving theme at their school, and in the culminating gallery walk students explain their thinking and share what they like about the Problems of the Month."
    - There are nine videos in the collections. Five of the videos are students in grades K-6 engaging in the different levels of the "Party Time" problem. Four of the videos are pre-lesson and post-lesson conversations with teachers, principals, and students discussing the Problem of the Month project. Some of the videos are separated into segments.
    - Many of the videos include the launching of the Problem of the Month task and then focus on small groups of students doing the task. The videos capture the progress of different small groups of students as they work on task.
- Formative re-engaging lessons
    - The website creators state: "Formative Re-Engaging Lessons involve a cycle of inquiry, instruction, assessment, analysis, selection, and re-engagement around a mathematical concept."

    - The collection is a set of five videos from one classroom lesson. The lesson is segmented into four videos and the fifth video is a pre-lesson conversation between the teacher and math coach.
- Organization of videos
    - CCSS-M Content and Practice Standards: Collection of excerpts from the public lessons videos illustrate students engaging in each of the eight mathematical practices and a variety of the mathematical content standards. The collection allows the viewer to search by grade level, content standard, or mathematical practice.
    - Tools for principals, coaches, and teachers: Collection of videos for teachers include teachers reflecting on their learners, on teaching practices, and on each other's teaching. Collection of videos for coaches include coaches reflecting on lesson study, their role in teacher learning, reflecting on the mathematical tasks, and excerpts from the pre-lesson and post-lesson conversations for the public lesson video collection. The video collection for principals includes the principals reflecting on their role in emphasizing the importance of mathematics teaching and learning in their respective schools.

Usefulness of the Videos:

- The collection of videos offer video representations of mathematics teaching and learning that can be used to demonstrate/model:
    - Setting-up/Launching a classroom mathematical activity in which students collaborate in small groups
    - Teachers interacting with students using different discourse structures (i.e. I-R-E, Funnelling, and Focusing)
    - Teacher transitioning between small group activity and whole class discussion/directions/lecture
    - Students engaging in mathematical activity with small groups of peers with and without the teacher
    - Teachers supporting students productive struggle
    - Teachers posing purposeful questions to individual students, small groups of students, and whole class
    - Teachers launching and implementing low-level and high-level cognitive demand mathematical tasks
    - Teachers, coaches, and students reflecting on their experiences teaching and learning during a classroom mathematics lesson
    - Teachers and coaches anticipating lessons, sharing their rationales behind pedagogical decisions, and interpretations of observed student behavior

- Teachers and students in Bilingual classrooms

Ancillary Materials:

- Public Lessons
  - Written overview of the set of videos for the classroom lesson and each video in the set.
  - Written teacher and/or coach commentary about the mathematics teaching and learning in the videos.
  - Transcripts for nearly all the videos
  - Lesson plans, the mathematical task(s) from the lesson, and student work sample(s) from the classroom lesson
- Number Talks
  - Written overview of each video in the Number Talk set
  - Transcript for each video
- Problem of the Month
  - Problems of the Month Tasks
  - Transcripts of the videos
- Formative Re-engaging
  - Overview of each of the video segments
  - Transcripts for the videos
  - Lesson plan, mathematical task in the lesson, pre- and post-assessments, supporting materials, and student work samples from the classroom lesson

Teaching Channel

Name of Resource: Teaching Channel
Author/sponsor: The Teaching Channel, a non-profit organization
Accessibility (URL, or place to buy it): These videos are available for free streaming on the internet. You have to create an account and password.
www.teachingchannel.org
Type of video (Individual task based interview, small group, whole class, teacher reflection): Excerpts of classroom lessons, which include whole class, small group, and teacher reflection.
Length of videos: 2 minutes to 26 minutes
Number of videos: Website reports 162 "math" videos
Level (HS, MS, Elementary): K-12
Content domains:

- K-8 CCSS-M Content Standards: Counting and Cardinality; Operations and Algebraic Thinking; Number and Operations in Base 10; Number and Operations - Fractions; Measurement and Data; Geometry; The Number System; Expressions and Equations; Functions; Statistics and Probability
- 9-12 CCSS-M Content Standards: Algebra; Functions; Modeling; Geometry; Statistics and Probability

Description of the Videos :

- The video collection is organized by grade level and topic, which are not specific to mathematics teaching and learning.
- The videos are tagged using, at most, three keywords that describe the grade level, mathematical content, CCSS-M Standard, and/or mathematical teaching practice.
- Video collection includes a search feature that allows the user to search videos by mathematical content, grade band, teaching practice.
- There seems to be two major foci for the videos - mathematics teaching practices (e.g. "giving efficient directions," "think time and collaborative learning," and "formative assessment using U-P-S strategy") and mathematics lesson ideas (e.g. "collaborate to solve inequalities" and "statistical analysis to rank baseball players.")
- The content of the videos varies. Many of the videos include excerpts of classroom lessons that follow a launch-explore-summarize structure. The launch involves the teacher setting up the activity while interacting with the whole class. The excerpts from the explore portion focuses on small groups of students collaborating on the mathematical task. The excerpts of the summary involve a whole class discussion about the students' work on the mathematical activity. All of these videos include a voice-

over commentary in which the teacher(s) reflects on pedagogical decisions and situates the decisions in the broader scope and sequence of the students' mathematical learning.

- The length of the videos vary greatly as does the number of excerpts from classrooms.

Usefulness of the Videos:

- Although many of the videos are brief, they do provide clear representations of particular mathematics teaching practices in classrooms. These practices include scaffolding and supporting students' mathematical reasoning, establishing classroom norms for student collaboration and discourse about mathematics, and setting up and implementing mathematical tasks that maintain the task's level of cognitive demand
- A number of the longer videos include multiple small groups of students collaborating on a mathematical task. Some of the excerpts provide representations of students' mathematical thinking (e.g. algebraic thinking, proportional reasoning, conjecturing, reasoning-and-proving.)
- A few of the videos provide clear representations of ways teachers control the classroom lesson, such as using hand and voice signals to get students' attention when they are working in small groups, asking funneling questions during whole class and small group discussions, and giving clear, descriptive instructions as to how the students will engage in the mathematical tasks
- Several of the videos provide opportunities to observe how technology is integrated into students' investigation of mathematical ideas (e.g. using ICT to investigate circle theorems) and how technology is coupled with students' mathematical modeling (e.g. using trigonometric functions to calibrate drones.)

Ancillary Materials:

- All of the videos include a brief description of the school system of the participating teachers/coaches/principals, objective of the video, and a small set of reflection questions for the viewer
- Most of the videos include transcripts
- Besides the transcript, many of the "Teaching Practice" videos include: lesson plans; instructional materials (e.g. curriculum materials, activity worksheets, technology instructions); and/or written teacher commentary about the lesson.

Video Mosaic Collaborative (VMC)

Name of Resource: Video Mosaic Collaborative (VMC)
Author/sponsor: VMC partners: Rutgers University Libraries, The Robert B. Davis Institute for Learning, and Wisconsin Center for Education Research. The VMC is a National Science Foundation funded initiative.
Accessibility: These videos are available for free streaming on the internet.
videomosaic.org
Type of video: Classroom lessons; after-school interventions and observations with a small group of students
Length of videos: 5 minutes to 60+ minutes
Number of videos: 280 videos in the collections
Level (HS, MS, Elementary): Grades 1 - 12
Content domains:

- Elementary and Middle school: Operations and Algebraic Thinking; Numbers and Operations in Base Ten; Numbers and Operations - Fractions; Statistics and Probability; Measurement and Data; Ratio and Proportional Reasoning; Expressions and Equations
- High School: Algebra; Statistics and Probability; Functions; Geometry

Description of the Videos:

- The following excerpts from the website's creators give an overview of the collection:
    - "The Video Mosaic Collaborative (VMC) is an interactive collaboration portal designed to enable teachers, teacher educators and researchers to analyze and utilize the real classroom videos shot over a span of 20+ years to make new discoveries in math education and transform mathematics research, teaching and learning."
    - "The collection is unique in its selection of carefully created clips from multi-hour classroom and after school intervention and observation sessions. These clips have been selected and summarized by the researchers who led the longitudinal studies and by graduate students and research associates assisting the Video Mosaic Collaborative project. Each clip was developed to support teacher education, research and the practicing teacher needing advice and support in the mathematics classroom."
- The videos in the collection are in two formats: (a) the raw footage of the video format; and (b) clips of the raw footage purposefully segmented in order to represent key aspects of student(s)' learning of and reasoning in mathematics.

- The classroom and after school classroom interventions involve high-level cognitive demand tasks. The researchers interactions with students maintain the level of cognitive demand as the students engage in the tasks.
- The videos include students using mathematical tools such as graph paper, base ten blocks, algebra blocks, computers, the tower of hanoi, calculators, and number lines.
- The focus of nearly all the videos is on students individually and collectively engaging in mathematical reasoning

Usefulness of the Videos:

- The creators of the website write the following about affordances of the videos:
    - The teacher educator can: "Influence teacher beliefs on how students effectively learn and understand mathematics concepts" and "Illustrate how videos can enhance the preparation of mathematics educators."
    - Teachers can: "Demonstrate how students learn mathematical concepts, such as fractions; Explore effective teaching strategies for use in the classroom, with groups or one on one; Learn about topics in depth, for classroom preparation."
- The videos capture complete segments of students' discourse and written inscriptions as they engage in mathematical tasks in grades 1-12. The complete nature of the segments are useful representations of students' productive struggle as they engage in mathematical tasks.
- Similarly, the complete segments of researchers' interactions with students in classroom and after-school interventions are useful representations of instructional practices (i.e. posing purposeful questions, wait time, eliciting evidence of student thinking) that support the students productive struggle.

Ancillary Materials:

- Transcripts of the videos
- Copies of student work samples
- Mathematical Tasks from the videos
- Analytic tool (coming soon) to create video excerpts and annotations. The authors of the website describe the RUanalytic Tool as "a web based video annotation and playlist creation tool. This tool intended to allow users to explore and analyze video in the VMC. Once the user finds video they can create an event from small parts of the video. Users can save multiple events to an Analytic. Once saved, an Analytic can be shared with other users of the tool or with users who do not have access to the tool."
- Accompanying each video is a detailed description that includes: the events of the video, researchers in the video, math tool(s) used in the video, math strand, math problem, grade level, NCTM Content and Process Standard, Forms of Reasoning, Student participants, Setting, Student Gender and Ethnicity

- The website has a powerful search feature that allows users to search by mathematical task, NCTM (2000) Content and Process Standard, grade level, forms of mathematical reasoning, and mathematical tool

PBS Mathline

Name of Resource: PBS Mathline
Author/sponsor: PBS Learning Media
Accessibility (URL, or place to buy it): These videos are available for free streaming on the internet. You have to create an account and password.
www.pbslearningmedia.org,
Type of video: Video of classroom mathematics lesson
Length of videos: 15 - 60 minutes
Number of videos: 53
Level (HS, MS, Elementary): PreK-2, Grade 3-5, Grade 6-8, Grade 9-12
Content domains:

- Grades K-5: Measurement and Data; Operations and Algebraic Thinking; Geometry; Number and Operations in Base Ten; Number and Operations - Fractions;
- Grades 6-8: Expressions and Equations; The Number System; Ratios and Proportional Reasoning; Statistics and Probability; Functions; Geometry
- Grades 9-12: Algebra; Functions; Statistics and Probability; Number and Quantity; Modeling

Description of the Videos:

- A number of the lessons follow a launch-explore-summarize format. The teacher first introduces or sets-up a class task, activity, or experiment. Then the teacher provides students time to engage in the mathematical task/activity/experiment. The teacher then concludes with a discussion or lecture about the overarching mathematical idea(s) in the lesson.
- Many of the lessons in the videos include both small group and whole class discussions in which students are working on a mathematical task, activity, or experiment that requires a significant portion of the lesson's time.
- Some of the teachers in the videos demonstrate instructional practices and mathematical tasks that have the *form* but not the *function* of those advocated by the NCTM Standards.
- The videos include teacher and student reflections on teaching and learning; teacher voice over and interpretation of some of the events in the classroom videos; edited, full lengths segments of the classroom lesson; segments of video focusing on individual and groups of students engaging in mathematical tasks
- Names of the videos by grade band **[Bold indicates that the video couldn't be found on PBS Learning Media]**:

- Grade PreK-2: Button, Button; Creature Features; Here, There, and Everywhere; **It's a Perfect Fit - Part I-III**; Money Counts; Peddling Petals; Sand Babies; Tessellations WOW!; The Magic Box; To Half of Half Not
- Grade 3 - 5: **An Apple a Day**; **Bead-Dazzling**; **Blazing the Trail**; Bubble Mania; Chances Are - Part I - III; Food for Thought; It Takes Ten; **Looking Through the Algebraic Len**s; Mirror, Mirror; **Mix It Up**; SideWalk Capers; **Snake Patterns-s-s-s**; Soak It Up; Struts n' Stuff; **Tree-mendous Plots**; Whirlybirds
- Grade 6-8: Alphabits; Aw Chute; **Drip, Drop, Drip, Drop**; Fantasy Baseball - Part I-II; Fill 'er Up; **Hop to It**; How Many Noses are in Your Arm?; In a Heartbeat; Is it Really News?; Let's Face It; **Looking Through the Algebraic Lens**; Million Dollar Giveaway; Once in a Blue Moon; **Reaching New Heights**; Remove One; Rock Around the Clock; Roll Out the Barrel; Rumors; Something Fishy; Steppin Out; The Factor Game; The Great Race; The Smithville Families; Tiling the Plaza; **Up, Up, and Away;** We're All Tuned In Wet Heads; What's Your Angle?;
- Grade 9-12: Bottles and Divers; Building Boxes; The Busing Problem; Getting Out of Line; Meadows or Malls; Mystery Liquids; Pennies, Pressure, Temperature, and Light; Rhinos and M&M's; Squares Inside Squares; Stressed to the Breaking Point; Toothpicks and Transformations; The Yo-Yo Problem; Making the Case

Usefulness of the Videos

- The videos of the classroom lessons are useful in modeling the set-up and implementation of high-level mathematical tasks as well as the set-up and implementation of procedure without connections tasks.
- The videos of the classroom lessons are useful in modeling patterns of discourse advocated in NCTM Standards (1991, 2014) as well as traditional I-R-E discourse patterns.
- The videos of the classroom lessons are useful in modeling instructional practices that vary along the continuum between traditional, direct instruction/transmission practices and problem/student-centered, NCTM (2014) *Principles in Action* aligned practices.
- The teacher reflections are useful in providing insight for the teacher's instructional decisions and the student reflections are useful in providing insight about the lesson from the learner's perspective.
- A number of videos provide segments of video focused on individual or groups of students working on a mathematical task that are useful for representing students' mathematical thinking and reasoning around the mathematical ideas in the lesson.

Ancillary Materials:

- Lesson Plans that include lesson objectives; lesson overview; lesson materials; procedure for implementing the lesson; extensions for the lesson
- Descriptions for teacher educators as to how the lesson aligns with the *Professional Standards for Teaching Mathematics* (NCTM, 1991)

TIMSS Videos

Name of Resource: TIMSS Videos (Videos from Third International Math and Science Study)
Author/sponsor: TIMSS
Accessibility (URL, or place to buy it): These videos are available for free streaming on the internet. You have to create an account and password.
http://www.timssvideo.com/videos/Mathematics
Type of video (Individual task based interview, small group, whole class, teacher reflection): Whole class/Whole lesson videos, video generally follows the teacher, but does include some small groups and individual students interacting with the teacher.
Length of videos: Most videos are between 40 and 50 minutes long. There are some that are shorter (30-40 minutes) and on that is a double period of 69 minutes.
Number of videos: 29 videos (four each from Australia, The Czech Republic, Hong Kong, Japan, The Netherlands, Switzerland, and five from The United States)

- 13 videos are in English (Australia, USA, and 3 of the 4 Hong Kong videos)
- The rest have English subtitles
- All the videos have English Transcripts

Level (HS, MS, Elementary): Middle School (8th grade)
Content domains:

- Australia
    - Angles in a polygon (conjectures)
    - Congruent triangles
    - Data Collection and representation
    - Ratios
- Czech Republic
    - Pythagorean Thm
    - Perimeter of a circle
    - Exponents, combining like terms
    - Operations on numbers with exponents, area and volume
- Hong Kong:
    - Square Roots
    - Simultaneous Linear Equations
    - Polygons (interior angles)
    - Identities
- Japan:
    - Parallel Lines and Angles

    - Areas of Triangles between parallel lines
    - Solving inequalities
    - Solving inequalities
- Netherlands
    - Graphing Linear Equations
    - Pythagorean Thm
    - Surface Area
    - Equations (factoring)
- Switzerland
    - Factoring quadratics
    - Introducing algebra (terms and variables)
    - Pythagorean thm. Solids.
    - Equivalence, solving equations
- USA
    - Graphing Linear Equations
    - Writing variable expressions
    - Exponent rules
    - Secants and tangents
    - Interior angles of a polygon

Description of the Videos:

- The videos are examples of uninterrupted and unedited classroom lessons. They show a variety of teaching structures and approaches, as well as a variety of content domains.
- The videos are also very useful to show cultural differences in instruction between countries.
- The videos are not idealized versions of classrooms. As a result, they are less models of "ideal" teaching, but rather opportunities to analyze classroom teaching.

Usefulness of the Videos: There are several ways in which these videos could be used in effective ways. First of all, as unedited examples of teaching, they are very good for analyzing and interacting with the complexities of practice. One could use the videos as a way to look at specific instantiations of patterns of interaction and see how they play out in classroom situations. A couple interactive features of the videos would enable teacher educators to use the videos in this way. For example, videos can be bookmarked and then the bookmarks saved so that students could choose interesting parts of the video and make comments on them in response to specific questions from the teacher. Students can also create papers in which they embed video links, and then have those papers accessible to others.

Ancillary Materials:

For each video there is:

- a short overview describing the content, length and size of the class.

- a transcript of the class (in English).
- close-captions in English
- lesson graph, in which lesson sections are described and connected to elapsed time
- copies of the problems given
- comments made by a researcher connected to times in the lesson (these usually situate the lesson in terms of national averages, for instance, they comment that this lesson had five minutes going over HW. 51% of classes in this country started by going over homework. He spent 35% of the class going over homework)
- comments made by the teacher connected to times in the lesson (these usually describe the context or the teachers' thinking at that particular time.
- Some videos have a third commentary (NRC Commentary) which seems to be a researcher from the country of the video placing it in the national context. For instance the researcher may describe how "typical" specific practices or structures seen in the video are in that country, or how difficult a specific topic might be for typical students of that country.

Teaching Math: A Video Library

Name of Resource: Teaching Math: A Video Library, K-4; Teaching Math: A Video Library, 5-8; Teaching Math: A Video Library, 9-12
Author/sponsor: WGBH Boston, Annenberg Foundation
Accessibility (URL, or place to buy it): http://www.learner.org/resources/series32.html, http://www.learner.org/resources/series33.html, http://www.learner.org/resources/series34.html; free streaming on the internet
Type of video: Edited videos of classroom lessons
Length of videos: 10-30 minutes
Number of videos:

- Grades K-4: 52
- Grades 5-8: 6
- Grades 9-12: 19

Level (HS, MS, Elementary): K-12
Content domains (i.e. transcripts, tasks):

- Grades K-4: Counting and Cardinality; Geometry; Number and Operations - Fractions; Measurement and Data; Number and Operations in Base Ten; Ratios and Proportional Relationships;
- Grades 5-8: Geometry; Number and Operations - Fractions; Statistics and Probability
- Grades 9-12: Algebra; Functions; Modeling; Geometry; Statistics and Probability

Description of the Videos :

- Videos include: pre-lesson teacher commentary and description of classroom setting; portions of classroom lessons with and without teachers' and students' voice over reflections; post-lesson student and/or teacher reflections (not all videos); post-lesson viewer reflection questions about mathematics pedagogy in video
- Classroom videos shift from focus on single student, to whole class, to teacher. Also, the videos periodically insert teacher and student commentary occurring outside the classroom.
- Classroom video of small groups of students capture students' written work, students' work on calculators, and mathematical conversations amongst the students and the teacher.
- Most of the classroom videos begin with full class, transition to students arranged in small groups, and return to full class.
- Many of the videos involve the launch, explore, and summarize lesson format. The launching of the activity occurs with the full class in which the teacher mediates interaction between her and the students or amongst the students. The explore phase

involves students working in small groups (3-5 students) in which the students are interacting with each other as well as the teacher who is periodically monitoring the groups; summarize phase is full class in which the teacher selects and sequences students approaches to the tasks (not all videos.)

Usefulness of the Videos:

- The videos are useful for demonstrating excerpts of lessons in which teachers demonstrate instructional practices that constitute orchestrating productive mathematical discussions.
- Demonstrates ways in which teachers may set-up of high level cognitive demand task that maintains the level of cognitive. Also, demonstrates the way a teacher may conclude lessons, in which students do not complete the task, without giving away the "punchline"
- Demonstrates purposeful questions a teacher may ask to elicit and extend students' mathematical understandings

Ancillary Materials:

- Supplementary webpage that includes: List of NCTM (1989) Process Standards with which the task aligns; brief background and overview on the classroom in the video and the sequence of events in the video; range different of discussion topics about the mathematics in the video, students learning of mathematics in the video, teacher's pedagogy in the video, etc; extension activity that may be used following the lesson in the video; some videos have descriptions of the course and curriculum.

Center for Algebraic Thinking

Name of Resource: Center for Algebraic Thinking

Author/sponsor: Center for Algebraic Thinking, a consortium of Willamette University, George Fox University, Pacific University, and Western Oregon University

Accessibility (URL, or place to buy it): These videos are available for free streaming on the internet. You have to create an account and password.
http://www.algebraicthinking.org

Type of video (Individual task based interview, small group, whole class, teacher reflection): Nearly all the videos (66 of 68) are of individual task-based interviews, 1 of a teacher leading a short discussion (34 seconds), and 1 of a whole class (38 minutes.)

Length of videos: Most videos are between 30 seconds and 2 minutes. Some of the individual videls go longer, up to five minutes.

Number of videos: 68 videos

Level (HS, MS, Elementary): Middle and High School

Content domains: Algebraic Relations, Analysis of Change, Modeling and Word Problems, Patterns and Functions, Pre-algebra, variables and expressions, linear equations, proportional reasoning

Description of the Videos :

- For the most part, the videos are short, task based interviews of students working to solve problems connected to algebraic thinking.
- Many of the videos are of students solving problems with decontextualized algebraic equations and expressions, asking them what variables might equal, for instance, or what two expressions are the same. Other tasks involve making sense of graphs and the relationships between quantities.

Usefulness of the Videos:

- The videos are extremely useful in highlighting student thinking and both the way they understand algebraic ideas and common misconceptions around those ideas.
- Furthermore, the videos are referenced by content domain, and common core standard, so you can search the videos for ones on specific content.

Ancillary Materials:

The website has a rich set of ancillary materials. They include:

- An "Encyclopedia of Algebraic Thinking" which is a searchable database of 164 entries about algebraic thinking. Each entry includes a connection to the CCSS-M, an introduction to the idea, a comment on symbolic representation connected to this

topic, interviews with students, mathematical issues, teaching strategies and a list of references. It also invites readers to share their own experiences with this topic.

- A database of 101 assessment questions, aligned with content domains and common core state standards. These assessments have also been used in their video interviews, as well as in many of the references that they cite in their encyclopedia.
- 15 modules for use by mathematics teacher educators on various elements of algebraic thinking. Each module includes an introductory set of problems for participants to engage in, video of students engaging in the problems, research findings, assessment questions, suggestions for teaching and a list of references.
- An instructional technologies database, in which they describe various technologies.
- Apps that they have developed for use in the classroom.
- An extensive list of references related to algebraic thinking.

The Fostering Geometric Thinking Toolkit: A guide for Staff Development

Name of Resource: The Fostering Geometric Thinking Toolkit: A Guide for Staff Development

Author/sponsor: Mark Driscoll, Rachel Wing DiMatteo, Johannah Nikula, Michael Egan, June Mark, Grace Kelemanik of Educational Development Center. Inc.

Accessibility (URL, or place to buy it): Available from Heinemann Publishing (ca. $225) (http://www.heinemann.com/products/E01147.aspx)

Type of video (Individual task based interview, small group, whole class, teacher reflection): Small groups of middle and high school students engaged in working collaboratively on rich geometric tasks.

Length of videos: 5 - 20 minutes

Number of videos: 15 videos

Level (HS, MS, Elementary): Middle and High School

Content domains: Geometric thinking, transformations, properties of shapes and lines.

Description of the Videos :

- Small groups of middle and high school students engaged in working on rich geometric tasks. They reason about spatial relationships, and properties of shapes. They engage in conjecturing and the beginnings of proof in the context of solving problems connected to constructions. They also push each other to be clear and consistent. An off-camera teachers sometimes asks questions of the students.
- There is also text interspersed with the video that identifies the kind of thinking that students engage in, aligned with frameworks described in the staff development materials.

Usefulness of the Videos: These videos are good examples of students persisting with doing mathematics tasks, as well as addressing both reasoning and precision of language.

Ancillary Materials: These videos are part of a set of professional development materials in which participants learn about a framework for geometric thinking and engage in working to understand how students might develop and exhibit these types of thinking. The whole package has lesson plans, handouts and assignments for participants.

Fostering Algebraic Thinking Toolkit: A Guide for Professional Development

Name of Resource: Fostering Algebraic Thinking Toolkit: A Guide for Professional Development

Author/sponsor: Mark Driscoll, in collaboration with Judith Sawojewski, Andrea Humez, Johanna Nikula, Lynn Goldsmith and James Hammerman

Accessibility (URL, or place to buy it): Available from Heinemann Publishing (ca $300) http://www.heinemann.com/products/E02865.aspx

Type of video (Individual task based interview, small group, whole class, teacher reflection): Small group work with teacher; teacher reflection

Length of videos: 5-12 minutes

Number of videos: Three

Level (HS, MS, Elementary): Middle and High School

Content domains (i.e. transcripts, tasks): Algebra, Functions, Modeling

Description of the Videos :

- Video one: 11:15 minutes (0:30 - 11:45 on DVD), Teacher working with small group on problem (modeling two different linear relationships and comparing them), and then teacher reflecting on her work with children.
- Video 3: (16:25 - ?) Teachers reflect and debrief on questions asked during small group work on algebraic tasks

Usefulness of the Videos:

- These videos serve as good examples of teachers supporting cognitively demanding group work through focusing, not funneling.
- They also are good examples of reflective practice, teachers talking about their work.

Ancillary Materials:

- The whole program is designed as a companion to *Fostering Algebraic Thinking*, by Mark Driscoll (http://www.heinemann.com/products/E00154.aspx).
- These videos are part of a set of professional development materials specifically geared toward fostering algebraic thinking, analyzing student work, documenting patterns of student thinking and asking questions of students.
- The materials are organized into four professional development sessions, and include facilitation notes, notes on the mathematics, and handouts for participants.

Connecting Mathematical Ideas: Middle School Video Cases to Support Teaching and Learning

Name of Resource Connecting Mathematical Ideas: Middle School Video Cases to support Teaching and Learning
Author/sponsor: Jo Boaler and Cath Humphreys
URL or (URL, or place to buy it): Heinemann Publishing ($25)
http://www.heinemann.com/products/E00670.aspx
Kind of video: Mostly whole class discussion (8 out of 10), two small group interview around experience of math class (not specific mathematics content)
Length of videos: Range from 4 to 15 minutes. majority are between 8 and 12 minutes long.
Number of Videos: 10 videos
Level (HS, MS, Elementary): Middle School
Content domains: Number & Quantity; Algebra; Functions; Geometry
Description of the Videos :

- Video 1: Border problem, 12 minutes, whole class discussion. Talk about wrong answers first, different methods for getting an answer. Lots of great talk moves turn and talk, restating, asking for understanding, having students go to board and discuss, representing student thinking, asking for referents, rephrasing, connecting equation to picture. They are edited to skip some of the conversation. Method over numerical answer.
- Video 2: Border Problem 2, 12 minutes Whole class discussion. Creating a rule for the border problem. Using variables to create expressions. Functions. Introduce vocabulary when needed. Student reasoning, student discourse, defining variables, "I'm glad it confused you because it really made you grapple"
- Video 3: Convincing others 10 minutes, whole class discussion. Convincing others that your rule works for all numbers. Creating norms for discussion, reasoning, justification, evaluating the arguments of others. particular case to help you understand the general case. 2(n-1) = 2n -2
- Video 4: Division of fractions 15 minutes. Making sense of division of fractions. Creating arguments and critiquing the arguments of others. Representations of division of fractions. (area model, linear model. fact family method) making sense of operations.
- Video 5: Notion of proof 9 minutes What does it mean to show something is true? 2(n-1) = 2n -2 moving from specific cases to "generic cases" using specific examples to

figure out why it works for all numbers, it needs to work for all numbers. You would have to explain what the variable means and why the formula works.

- Video 6: Class Participation 14:24 minutes 3 minutes into it, people say they don't want to share with the class. Teacher shares why she thinks sharing out is important. She thought reporting for your group was easier, but it actually is harder for many students. Hard to represent others' thinking. Popsicle sticks, she explains why people think they are good, but why do people not like them. role of right and wrong answers. Being confused is important. Trying to lower the pressure,
- Video 7: Interview 1 9:17 minutes. Interview with three students about video 4 and class in general, division of fractions. They talk about what the teacher does. Talking about multiple solutions, vs just one answer and then move on. Teacher loves multiple solutions. What is the best math lesson, students talk about a good discussion where they disagree. stay on the same thing until we get it. A bad lesson - - just doing a worksheet without discussion it's OK if you are wrong, lot of different ideas in class.
- Video 8: Interview 2 4:12 minutes. Interview with three students about math class, what they like about it. Learn more by talking in groups. Teacher likes it when you make mistakes, you learn from them. Comparing teacher giving method without ever figuring why it works. Prefer why it works approach. You understand it better, you can figure out why you messed up. She listens and wants to hear kids' ideas.
- Video 9: Surface Area 8:22 Minutes. Whole class discussion in which students work to derive the formula for the surface area of a cylinder. Memorizing versus figuring out.
- Video 10: Volume of Prisms 6:23 minutes. whole class discussion about volume of cylinder. use what we know about rectangular prisms to create formula for cylinder and other prisms. General formula, area of the base times the height.

Usefulness of the Videos:

- These videos in general show examples of effective discussion moves and students making arguments justifying solutions.
- They also show a teacher working to establish norms around discourse and around multiple solutions, proof, and meaning making, as well as the role of wrong answers.

Ancillary Materials:

- These videos are connected to a book that treats each video as a case study. Each chapter of the book is centered on a video, and includes background and analysis by the teacher, as well as analysis of the clip by Jo Boaler, and mathematics education researcher.
- Some of the videos have transcripts connected to them on the CD.

IMAP Integrating Mathematics and Pedagogy

Name of Resource: IMAP Integrating Mathematics and Pedagogy

Author/sponsor: San Diego State University Research Foundation; Randolph Philipp, Candace Cabral, Bonnie Schappelle

Accessibility (URL, or place to URL, or place to buy it): http://www.sci.sdsu.edu/CRMSE/IMAP/pubs/IMAP_Product_Descriptions.pdf

Type of video (Individual task based interview, small group, whole class, teacher reflection): There is a range of videos the majority are individual, task based interviews, but there are also some that are whole class and some that are small group

Length of videos: Most of the videos are quite short, less than two minutes. A small number of videos (about 10) are longer than 8 minutes. The longest video is 14 minutes.

Number of videos: 232

Level (HS, MS, Elementary): Elementary

Content domains (i.e. transcripts, tasks): Number and Operations in the primary grades; addition, subtraction, division and multiplication of whole numbers, decimals and fractions, place value, identifying and comparing fractions, a variety of story problems

Description of the Videos:

- Most of the videos are individual task-based interviews in which students solve problems concerning number and operations and explain their thinking. Some of the videos are solving problems in context, and some are "naked" problems, out of context.
- A smaller number of the videos are of students working in small groups, and an even small number of videos are of whole class discussions.
- Each of the videos also has a transcript, which can be viewed electronically alongside the video, as well as as a table of "related info" which includes a list of the categories the video fits into (i.e. erd grade, latina student, whole number addition), a short description of what happens in the clip, some important things to notice, and a list of other clips that the child is in.
- The videos are categorized in a number of ways (gender, grade, ethnicity, content, teaching/interviewing, strategy, miscellaneous). The viewer can select videos that meet certain category criteria (i.e. addition of fractions or female, 4th grade, African American, doing addition)

Usefulness of the Videos:

- Although these videos are not specifically about secondary mathematics, they are an excellent example of how to interview children, and provide tremendous opportunities

for viewers to make sense of student thinking. Student thinking is generally quite visible and often surprising.

- For secondary teachers and teacher candidates, these videos can illuminate how complex and difficult elementary mathematics can be for many children, and what the sources of some of the difficulties (and possible areas of strength) that their own students may have.
- These videos also provide opportunities to see students solving problems on their own, engaging in sophisticated reasoning.

Ancillary Materials: In addition to the transcripts and overviews, as well as the ability to search the videos based on certain criteria, there is a facilitators book that provides a set of frameworks that both situate the videos in an overall understanding of mathematics teaching and learning, and guide the creation and use of the videos themselves. The guide is available from Amazon http://www.amazon.com/IMAP-Integrating-Mathematics-Pedagogy-Childrens-Mathematical-Thinking/dp/0132098954/ref=sr_1_2?s=books&ie=UTF8&qid=1408718247&sr=1-2&keywords=IMAP and includes an introduction describes the importance of focusing on children's thinking and how teachers can benefit from looking at videos of children's thinking. It also includes a section on how mathematics educators could use the videos. Finally it has a section with six "thematic stories" that could serve as modules, centered around a specific theme, with suggested videos and facilitation moves.

Connected Math Project (CMP)

Name of Resource: Connected Math Project; Classroom Videos
Author/sponsor: Connected Math Project; Michigan State University
Accessibility (URL or place to buy it): https://connectedmath.msu.edu/video/
Type of video (Individual task based interview, small group, whole class, teacher reflection): Whole group, small group and teacher reflection
Length of videos: Longer videos from 9-35 minutes, divided into "chapters" of less than a minute to five minutes.
Number of videos: 21 video modules, 9 from sixth grade, 5 from 7th grade, 7 from 8th grade
Grade 6 videos (9)

- A Model For Multiplication 25 min; 8 chapters
- Modeling more multiplication situations 21 min 8 chapters
- Student Skills 26 min 11 chapters
- Student Discourse 14:30 min 7 chapters
- Teacher Questions 8 videos ca 2:30 each
- Teacher Reflection 5 videos 4-9 min each
- Relating Fraction and Decimal Multiplication 30 min, 15 chapters.
- Missing Factors 29 min, 15 chapters
- Action Research 25 min, 7 chapters

Grade 7 videos (5)

- Walking to Win One 23 min; 14 chapters
- Walking to Win Two 32 min; 12 chapters
- Comparing costs and connecting tables, graphs and equations 35 min; 16 chapters
- Establishing Classroom Norms 35 min; 14 chapters
- Some Management Issues: Homework and Vocabulary 34 min; 5 chapters

Grade 8 Videos (7)

- Making Smaller Ballots 31 min; 11 chapters
- Fighting Fleas 22 min; 9 chapters
- Predicting the Ones Digit 25 min; 9 chapters
- Teacher Questions 12 min. 6 chapters
- Teacher Reflections 5 chapters 3-7 min each
- Tiling Pools 27 min; 17 chapters
- The Pool Problem 9 min; 9 chapters

Level (HS, MS, Elementary): Middle School

Content domains (CCSS-M Content Standards): Sixth Grade: Multiplying fractions and multiplying decimals ; Seventh Grade: Linear relationships and solving problems within the context of linear situations; Eighth grade: Exponential Relationships exponential decay, reasoning about exponential patterns, equivalence (in the context of linear relationships) Variables

Description of the Videos:

- The videos are compressed versions of real classroom sessions (edited for length). There are longer videos which, typically, take about 30 minutes to represent 60-90 minutes of instruction, in order to give a sense of a typical lesson. The longer videos are also generally split into shorter "chapters" each of which focuses on a shorter episode from the longer video. Most of the longer videos are of the "launch, explore, summary" format that is used with most of the investigations in the CMP curriculum. Many of the longer lesson videos also have video (or audio) of the teacher reflecting on the video.
- Some of the grade level bands have collections of video concentrating on specific teaching issues, rather than organized by lesson. For instance there may be a series of clips featuring questioning done by the teacher, or a series of clips connected to creating norms in a classroom.
- There are also series of clips involving teacher reflection on the lessons.
- The instruction involves launching rich tasks and using student work on these tasks to introduce important mathematical concepts and derive efficient ways to compute and solve problems. They contain many examples of students reasoning and justifying, and teachers eliciting student thinking and pushing students to make sense of important mathematics.

Usefulness of the Videos:

- These videos provide opportunities for users to analyze student learning and teaching in the context of rich tasks and sense making.
- These videos are connected to a specific curriculum so provide opportunities for teachers using CMP to see others wresting with implementation issues and students grappling with the curriculum
- These videos also provide opportunities to talk about creating norms for mathematical discussion, as well as other pedagogical issues (i.e. homework and vocabulary)
- Although edited, these videos provide opportunities to see realistic teaching. Although there are many examples of effective teaching, these videos are not presented as models, but rather as opportunities to analyze and think about teaching.

- Many clips of students working in groups, accompanied by examples of student work make these videos excellent for analyzing student thinking and student engagement.

Ancillary Materials (i.e. transcripts, tasks):

- **For most modules:**
    - Transcript
    - Copies of the tasks
    - Learning goals from the curriculum
    - Examples of student work from the lesson
    - Facilitator notes with Professional development plans and anticipated participant responses
- This is part of a larger site connected with the Connected Mathematics Project (CMP), a widely used, standards-based middle-school curriculum. The site has may resources for teachers including
    - A section about the goals, history and philosophy or CMP
    - A section with assessments, materials for students and teachers
    - A description of the mathematics in the curriculum
    - A section about how to organize and plan for a student-centered classroom.
    - A section on professional development connected ot the curriculum.
    - Research about CMP
    - Resources for parents and families

Mathematics Assessment Project (Mathematics Assessment Resource Service, MARS)

Name of Resource: Mathematics Assessment Project

Author/sponsor: Mathematics Assessment Resource Service (MARS); Shell Center for Mathematical Education, University of California at Berkeley, The University of Nottingham

Accessibility (URL, or place to buy it):

The videos are here: http://map.mathshell.org/materials//pd.php

Access videos by clicking on a specific Professional Development Module on the left, Each Module will then have a series of tabs on the top, including some that are for videos (i.e. "Activity D Video")

The homepage for the larger site is here: : http://map.mathshell.org/materials//index.php

Type of video (Individual task based interview, small group, whole class, teacher reflection): A mix of whole class discussion videos, small group work, and teacher reflection.

Length of videos: About half are in the 2-5 minute range, and the other half are 9-11 minutes.

,

Number of videos: There are 16 videos connected to five different professional development modules.

- Module 1, Formative Assessment: 8 videos connected to 5 activities
- Module 2, Concept Development Lessons: 1 video
- Module 3, Problem Solving Lessons: 4 videos connected to 2 activities
- Module 4, Improving Learning Through Questioning: 2 videos connected to two activities
- Module 5, Students working collaboratively: 1 video

Level (HS, MS, Elementary): Grades 7, 8, 9

Content domains (CCSS-M Content Standards): Estimation, Proportional Reasoning, Problem solving, Growth and rates of change, variables, Area, surface area and volume, sampling, Representations of functions

Description of the Videos :

General Characteristics:

- Videos are of grades 7, 8 and 9 in the United Kingdom. There are a variety of British and other accents that Americans may find difficult

- Seven of the 16 videos have the option of having English or Spanish subtitles (Modules 3, 4 and 5)
- The clips are often edited to show examples of specific teacher moves or specific patterns of interaction, however, they are not staged or unrealistic.
- Clips are in the context of larger Professional development modules that are aimed at issues connected to teaching for understanding through the use of rich mathematical tasks
- Clips lack time stamps, nor do they have transcripts.

Descriptions by Module:

- Module 1, Formative Assessment: 8 videos connected to 5 activities. This module is designed to give teachers exposure to examples of teaching for understanding using rich tasks, and as such has many videos of short classroom clips interspersed with teachers talking about the benefits and challenges of using formative assessment and attending to student understanding.
    - Activity C Videos: Short videos of specific formative assessment techniques, showing students and teachers engaging in these techniques and teachers talking about their use
        - Min-whiteboards (2:30)
        - Posters (2:20)
    - Activity D Videos: Teachers discussing Feedback
        - Short examples of how teachers give and use feedback in a lesson, and teachers discussing giving and using comments on problem write-ups during the process (4:22)
    - Activity E Video: Observing Formative Assessment
        - Excerpts from lessons in which students respond to feedback on their work Including student discussion of feedback and work in groups (8:45)
    - Activity F Video: Formative assessment Lesson by Lesson
        - Andrew's Lesson: Estimation by sampling, justification, proportional reasoning Routines around feedback (11:00)
        - Dominic's Lesson: Growth Patterns, Representations of growth, Justification, Modeling (10:00)
        - Amy's Lesson: Optimizing security camera placement, Visual Reasoning, Representation, Justification (9:00)
    - Activity G Video: Student Views
        - Students talk about receiving feedback, how it effects their learning and their motivation (4:11)
- Module 2, Concept Development Lessons: One video

    - Different representations of algebraic expressions (geometric, table, expression, description) Teacher interacting with one small group (4:22)
- Module 3, Problem Solving Lessons: Four videos connected to two activities. Subtitles in English and Spanish
    - Activity D Video: Problem Solving Lessons, explicit norms for problem solving and working in groups, appropriate use of tools
        - Organizing a Table Tennis Tournament; 9:10
        - Designing a box for 18 sweets; Nets, surface and volume, optimization 9:30
    - Activity E Video: Teacher follow-up. Teachers discussing student work and teaching of lessons, same lesson for grade 7, 8 and 9. Subtitles in English and Spanish.
        - Teacher Follow-up for Table Tennis (5:20)
        - Teacher Follow-up for Sweets Box (5:20)
- Module 4, Improving Learning Through Questioning: Two videos Subtitles in English and Spanish.
    - Activity C Video Sharing Gas Costs, work with small groups, (12:45)
    - Activity E Video Teachers working together to estimate how many dentists in the UK (5:30)
- Module 5: Students Working Collaboratively: One video. Students working in small groups to estimate how many teachers in the UK (11:00)

Usefulness of the Videos: These videos are good examples of effective teaching using high demand tasks. Although they are edited, they are realistic and not scripted. The teachers show effective attention to the creation of norms and expectations. These videos are also effective in giving voice to teacher concerns and addressing them. The videos use rich and interesting tasks. The ancillary materials help make the video even more effective.

Ancillary Materials (i.e. transcripts, tasks): The videos themselves are parts of Professional development modules. Each of the modules has a Facilitator's guide with a suggested progression of activities in the service of a particular theme. (Introduction to formative assessment, Using questioning, etc.). The modules address specific teaching goals and techniques and address common teacher concerns. They also involve doing the mathematics of a rich task and analyzing student work.

This is part of a larger website dedicated to developing and disseminating high demand tasks (which they call formative assessment tasks) for use in mathematics classrooms. The home page (http://map.mathshell.org/materials//index.php) has links to lessons, tasks and tests.

From the website:

The Mathematics Assessment Project has developed the Classroom Challenges to exemplify the types of activities needed to supplement traditional classroom practice and support the Standards. The Professional Development Modules are designed to help teachers with the practical and pedagogical challenges presented by these lessons.

Module 1 intoduces the model of formative assessment used in the lessons, its theroetical background and practical implemention. Modules 2 & 3 look at the two types of Classroom Challenges in detail. Modules 4 & 5 explore two crucial pedagogical features of the lessons: asking probing questions and collaborative learning.

The modules are activity-based; built around a collection of example classroom activities. The aim is to engage groups of teachers in constructive discussions about their own practices and how these could change. They then plan and teach a lesson using these ideas in their own classroom, and meet again to reflect on their experiences.

Each module includes a PD session guide and handouts for teachers, as well as sample classroom materials and suggested lesson plans. Also included are videos of real teachers trying these techniques with their own classes, often for the first time, and discussing the results.