Capturing Multiple Dimensions of Teaching Practice

The Teaching Dimensions Observation Protocol (TDOP)

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Outline of the Seminar

- Background on the state of studying teaching at the postsecondary level
- Background of the TDOP instrument
- Trial run using the TDOP instrument
- Goal: To enhance the study of teaching in HE and provide practitioners with a robust, adaptable instrument for assessing teaching practice

Current Approaches to the Empirical Study of Teaching

1:00pm — Temporal Progression of a Class → — 1:50pm

Outside of class: Planning & organizational constraints

Focus on specific teaching methods (e.g., lecture, small-group work)

Focus on specific behaviors (e.g., clarity, enthusiasm, organization)

Focus on instructor cognition (e.g., beliefs, approaches to teaching)

Focus on instructional technology

Focus on student-teacher interactions (e.g., question wait time)

Use of student-based proxy measures (e.g., end-of-semester evaluations)

Different methods used to study teaching

- Surveys: Self-reported use of particular teaching practices (e.g., FSSE, HERI Faculty Survey)
- Interviews: Self-reported practices and reasoning
- Observations: Observed practice (e.g.,Teaching Behaviors Inventory, RTOP)
- Experiments: Manipulate teaching methods and measure student outcomes

The Faculty Survey of Student Engagement (FSSE)

"We rely upon NSSE and FSSE data to encourage the campus community to take responsibility for student learning and engagement."

Director for the Center for Teaching & Learning, University of Missouri - St. Louis.

Source: Indiana University

Reformed teaching observation protocol (RTOP)

III. LESSON DESIGN AND IMPLEMENTATION

		Never Occurred				Very Descriptive
1)	The instructional strategies and activities respected students' prior knowledge and the preconceptions inherent therein.	0	1	2	3	4
2)	The lesson was designed to engage students as members of a learning community.	0	1	2	3	4
3)	In this lesson, student exploration preceded formal presentation.	0	1	2	3	4
4)	This lesson encouraged students to seek and value alternative modes of investigation or of problem solving.	0	1	2	3	4
5)	The focus and direction of the lesson was often determined by ideas originating with students.	0	1	2	3	4

IV. CONTENT

Propositional knowledge

6)	The lesson involved fundamental concepts of the subject.	0	1	2	3	4
7)	The lesson promoted strongly coherent conceptual understanding.	0	1	2	3	4
8)	The teacher had a solid grasp of the subject matter content inherent in the lesson.	0	1	2	3	4
9)	Elements of abstraction (i.e., symbolic representations, theory building) were encouraged when it was important to do so.	0	1	2	3	4
10)	Connections with other content disciplines and/or real world phenomena were explored and valued.	0	1	2	3	4

Procedural Knowledge

11)	Students used a variety of means (models, drawings, graphs, concrete materials, manipulatives, etc.) to represent phenomena.	0	1	2	3	4
12)	Students made predictions, estimations and/or hypotheses and devised means for testing them.	0	1	2	3	4
13)	Students were actively engaged in thought-provoking activity that often involved the critical assessment of procedures.	0	1	2	3	4
14)	Students were reflective about their learning.	0	1	2	3	4
15)	Intellectual rigor, constructive criticism, and the challenging of ideas were valued.	0	1	2	3	4

2000 Revision
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Record here events which may help in documenting the ratings.

Time	Description of Events

2000 Revision
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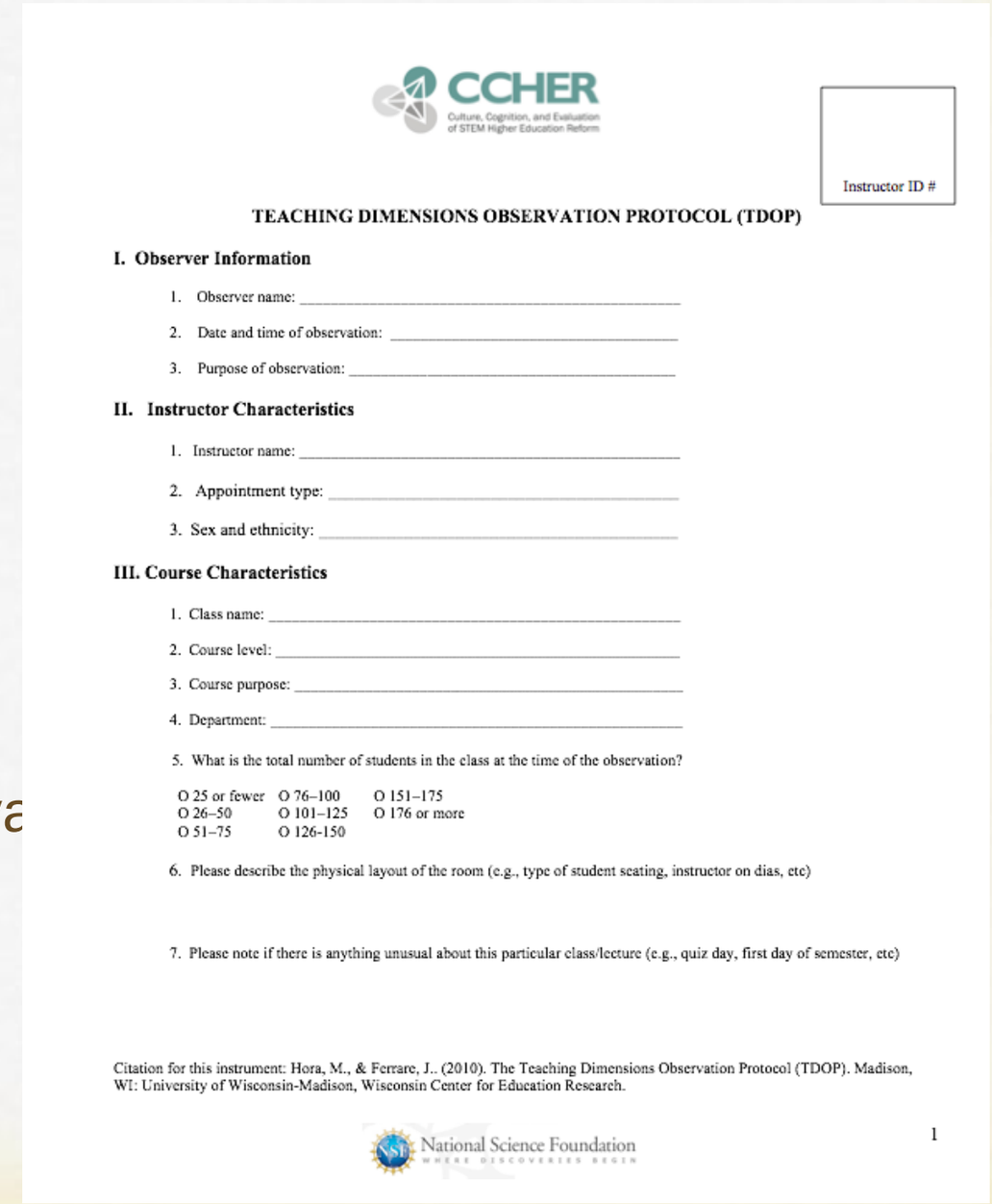
Source: Arizona State University

Background of the TDOP

- Goal: To provide **structured** and **descriptive** accounts of teaching practices across **multiple dimensions** and **disciplines**
- Existing instruments too subjective, unstructured and coarsely grained (esp. lecture method)
- Wanted to capture temporal variability within a class period - data collection at 5-minute interval
- Adaptation of Osthoff instrument for IHEs
- Draws on activity theory - accounts for role of teacher, students and context

Component parts of the tdop

- Observer information
- Instructor characteristics
- Course characteristics
- Instruction coding
  - Dimensional coding at 5-minute interva
  - Open-ended note-taking
- Field notes



CCHER
Culture, Cognition, and Evaluation of STEM Higher Education Reform

Instructor ID #

TEACHING DIMENSIONS OBSERVATION PROTOCOL (TDOP)

I. Observer Information

1. Observer name: _____
2. Date and time of observation: _____
3. Purpose of observation: _____

II. Instructor Characteristics

1. Instructor name: _____
2. Appointment type: _____
3. Sex and ethnicity: _____

III. Course Characteristics

1. Class name: _____
2. Course level: _____
3. Course purpose: _____
4. Department: _____
5. What is the total number of students in the class at the time of the observation?

O 25 or fewer O 76–100 O 151–175
O 26–50 O 101–125 O 176 or more
O 51–75 O 126-150

6. Please describe the physical layout of the room (e.g., type of student seating, instructor on dias, etc)

7. Please note if there is anything unusual about this particular class/lecture (e.g., quiz day, first day of semester, etc)

Citation for this instrument: Hora, M., & Ferrare, J.. (2010). The Teaching Dimensions Observation Protocol (TDOP). Madison, WI: University of Wisconsin-Madison, Wisconsin Center for Education Research.

National Science Foundation
WHERE DISCOVERIES BEGIN

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the code bank

Teaching Methods	Cognitive Demand*	Instructional Tools
Lecturing	Receive and memorize	Posters
Illustrations/anecdotes	Understand problem-solving	Books
Demonstrations	Create ideas	Pointers
Small group work	Integrate prior information	Blackboard
Desk work	Connections to real-world	Overhead
Problem-solving		Laptop/slides
Novel question		Misc. Object
Rhetorical question		Demo equipment
Display conceptual question		

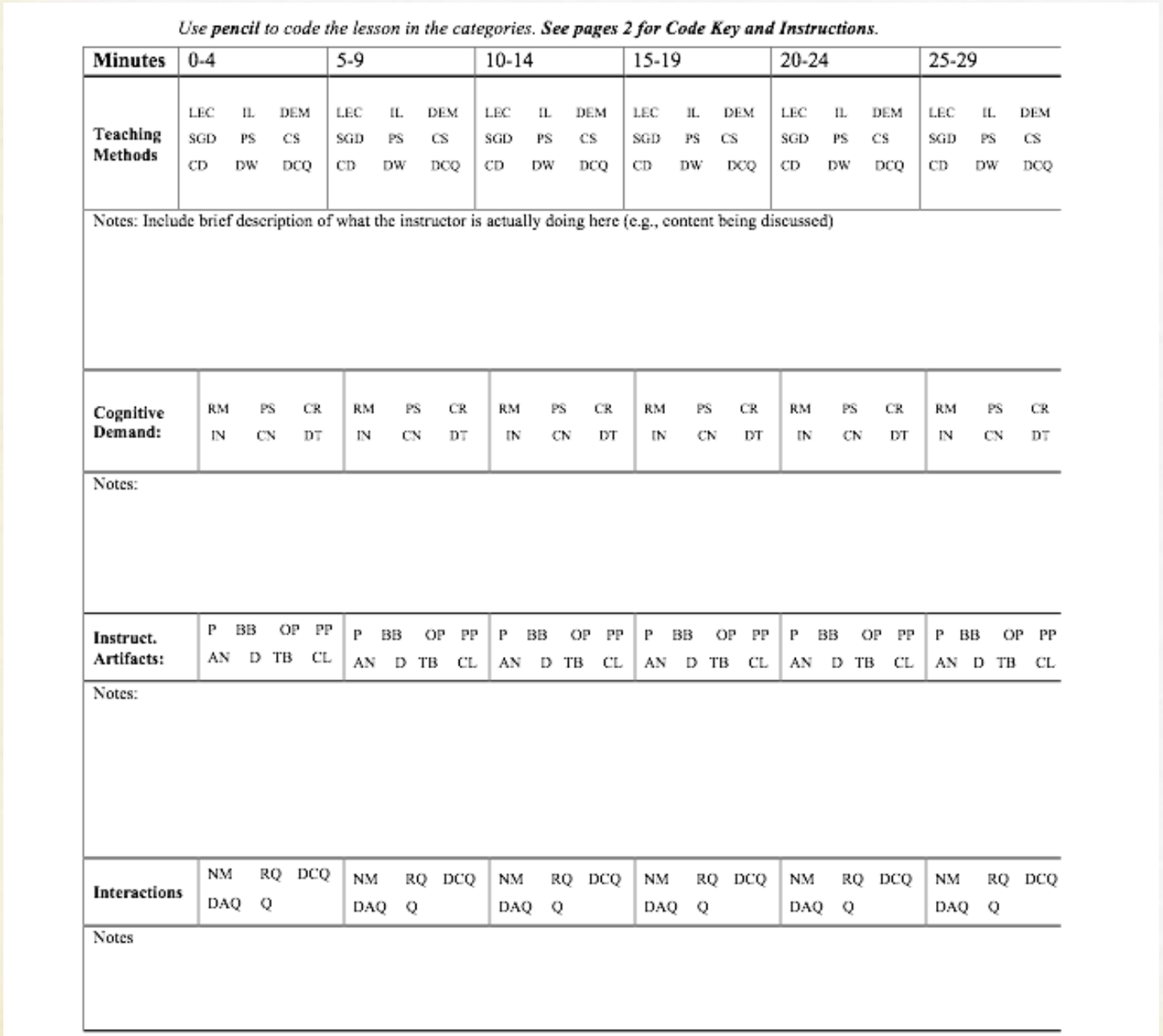
* = High-inference code (Danger!)

Training and Inter-rater reliability (IRR)

	Teaching Methods	Cognitive Demand*	Tools
Analyst 1/Analyst 2	0.707	0.625	0.655
Analyst 1/Analyst 3	0.745	0.659	0.781
Analyst 2/Analyst 3	0.732	0.578	0.728

Cohen’s Kappa scores (1 is perfect agreement between raters while taking into account agreement due to chance alone)

Coding an intro Bio Class



*Use **pencil** to code the lesson in the categories. **See pages 2 for Code Key and Instructions.***

Minutes	0-4	5-9	10-14	15-19	20-24	25-29
Teaching Methods	LEC IL DEM SGD PS CS CD DW DCQ	LEC IL DEM SGD PS CS CD DW DCQ	LEC IL DEM SGD PS CS CD DW DCQ	LEC IL DEM SGD PS CS CD DW DCQ	LEC IL DEM SGD PS CS CD DW DCQ	LEC IL DEM SGD PS CS CD DW DCQ
Notes: Include brief description of what the instructor is actually doing here (e.g., content being discussed)						
Cognitive Demand:	RM PS CR IN CN DT	RM PS CR IN CN DT	RM PS CR IN CN DT	RM PS CR IN CN DT	RM PS CR IN CN DT	RM PS CR IN CN DT
Notes:						
Instruct. Artifacts:	P BB OP PP AN D TB CL	P BB OP PP AN D TB CL	P BB OP PP AN D TB CL	P BB OP PP AN D TB CL	P BB OP PP AN D TB CL	P BB OP PP AN D TB CL
Notes:						
Interactions	NM RQ DCQ DAQ Q	NM RQ DCQ DAQ Q	NM RQ DCQ DAQ Q	NM RQ DCQ DAQ Q	NM RQ DCQ DAQ Q	NM RQ DCQ DAQ Q
Notes						

Key Steps in Coding:

1. Carefully study all codes prior to conducting observation

2. Take detailed notes

Practice coding
an intro biology class

Source: MIT Introductory Biology, Spring 2005 - youtube

Data management

			Teaching Methods			Cognitive Demand		Interactions	
Resp ID	Obs	Interval	LEC	IL	DEM	RM	PS	DCQ	Q
A01	1	1	1	1	0	1	0	0	0
A01	1	2	1	0	0	1	0	1	0
A01	1	3	1	1	0	1	0	0	1
A01	1	4	1	0	0	1	1	0	0
A01	1	5	1	0	0	1	1	0	0
A01	1	6	1	1	1	1	0	0	0
A01	1	7	1	0	1	1	0	0	0
A01	1	8	1	0	0	1	0	1	0
A01	1	9	1	0	0	1	0	0	0

Data analysis

- Data matrices can be analyzed in multiple ways and at multiple levels (e.g., individual, department, institution)
- For code frequencies: Sum all columns (i.e., codes) and divide by number of rows (i.e., 5-minute intervals)
- For affiliation graphs: Use UCInet to convert into code-code matrices and create graph
- Other possibilities: Movies of practice over time

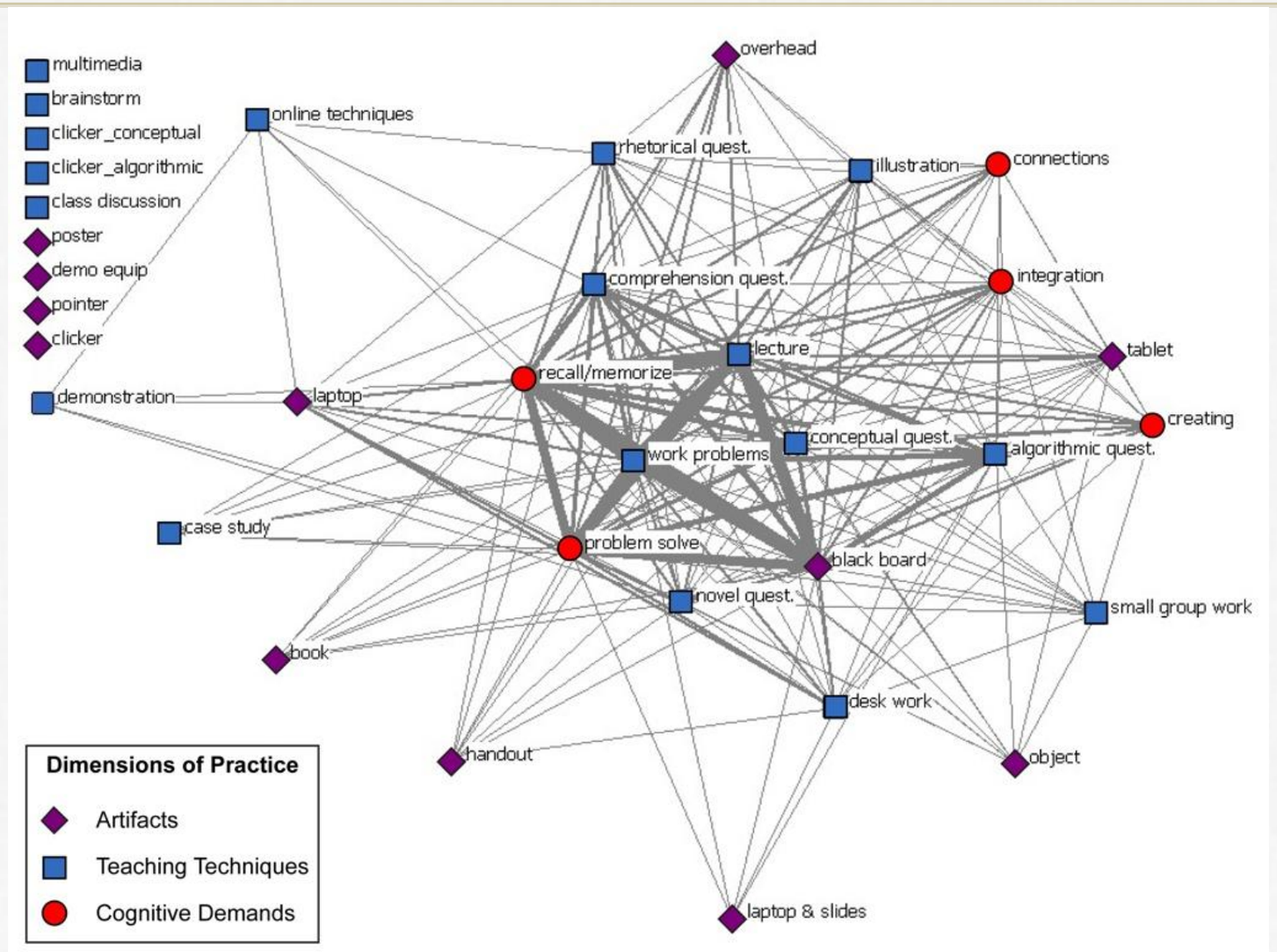
Example of TDOP Results

Descriptive results of specific teaching dimensions

	Math (381 intervals; n=18)	Physics (219 intervals; n=11)	Chemistry (180 intervals; n=9)	Biology (224 intervals; n=11)
Teaching Techniques				
Lecture	75%	93%	81%	84%
Demonstration	1%	40%	14%	0%
Working out Problems	66%	18%	16%	0%
Rhetorical Questions	11%	5%	16%	4%
Cognitive Demands				
Receive/Memorize	83%	93%	89%	91%
Problem-solving	58%	28%	18%	14%
Connection to Real-world	6%	24%	11%	20%

Example of TDOP Results

Mathematicians Network affiliation graph (n=18)



Graph density: 0.335

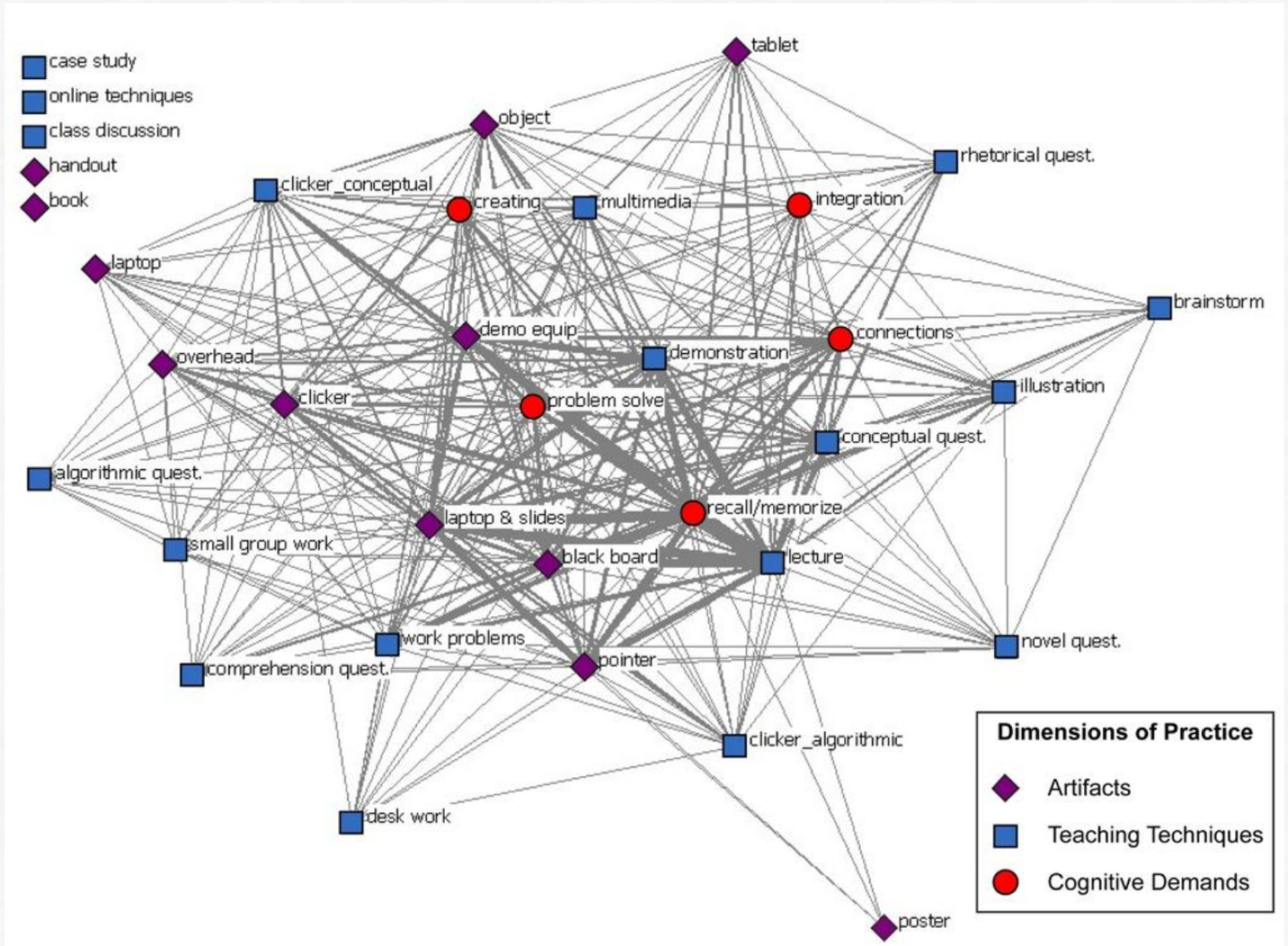
Frequently observed triads:

lecture/receive-memorize/blackboard: 60.4%

worked-out problems/problem-solving/blackboard: 38.6%

Example of TDOP Results

Physicists Network affiliation graph (n=11)



Graph density: 0.538

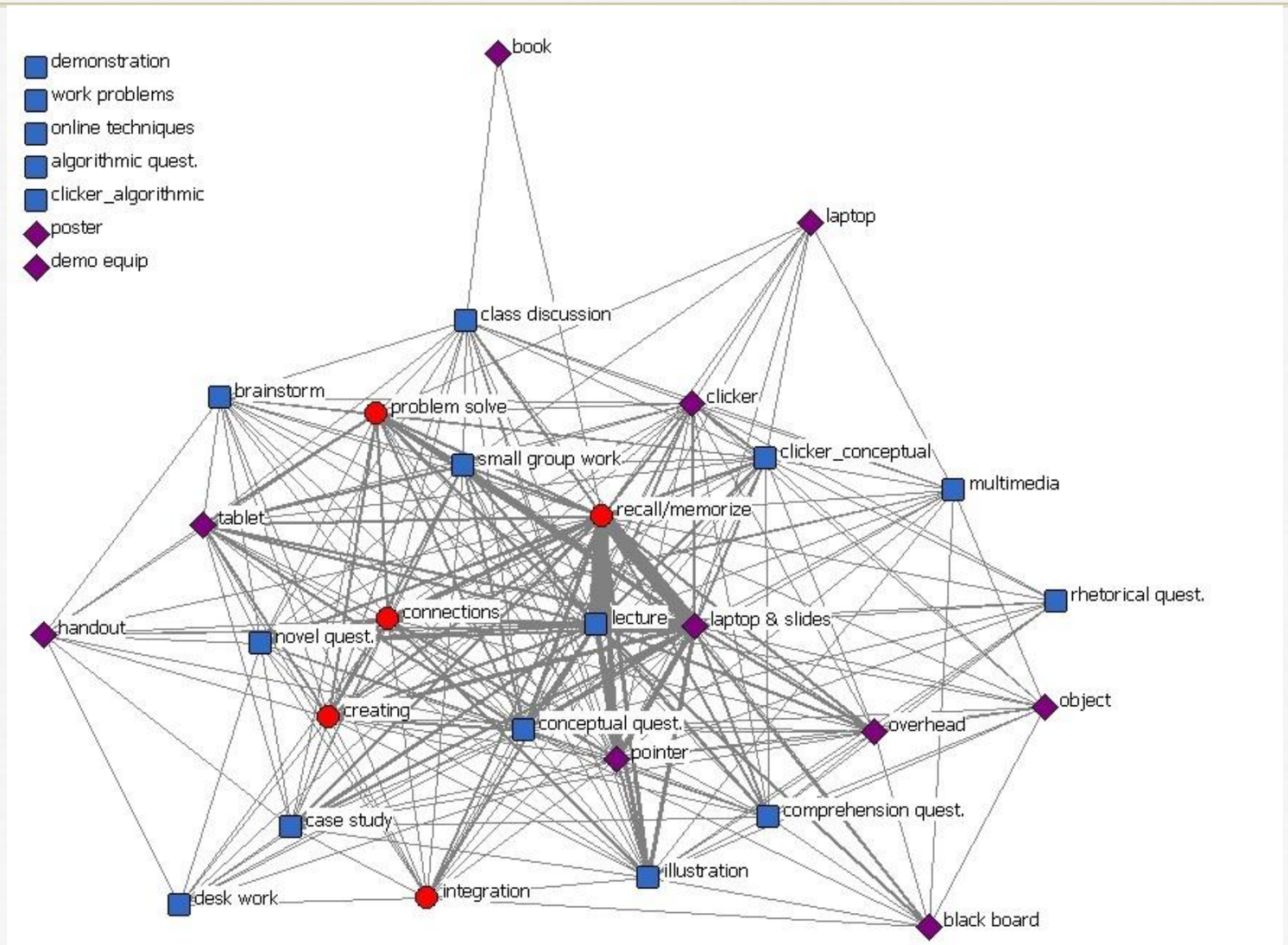
Frequently observed triads:

lecture/receive-memorize/slides: 50.7%

lecture/receive-memorize/blackboard: 45.7%

Example of TDOP Results

Biologists Network affiliation graph (n=11)



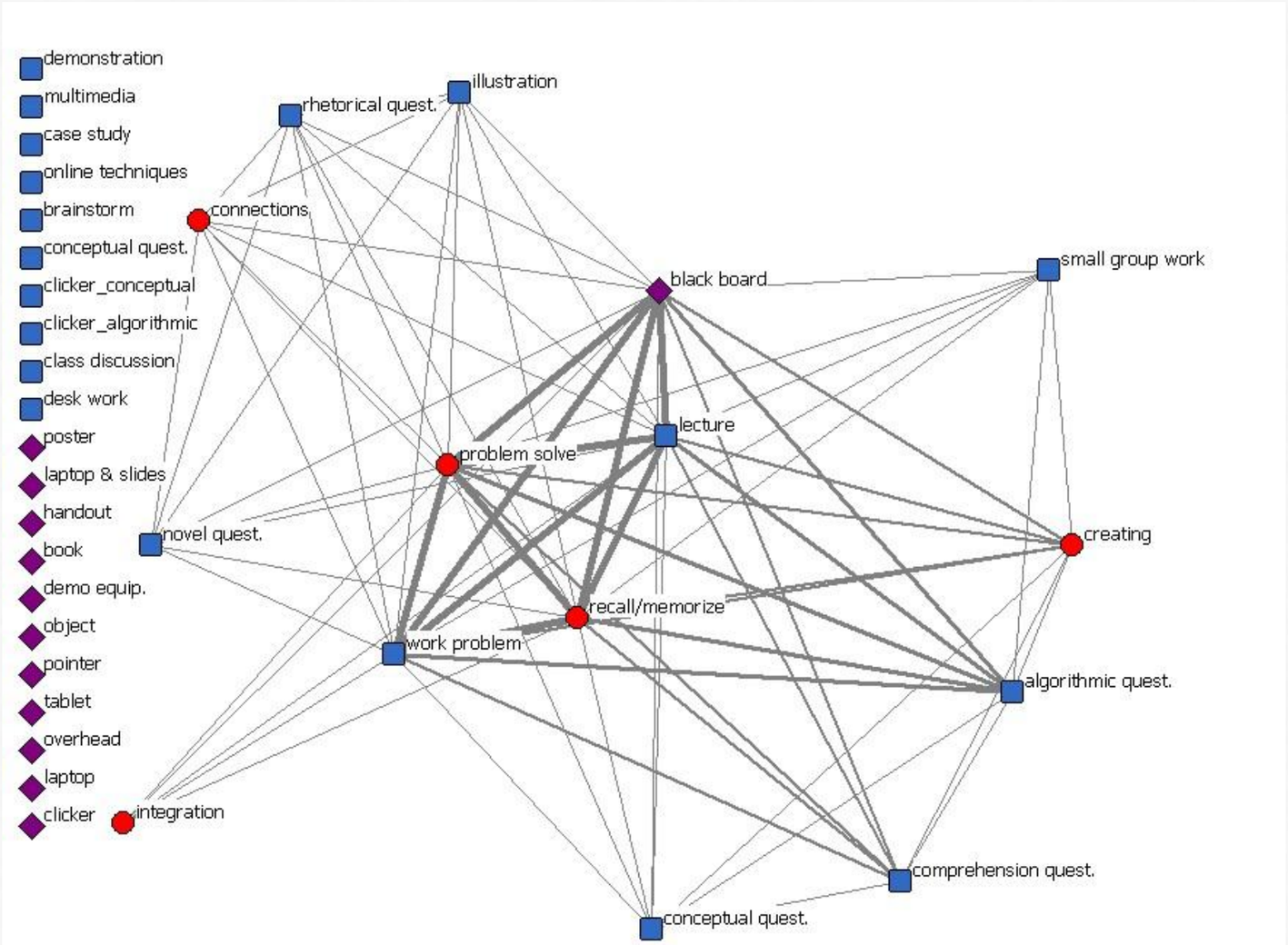
Graph density: 0.415

Frequently observed triads:

lecture/receive-memorize/slides: 69.2%

small-group work/problem-solving/slides:7.1%

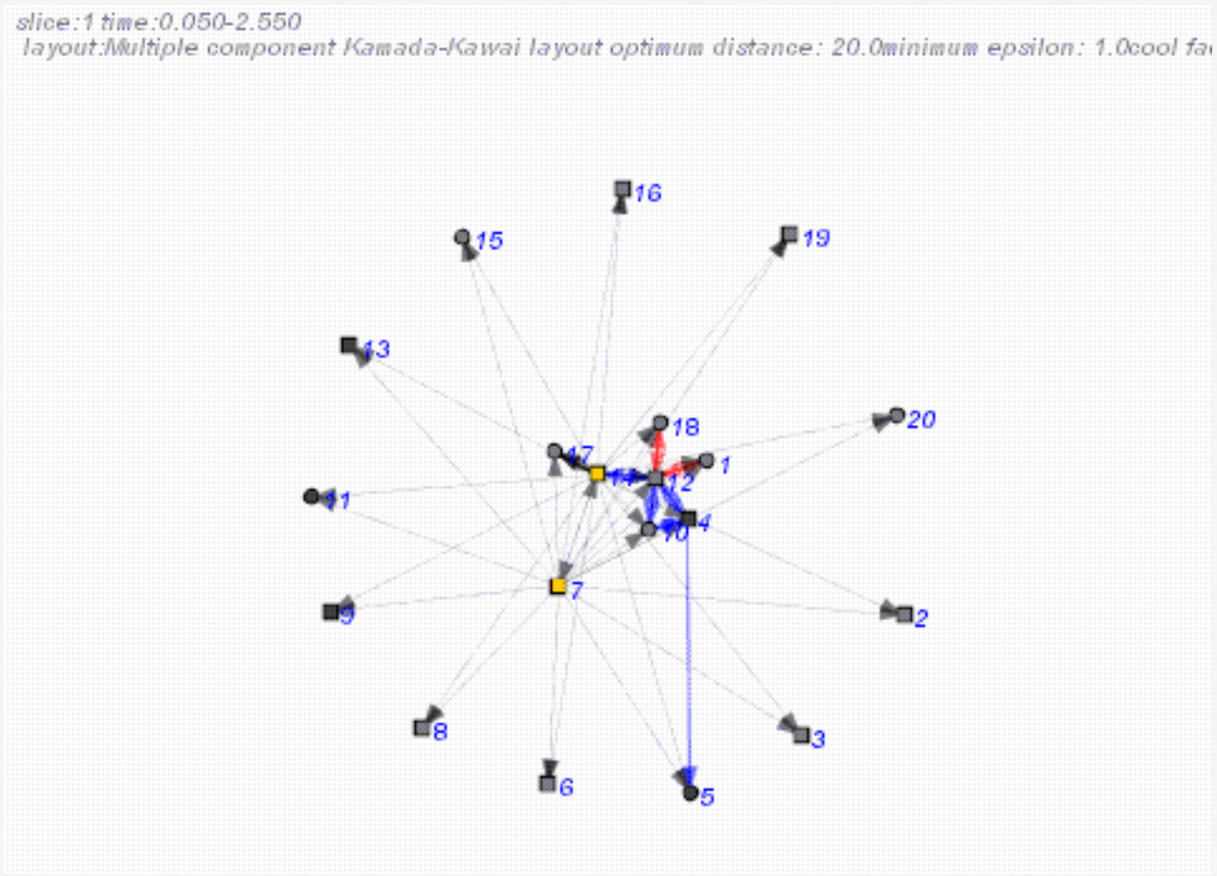
A case study
dr. Larsen - applied mathematics



OTHER WAYS TO ANALYZE TDOP DATA

MOVIES DEPICTING TEMPORAL PROGRESSION OF CODES USED WHILE TEACHING

Conversation Interactions in a HS Classroom



Source: Dan McFarland, Stanford University (Social Network Image Animator)

Data Interpretation

- Not designed to measure instructional quality - not enough information about content, situation, student responses, etc.
- These data only reflect large classes, and not discussions, labs or tutorial sessions
- Results: A multi-dimensional and temporal account of teaching practice based on systematic observations

Next Steps

- Wave II data collection in Spring of 2012 - a focus on (a) the relationship between class topics and TDOP data, and (b) further de-composing the “lecture” mode
- Identifying how practitioners in the field could use TDOP data
- Providing training and technical assistance

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