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Description of Observation Protocol for CSPCC

Nina White and Vilma Mesa, University of Michigan, Version 8.2: September 21, 2012

Overview

This classroom observation protocol serves at least three purposes within the CSPCC study. First and second, it serves to corroborate interview and survey data. Third, it provides a snapshot of instruction. Although we can't make any conclusions from single observations, especially not about what is not observed, this snapshot provides an opportunity to see if a single observation resembles or does not resemble stereotypical calculus instruction, where we use the gross stereotype of calculus instruction is mostly focused on rehearsing procedures, with limited participation from students, with teachers delivering most of the information or presenting most of the solutions; group work use is limited, and technology, when used by the instructor is for demonstrations purposes, when used by the students is for computation purposes; in general the cognitive demands of the tasks is low and there is an overemphasis on symbolic manipulation with less emphasis on connections between representations; contextualization of problems is low.

This observation protocol is designed with calculus instruction in mind. Many calculus classes are taught in a lecture style and are not very "reformed." It is designed to be a low-inferential observation protocol that will capture important characteristics of calculus classes and will be useful in comparing all classroom formats (reformed or not). In addition to attending to some standards-based criteria (e.g., student engagement, student exploration), we document the *problems* that are worked by students or the instructor and some of their characteristics. We seek to capture what is it like for a student to be in any given calculus class.

The observation protocol comprises a cover sheet and three parts.

1. Activity Log (Paper): This log is recorded in real time during the class at 5-minute intervals. It keeps track of the basic activities in the class. These categories are not very detailed, but provide a framework for the richer observational description in the Problems Log. After the observation, there is a place for the observer to record impressions of the class activity, using the log as a record and evidence.
2. Problems Log (Paper): This log is also recorded in real time. Every problem in the class (whether presented by the instructor, presented by students, or worked in groups) is recorded in a detailed log. Note: To supplement this log it will be helpful to collect and label a lesson plan (if available) and any materials handed out in class. After the observation, there is a place for the observer to record impressions of the class activity, using the log as a record and evidence.
3. Post-Observation Survey (Online): This portion of the protocol is online. It is to be filled out as soon as possible after the observation. It comprises two parts; prompts to summarize the two Logs are followed by a more general Survey about the class. The two Log Summaries ask the observer to use the Logs recorded during class to answer specific questions about the classroom practices and problems. The questions in the Survey are designed to correspond to questions from the student and instructor surveys in Phase I and codes we seek to capture in the interview data. The Survey covers four areas: Atmosphere, Interaction, Connections, and Mathematical Quality. Theses questions can be answered from memory, so no other extra

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note taking is necessary. We strongly recommend that you familiarize yourself with the questions before the observation.

This document provides detailed descriptions of all three parts of the protocol, including the code definitions for both Logs and a copy of the questions in the Post-Observation (online) portion.

Make sure to create pdfs of the logs you collected.

Tips for Using this Protocol

1. Spend time reading over the definitions of the codes to make sure you understand them. Ask for clarification if needed or take extra notes if in doubt.
2. Bring a stopwatch to your observation. The Activity Log is easiest to fill out with the assistance of a stop-watch.
3. Bring your own surface to write on. It will be helpful if it can hold two pages at once.
4. Collect any additional materials from the instructor before or after class. This includes quizzes, worksheets, lesson plans, etc. Label all collected materials with instructor name, observer name, observation date, institution name, and class name.
5. Print many copies of the Problem Log. We have needed about one page per 10 minutes of class. Bring even more, just in case. To save on hand-writing the header of each page, you have the option of electronically filling in the header before printing the copies—but this must be done separately for each observer and each observation.
6. Number the Problem Log pages as you use them.
7. Fill out the Post-Observation portion as soon as you can after the observation.

Code Changes Since Version 7.0

- More precise definition of P codes (Presentations) on both Logs
- More precise definitions of Technology Codes on Problem Log
- Minor changes and clarifications of E and D codes in Activity Log
- SA (Single Answer) no longer exists as a code in Features on Problem Log
- MS (Multiple Solutions) is now called MM (Multiple Methods)
- S/M now refers to both learning a procedure AND practicing a procedure
- More precise instructions for what to include in the Notes part of Problem Log

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Activity Log Description[1]

This log looks like this:

Class:	Date:	Instructor:
Institution:		Observer:

Activity Log

(Adapted from IBL Observation Protocol and CETP Core Evaluation – Classroom Observation Protocol)

For each 5-minute interval, code all activities that occur. Don't put the same code more than once into the same 5-minute box.

Time	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
Activities:												
Time	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100	100-105	105-110	110-115	115-120
Activities:												

L	Professor lecturing—presenting material not in response to student concerns/questions. Lecture includes setting up a problem to be solved. It also includes solving a problem at the board without student involvement.
IRE	IRE-style lecture. "Fill-in-the-blank" kind of interaction with students. Does not require students to explain things. Class may answer in unison. Student contribution are general one word or short phrases which fit into instructor's train of thought. Only use this code embedded inside of lecture, not, for example, to code a few exchanges within a class discussion.
LwQ	Lecture with Questions— Students ask questions and respond with full sentences to instructor questions (short of describing in-depth processes or solutions). However, content is still primarily created by the instructor.
LwC	Lecture with Clicker. Lecture is driven by student responses on clickers. Feedback by clicker is consistently sought during the lecture.
E	Extended explaining by instructor, *in response to* question or difficulty. An extended takeover of class—a mini-lecture. Different from L because is responsive to an issue that arises on the spot. E can be described as "reactive content delivery." This is by definition responsive and includes *revoicing with elaboration*.

D	Class discussion—this is characterized by significant public student generation of content, such as students describing a solution from their seats to the class and the class (or the instructor) responding. Note that E can arise within a session of D.
G	Working on a problem or an example in groups of 3 or more.
2	Working on a problem or an example in pairs.
I	Working on a problem or an example individually. This may last only a few minutes.
P	Students presenting a solution or proof (individuals or groups) in a publically *visible* way. That is, a student may present at the board, on a document projector, or from a laptop screen. If a student orally describes a solution from his seat, then P is *not* the right code. In this case, use D instead.
T	Students or instructor using technology, for example calculators, computer-based quizzes/worksheets, computer animations, or computer algebra systems.
B	Addressing class business, procedural activity (e.g. returning papers)
A	Assessment. For example, a quiz.
O	Other (describe)

Activity Log

It is meant to record the general class activity and is divided into 5-minute intervals.

Classroom Activity:

A stopwatch is useful in using this part of the log. For every 5-minute interval, the observer records the general format/mode of instruction and/or class activity. The following codes are used. *More than one code can be used in each 5-minute block. However, there is no need to repeat the same code within one 5-minute block.* The definitions also appear in the recording sheet.

L Instructor lecturing—presenting material not in response to student concerns/questions. Lecture includes setting up a problem to be solved. It also includes solving a problem at the board without student involvement.

IRE IRE-style lecture. "Fill-in-the-blank" kind of interaction with students. Does not require students to explain things. Class may answer in unison. Student contributions are general one word or short phrases which fit into instructor's train of thought. Only use this code embedded inside of lecture, not, for example, to code a few exchanges within a class discussion.

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LwQ Lecture with Questions— Students ask questions and respond with full sentences to instructor questions (short of describing in-depth processes or solutions). However, content is still primarily created by the instructor.

LwC Lecture with Clicker. Lecture is driven by student responses on clickers. Feedback by clicker is consistently sought during the lecture.

E Extended explaining by instructor, *in response to* question or difficulty. An extended takeover of class—a mini-lecture. Different from L because is responsive to an issue that arises on the spot. E can be described as "reactive content delivery." This is by definition responsive and includes *revoicing with elaboration*.

D Class discussion—this is characterized by significant public student generation of content, such as students describing a solution from their seats to the class and the class (or the instructor) responding. Note that E can arise within a session of D.

G Working on a problem or an example in groups of 3 or more.

2 Working on a problem or an example in pairs.

I Working on a problem or an example individually. This may last only a few minutes.

P Students presenting a solution or proof (individuals or groups) in a publically *visible* way. That is, a student may present at the board, on a document projector, or from a laptop screen. If a student orally describes a solution from his seat, then P is *not* the right code. In this case, use D instead.

T Students or instructor using technology, for example calculators, computer-based quizzes/worksheets, computer animations, or computer algebra systems.

B Addressing class business, procedural activity (e.g. returning papers)

A Assessment. For example, a quiz.

O Other (describe)

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Problem Log Description

This log looks like this:

Class:	Date:	Instructor:
Institution:		Observer:

Problem Log – Make many copies of this page

Time	Notes	Codes			
____		Actor	L	C	I
			P	G	2
		Tech	C	GC	CAS	A
		Rep	G	T	S	W
		Feat.	P/J	S/M	MM
			D	C	OE
____		Actor	L	C	I
			P	G	2
		Tech	C	GC	CAS	A
		Rep	G	T	S	W
		Feat.	P/J	S/M	MM
			D	C	OE
____		Actor	L	C	I
			P	G	2
		Tech	C	GC	CAS	A
		Rep	G	T	S	W
		Feat.	P/J	S/M	MM
			D	C	OE
____		Actor	L	C	I
			P	G	2
		Tech	C	GC	CAS
		Rep	G	T	S	W
		Feat.	P/J	S/M	MM
			D	C	OE

CODES											
Actor				Tech		Rep		Features			
L	Within Lecture	P	Students Presenting	C	Calculator	G	Graph	P/J	Proof/Just'n	D	Diagrams used
C	Class	G	Group (3+)	GC	Graphing Calculator	T	Table	S/M	Skill/Method	C	Contextualized
I	Students Individual	2	Pairs	CAS	Computer Alg. System	S	Symbol	MM	Multiple Sol'n Methods	OE	Open-ended
				A	Animation	W	Word				

This log records important characteristics of problems observed in a calculus class. It records who performed each problem, and, when ascertainable, how technology was used in the problem, what representations were used in the course of solving the problem, and other "complexity" features of the problem. There is space to record the content of the problem.

This record can shed light on several dimensions of the calculus class, for example:

1. The mathematical quality of instruction.
2. Evolution of concepts within the lesson.
3. Interactivity of the classroom.
4. Use of technology in the classroom.
5. Variety of representations used.
6. The nature of problems presented/worked.

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Using this log

The log should be used in real time to record every instance of a problem observed class, *whether or not the students are involved in the problem-solving process.*

It is not always straightforward to decide what constitutes a "problem." Teachers may announce: "let's do an example" or "let's to do a problem." These are easy ways to signal that an example/problem is coming. However, a question posed casually to the class may evolve into a problem. One way to address this is to start recording content and later decide whether it is or is not a problem. Use your judgment in identifying what constitutes an example or problem. A definition or illustration should not count as an "example."

To supplement this log it will be helpful to collect and label a lesson plan (if available) and any materials handed out in class. *Label collected materials with instructor name, observer name, observation date, institution name, and class name.*

What you record

Time:

As much as possible, record the **start** and **end** time of each example/problem. This is not always straight-forward; use your best judgment. Having a beginning and end time might be useful in learning how long on average teachers spent in their examples/problems.

Actor:

Who is working the problem? This may change over the course of a problem. This code gives evidence of student involvement and investment in the class (and what instructor practices encourage that). *Record a new instance of the problem each time the actor changes.*

L A problem solution is presented by the "**L**ecturer" (this word being a proxy for Instructor). That is, the instructor presents the solutions without significant contribution from students.

C **C**lass. This is where a student or group of students presents or works a solution through the instructor. That is, students speak and the instructor writes or summarizes. It's qualitatively different than a student presenting, because the work is filtered through the instructor. This will often correspond to a code of D in the Activity Log.

I Students working **I**ndividually

P Students presenting a solution or proof (individuals or groups) in a publically visible way. That is, a student may present at the board, on a document projector, or from a laptop screen. If a student orally describes a solution from his seat, then P is *not* the right code. In this case, use C instead.

G Students working in groups of 3 or more on a problem.

2 Students working in pairs

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Notes:

Use this area to record the content of the problem and other mathematical or pedagogical features you observe. At a minimum record/summarize the statement of the problem; information collected here might allow a comparison with exam and homework problems. If possible, record/summarize various solutions presented. This will give information on standard or non-standard solution methods, if multiple solution methods are presented or encouraged, and how various representations are used in the solution. You can use more than one line, but make sure to only mark the codes in the row corresponding to the first "Notes" box you use for a problem. Lastly, consider including notes on mistakes in the presentation, connections made to other problems or concepts, sketches of diagrams used, students involvement in a whole-class solution, their apparent previous exposure to a given problem or problem type, or anything else you find important or striking.

Technology:

This captures what technology was used in solving a problem. Technology can be an excellent illustrative tool because many examples can be explored at once. It can also allow the students to solve problems that are computationally intractable by hand (such as empirical evidence of limits). However, it can detract from the development of number sense and procedural fluency. This particular category serves to corroborate the responses in the End of Term Student and Instructor Surveys. Multiple codes may be used to describe technology used in a given problem.

C **C**alculator. This refers to the functionality of a graphing calculator, rather than the instrument itself. The actual instrument used may be a graphing calculator, a smart phone, a CAS, or the internet. If an action is performed with technology that is within scientific calculator capabilities (e.g. arithmetic or trigonometric calculations), it should get this code.

GC **G**raphing **C**alculator. This refers to the functionality of a graphing calculator, rather than the instrument itself. The actual instrument used may be a smart phone, a CAS, or the internet. If an action is performed with technology that is within TI-83 capabilities (so no symbolic differentiation or integration) but outside the capabilities of a scientific calculator, it should get this code. This will primarily come up when a problem requires graphing and/or creating tabular data from a function.

CAS **C**omputer **A**lgebra **S**ystem. If an action is performed with technology that is within outside of TI-83 capabilities (e.g. differentiation or integration, graphing implicit functions, creating animations, etc.), it should get this code.

A A problem is solved or motivated using an animation.

Representations:

Many reformed calculus textbooks and programs (e.g., Harvard Calculus and Hughes-Hallet) emphasize the "Rule of Four" (previously called the "Rule of Three"), a term which refers to translating between four main kinds of representations of mathematical ideas—graphical, numeric (tabular), symbolic, and verbal. The assumption is that students will gain deeper conceptual understanding of calculus using all four representations instead of the more traditional emphasis on purely symbolic manipulation.

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In this section, code *all* the representations used in the entire problem-solving process (not just the statement of the problem). This will be difficult (or sometimes impossible) during student group work or pair-sharing. Record anything you observe, but don't worry about what you miss during these kinds of activities. If solutions are later shared with the whole class, you may have an opportunity to add more information.

G Graph. A function, equation, or other relationship between two variables is depicted graphically.

T Table (aka numeric or discrete data). A function, equation, or other relationship between two variables is depicted discretely. This will usually be in table form and the data will usually be numeric.

S Symbolic. A function, equation, or other relationship between two variables is depicted symbolically, that is, using algebraic symbols.

W Words. A function, equation, or other relationship between two variables is given in words. This may not be explicit—the words may describe a situation and the problem may require that variables be defined and the relationship between them extracted from the information given. This will be typical of harder word problems. Further, you should use your judgment as to the importance of the words in a given problem. If a problem gives a symbolic representation of a function and asks you to "find the y-intercept," the words are of minimal importance and the code should not be applied.

Features:

This category seeks to capture an assortment of other defining features of the problems. There are codes for various features of the solution process and answer, as well as codes signifying use of diagrams and existence of problem context. Some of these codes were chosen because of their correspondence to questions in the Interview Protocols. These showed substantive agreement in the last calibration test.

P/J **P**roof/**J**ustification. This refers to a problem where the solution includes a proof or justification of the method, steps, or conclusions. This is different than a solution *describing* steps taken; a P/J problem will focus on "why?" rather than "how?"

S/M **S**kills/**M**ethods. The *main* cognitive activity in such a problem is either learning or applying a skill, method, or procedure. This does not refer to using routine methods within more complicated problems. A very straight-forward optimization problem should be considered S/M.

OE **O**pen-**E**nded. Answer to problem is open-ended. This may include a problem about coming up with new methods, making hypotheses, or formulating questions. In particular, there is more than one correct answer to such a problem.

D **D**iagram. A diagram is used somewhere in the statement, solution process, or answer to a problem. This overlaps with graphical representations (G), but also includes diagrams for the geometric set-up of a problem that don't come from functions.

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C **C**ontextualized. A problem is contextualized if there is a real-world or pseudo-real world setting. A contextualized problem is not necessarily more difficult, nor does it necessarily require modeling. For example, "*Find the maximum value of f(t) = -t^2 – 4t + 6*" is not contextualized but "*A baseball's arc is given by f(t) = -t^2 – 4t + 6, where t is time in seconds after contact with a bat. What is the height of the baseball's peak?*" is contextualized, but not any requiring any more thought.

MM **M**ultiple **M**ethods. Use this code if multiple methods for arriving at a solution are presented (either by students or instructor).

A note on the choice of the **Contextualized** code. This is a catch-all proxy for modeling and applications—the kinds of questions we ask about in the Interview Protocols. We realize that not all contextualized problems are actually prompting modeling and/or applications. However, it might be difficult to decide on real time whether a problem is modeling, applications, both, or neither, because modeling and applications might have similar or overlapping definitions. Students and instructors may assume that these terms mean the same thing; so this code allows us to capture any problem that might be considered as modeling and/or applications. Include as much detail as possible about the problem so you can make a note about it in the post-observation survey.

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Post-Observation (Online) Portion Description

This portion of the protocol is online in a google form:

https://docs.google.com/spreadsheet/viewform?formkey=dGs1dnQzQlJSRGVobEdNeGhiY183Q1E6MQ

It has four parts:

1. Cover Sheet (CS)
2. Activity Log Summary (ALS)
3. Problem Log Summary (PLS)
4. Post-Observation Survey (POS)

Cover Sheet

This is an electronic version of the paper cover sheet.

Activity Log Summary

The codes collected in the Activity Log are not be considered the primary data; rather, they serve as a record to create a more descriptive summary of the activities observed in the lesson. That is, we want to consider the observers' impressions corresponding to the codes over the specific quantities of codes. In the online form the observer will create Activity Log Summary to capture these impressions. This will be coded using the same coding scheme as the interview data.

The following instructions are given for creating the Activity Log Summary:

> For each activity code that show up in your Activity Log, describe its enactment.
>
> *For example, if your Log had L, I, 2, and D codes, the summary could read:*
> *L: As can be seen in the Log, the predominant activity during the class was lecture. This lasted for about 45 minutes out of the 60 minute class. The lecture focused on solving example problems. The lecture was animated and the students seemed entertained.*
> *I, 2: Halfway through the class, the professor asked the students to work for 5 minutes on a problem individually and then share their answer with a partner.*
> *D: About 10 minutes was spent discussing various solutions pairs had come up with. No students came to the board, but they did express their solutions fully and some students critiqued others' solutions. The instructor did a lot of revoicing in the class discussion.*

Problem Log Summary

The online form prompts the user to reference the Problem Log data as a record for creating a summary called the Problem Log Summary. This summary can be coded using the same coding scheme as the interview data.

The Problem Log Summary comprises nine questions about the Problem Log data, giving the observer a space to describe the nature of problems in more detail. The questions are the following:

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1. In a few sentences, describe the mathematical content of the class and the trajectory of problems done.
2. If applicable, describe problems done in class that were open-ended.
3. If applicable, describe problems done in class that were contextualized. Were any of the problems examples of applications or modeling? Explain.
4. If applicable, describe problems done in class that required or elicited justification or mathematical argumentation.
5. If applicable, describe problems supporting or requiring conceptual understanding.
6. If applicable, describe problems supporting or requiring the use of mathematical definitions.
7. If applicable, describe problems supporting or requiring the use of representations other than symbolic representations.
8. If applicable, describe problems supporting or requiring the use of procedures. Were procedures learned for the first time? Justified? Practiced?
9. In general, what was your perception of the cognitive demand of problems done in class?

Survey

The questions in the Survey are designed to complement information captured by the two Logs. The questions were chosen for one of two reasons: (1) to correspond to questions asked in the Phase I surveys and (2) to correspond to the Codebook that emerged from the interview data, yielding explicitly designed opportunities for triangulation with the interview data.

The questions are organized into four areas: Atmosphere, Interaction, Connections, and Mathematical Quality.

Atmosphere:

1. Did the students seem to find the class interesting and engaging? What student behaviors lead you to this conclusion? (e.g. "Students asked a lot of questions and seemed excited to present at the board.")
2. Did the pace of the class seem reasonable? What student behaviors lead you to this conclusion? (e.g. "Students seemed to be furiously writing down notes without understanding.")
3. Was the instructor's language understandable/audible? Describe:
4. Did the instructor refer to other resources available to students? (e.g., office hours, the book, a tutoring center, study groups). Describe.
5. Was this section lead by a graduate student? Adjunct? Describe the affect this had on the class.
6. If this was a non-standard section (such as a lab or recitation), describe its form and function.
7. Describe your perception of the diversity of the classroom. (For example, you may want to discuss ethnic, gender, academic or physical abilities diversity.)
8. What did you personally find interesting or engaging about the class?
9. How did the class size affect the class? For example, how did it affect student participation or rapport with the instructor?

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Interaction:

1. Describe students' interaction with the instructor. What were the main forms of interaction? (E.g. question-asking? Question-answering? IRE-responses?)
2. Describe uniformity or non-uniformity of student-instructor interaction. (E.g. two students asked and answered many questions. The rest of the classroom did not interact much with the instructor.)
3. Describe observed student to student interaction, if any. (E.g., did you observe pair sharing, students challenging each others' work, students helping each other, etc.)
4. Describe what you can remember about instructor questioning behaviors. (E.g. "Instructor asked mostly engaged in mostly IRE-style questioning. If answers were not forthcoming after a few seconds, he moved on without student response.")
5. Describe what you can remember about student questioning behaviors. If applicable, describe your perception of instructor's behaviors that encouraged or discouraged questioning. (E.g. "Students asked few questions, but when they did, they were "why?" questions.")
6. Describe student contribution to content delivery in class. (E.g. "Students discussed solutions with the class from their seats.")

Connections:

1. Were connections made to other disciplines? Describe.
2. Were connections made to material from other points in the semester or previous courses? Describe
3. Was the textbook or textbook resources (e.g. worksheets or slides) used in class? If so, how?
4. Was homework dealt with or referred to in some way during class? Describe.

Mathematical Quality:

1. Did the instructor display an understanding of the mathematical content? If not, describe
2. Were mathematical concepts presented clearly and accurately throughout the lesson? If not, describe.
3. Were errors present in the lecture? Describe the errors. Were they significant? Typographical? Mathematical? Omissions? How did the instructor handle his own errors?
4. Did the instructor use precise language and notation?
5. Did the instructor preemptively address student errors or misconceptions? Describe.
6. Did the instructor explicitly address student errors or misconceptions as they arose? Describe.
7. Did instructor make learning goals explicit? Describe.
8. Describe students' demonstration of mathematical language and mathematical questioning.

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Cover Sheet

Institution:

Instructor observed (could be a TA):

Instructor status (if known):

Instructor of record:
(other than instructor observed, if applicable)

Observer(s):

Date of observation:

Class start time:

Class end time:

Type of Class (e.g. lecture, lab, discussion):

	Women	Men
# of students present at start		
students arriving late (tally)		

Use space below for any additional notes (morale, emotional climate, physical setting, distractions…)

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Activities:												
Time	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100	100-105	105-110	110-115	115-120
Activities:												

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IRE IRE-style lecture. "Fill-in-the-blank" kind of interaction with students. Does not require students to explain things. Class may answer in unison. Student contribution are general one word or short phrases which fit into instructor's train of thought. Only use this code embedded inside of lecture, not, for example, to code a few exchanges within a class discussion.

LwQ Lecture with Questions— Students ask questions and respond with full sentences to instructor questions (short of describing in-depth processes or solutions). However, content is still primarily created by the instructor.

LwC Lecture with Clicker. Lecture is driven by student responses on clickers. Feedback by clicker is consistently sought during the lecture.

E Extended explaining by instructor, *in response to* question or difficulty. An extended takeover of class—a mini-lecture. Different from L because is responsive to an issue that arises on the spot. E can be described as "reactive content delivery." This is by definition responsive and includes *revoicing with elaboration*.

D Class discussion—this is characterized by significant public student generation of content, such as students describing a solution from their seats to the class and the class (or the instructor) responding. Note that E can arise within a session of D.

G Working on a problem or an example in groups of 3 or more.

2 Working on a problem or an example in pairs.

I Working on a problem or an example individually. This may last only a few minutes.

P Students presenting a solution or proof (individuals or groups) in a publically *visible* way. That is, a student may present at the board, on a document projector, or from a laptop screen. If a student orally describes a solution from his seat, then P is *not* the right code. In this case, use D instead.

T Students or instructor using technology, for example calculators, computer-based quizzes/worksheets, computer animations, or computer algebra systems.

B Addressing class business, procedural activity (e.g. returning papers)

A Assessment. For example, a quiz.

O Other (describe)

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Institution: Observer:

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Problem Log – Make many copies of this page

Time	Notes	Codes				
_____		Actor	L P	C G	I 2	
		Tech	C	GC	CAS	A
		Rep	G	T	S	W
		Feat.	P/J D	S/M C	MM OE	
_____		Actor	L P	C G	I 2	
		Tech	C	GC	CAS	A
		Rep	G	T	S	W
		Feat.	P/J D	S/M C	MM OE	
_____		Actor	L P	C G	I 2	
		Tech	C	GC	CAS	A
		Rep	G	T	S	W
		Feat.	P/J D	S/M C	MM OE	
_____		Actor	L P	C G	I 2	
		Tech	C	GC	CAS	
		Rep	G	T	S	W
		Feat.	P/J D	S/M C	MM OE	

CODES												
Actor				Tech		Rep		Features				
L	Within Lecture	P	Students Presenting	C	Calculator	G	Graph	P/J	Proof/Just'n	D	Diagrams used
C	Class	G	Group (3+)	GC	Graphing Calculator	T	Table	S/M	Skill/Method	C	Contextualized
I	Students Individual	2	Pairs	CAS	Computer Alg. System	S	Symbol	MM	Multiple Sol'n Methods	OE	Open-ended
				A	Animation	W	Word				

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Demographic Information

Date:

Course Name/number:

Observer:

Class start time:

Institution:

Also Present:

Class end time:

Instructor:

Instructor gender:

	Women	Men
# of students present at start		
students arriving late (tally)		

Use space below for any additional notes (morale, emotional climate, physical setting, distractions…)

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Post-Observation Survey

This survey seeks to record quality indicators not necessarily captured by the Activity Log and Problem Log. Because some of these concepts indicators are complex, the questions require elaboration. There are in all 25 questions organized into four categories: Atmosphere (7 questions), Interaction (6 questions), Connections (5 questions), and Mathematical Accuracy (7 questions).

Familiarize yourself with these questions before the observation so that you know what kinds of things we are looking for. These questions are meant to capture "impressions," so no extra note-taking or logging should be necessary to answer them.

Use the "Other" option when neither "Yes" nor "No" seem appropriate. Explain what "Other" means. For example, it might mean "Unsure," "Not Applicable," etc.

Atmosphere (7 questions)

1. Did the lesson include activities? Yes No Other
   If yes, describe some of the activities you remember and how the students engaged with them.

2. Did the students seem to find the class interesting and engaging? Yes No Other
   What student behaviors lead you to this conclusion? (*e.g "Students asked a lot of questions and seemed excited to present at the board."*)

3. Did the pace of the class seem reasonable? Yes No Other
   What student behaviors lead you to this conclusion? (*e.g "Students seemed to be furiously writing down notes without understanding."*)

4. Was the instructor's language understandable/audible? Yes No Other
   Describe:

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5. Did the instructor refer to other resources available to students? Yes No Other
(e.g., office hours, the book, a tutoring center). Describe.

6. Describe your perception of the diversity of the classroom. (For example, you may want to discuss ethnic, gender, academic or physical abilities diversity.)

7. What did you personally find interesting or engaging about the class?

Interaction (6 questions)

1. Describe students' interaction with the instructor. What were the main forms of interaction?
(E.g. question-asking? Question-answering? IRE-responses?)

2. Describe uniformity or non-uniformity of student-instructor interaction.
(*E.g. two students asked and answered many questions. The rest of the classroom did not interact much with the instructor.)*

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3. Describe observed student to student interaction, if any.
   (*E.g., did you observe pair sharing, students challenging each others' work, students helping each other, etc.)*

4. Describe what you can remember about instructor questioning behaviors.
   (*E.g. "Instructor asked mostly engaged in mostly IRE-style questioning. If answers were not forthcoming after a few seconds, he moved on without student response.")*

5. Describe what you can remember about student questioning behaviors.
   If applicable, describe your perception of instructor's behaviors that encouraged or discouraged questioning.
   (*E.g. "Students asked few questions, but when they did, they were "why?" questions.")*

6. Describe student contribution to content delivery in class.
   (*E.g. "Students discussed solutions with the class from their seats.")*

Connections (5 questions)

Here we use connection in the broadest possible sense—to refer to connections between mathematical topics, connections between disciplines, and connections within a problem, say between multiple solutions.

1. Was technology used in this lesson? Yes No Other
   Explain its role.

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2. Did the instructor or students make use of connections between representations to present material or solve problems? Yes No Other
   Describe.

3. Were connections made to other disciplines? Yes No Other
   Describe.

4. Were connections made to material from other points in the semester or previous courses? Yes No Other
   Describe.

5. Describe your perception of lesson trajectory.
   That is, how was the lesson launched and wrapped up? How were problems and topics motivated and connected?

Mathematical Accuracy (6 questions)

1. Did the instructor display an understanding of the mathematical content? Yes No Other
   If not, describe.

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2. Were mathematical concepts presented clearly and accurately throughout the lesson? If not, describe. Yes No Other

3. Were errors present in the lecture? Yes No Other
Describe the errors. Were they significant? Typographical? Mathematical? Omissions? How did the instructor handle his own errors?

4. Did the instructor use precise language and notation? Yes No Other

5. Did the instructor *preemptively* address student errors or misconceptions? Describe. Yes No Other

6. Did the instructor explicitly address student errors or misconceptions *as they arose*? Describe. Yes No Other

7. Describe students' demonstration of mathematical language and mathematical questioning.

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