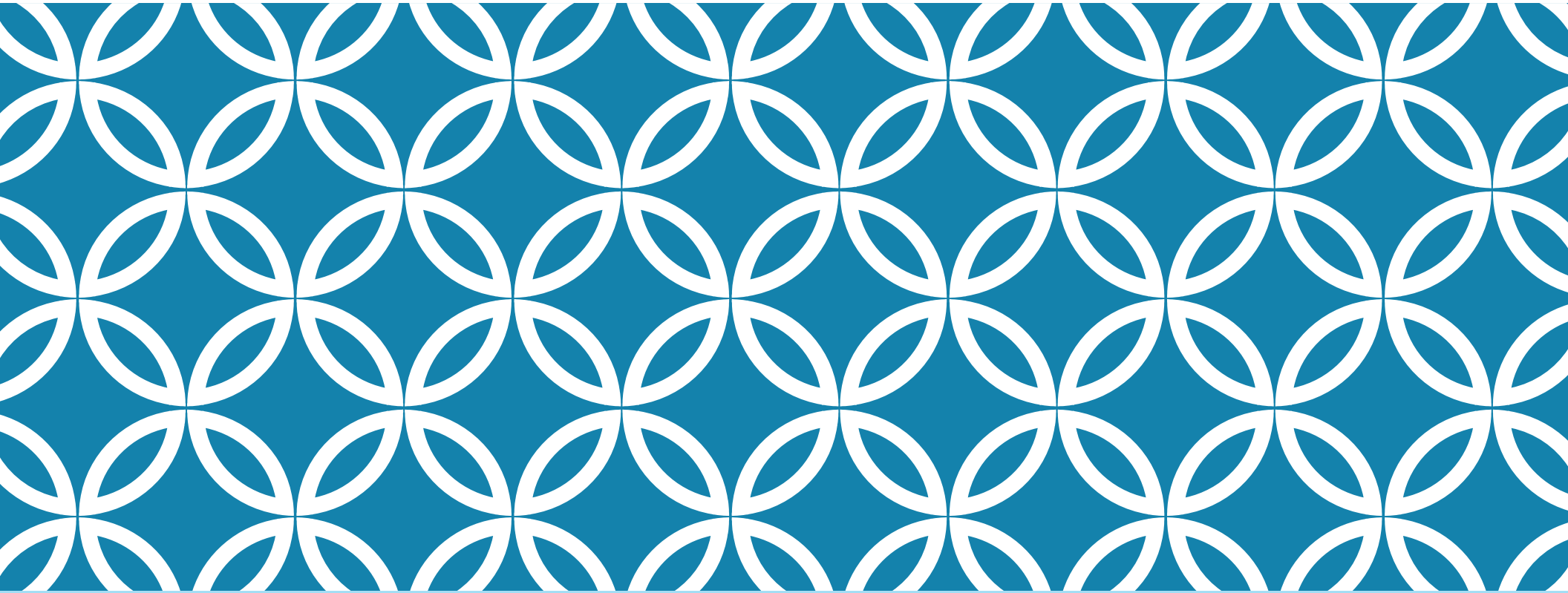

Lance Burger Comlan de Souza Kay Kelm Travis Kelm Marat Markin Agnes Tuska

FLOCK MATHEMATICS SUMMER INSTITUTE YEAR 2

FRESNO STATE
JUNE 6-8, 2016

Figure 1. Descriptions of the COPUS student and instructor codes.

1. Students are Doing

L	Listening to instructor/taking notes, etc.
Ind	Individual thinking/problem solving. Only mark when an instructor explicitly asks students to think about a clicker question or another question/problem on their own.
CG	Discuss clicker question in groups of 2 or more students
WG	Working in groups on worksheet activity
OG	Other assigned group activity, such as responding to instructor question
AnQ	Student answering a question posed by the instructor with rest of class listening
SQ	Student asks question
WC	Engaged in whole class discussion by offering explanations, opinion, judgment, etc. to whole class, often facilitated by instructor
Prd	Making a prediction about the outcome of demo or experiment
SP	Presentation by student(s)
TQ	Test or quiz
W	Waiting (instructor late, working on fixing AV problems, instructor otherwise occupied, etc.)
O	Other – explain in comments

2. Instructor is Doing

Lec	Lecturing (presenting content, deriving mathematical results, presenting a problem solution, etc.)
RtW	Real-time writing on board, doc. projector, etc. (often checked off along with Lec)
FUp	Follow-up/feedback on clicker question or activity to entire class
PQ	Posing non-clicker question to students (non-rhetorical)
CQ	Asking a clicker question (mark the entire time the instructor is using a clicker question, not just when first asked)
AnQ	Listening to and answering student questions with entire class listening
MG	Moving through class guiding ongoing student work during active learning task
1o1	One-on-one extended discussion with one or a few individuals, not paying attention to the rest of the class (can be along with MG or AnQ)
D/V	Showing or conducting a demo, experiment, simulation, video, or animation
Adm	Administration (assign homework, return tests, etc.)
W	Waiting when there is an opportunity for an instructor to be interacting with or observing/listening to student or group activities and the instructor is not doing so
O	Other – explain in comments

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Article

The Best of Both Worlds: Building on the COPUS and RTOP Observation Protocols to Easily and Reliably Measure Various Levels of Reformed Instructional Practice

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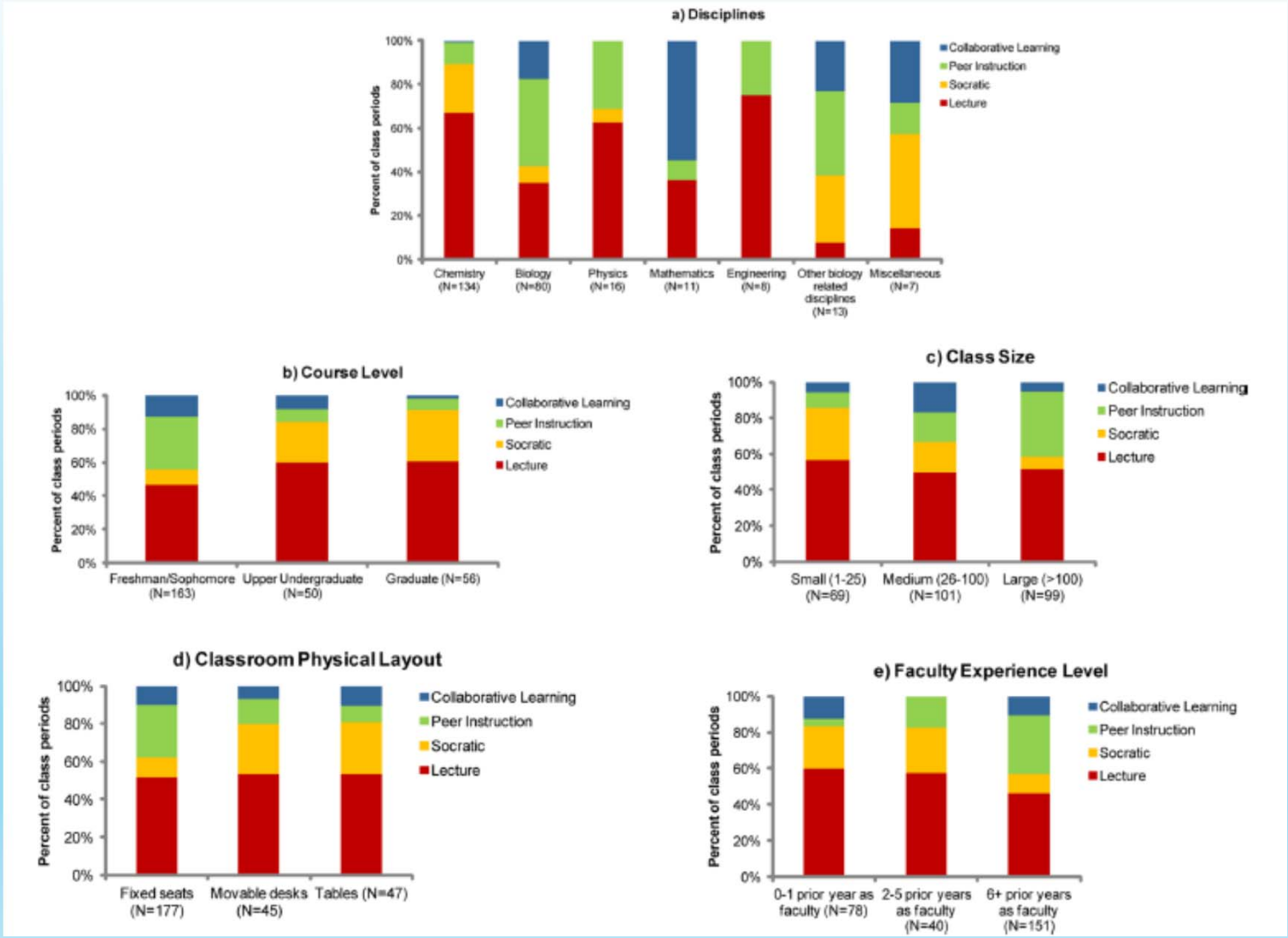
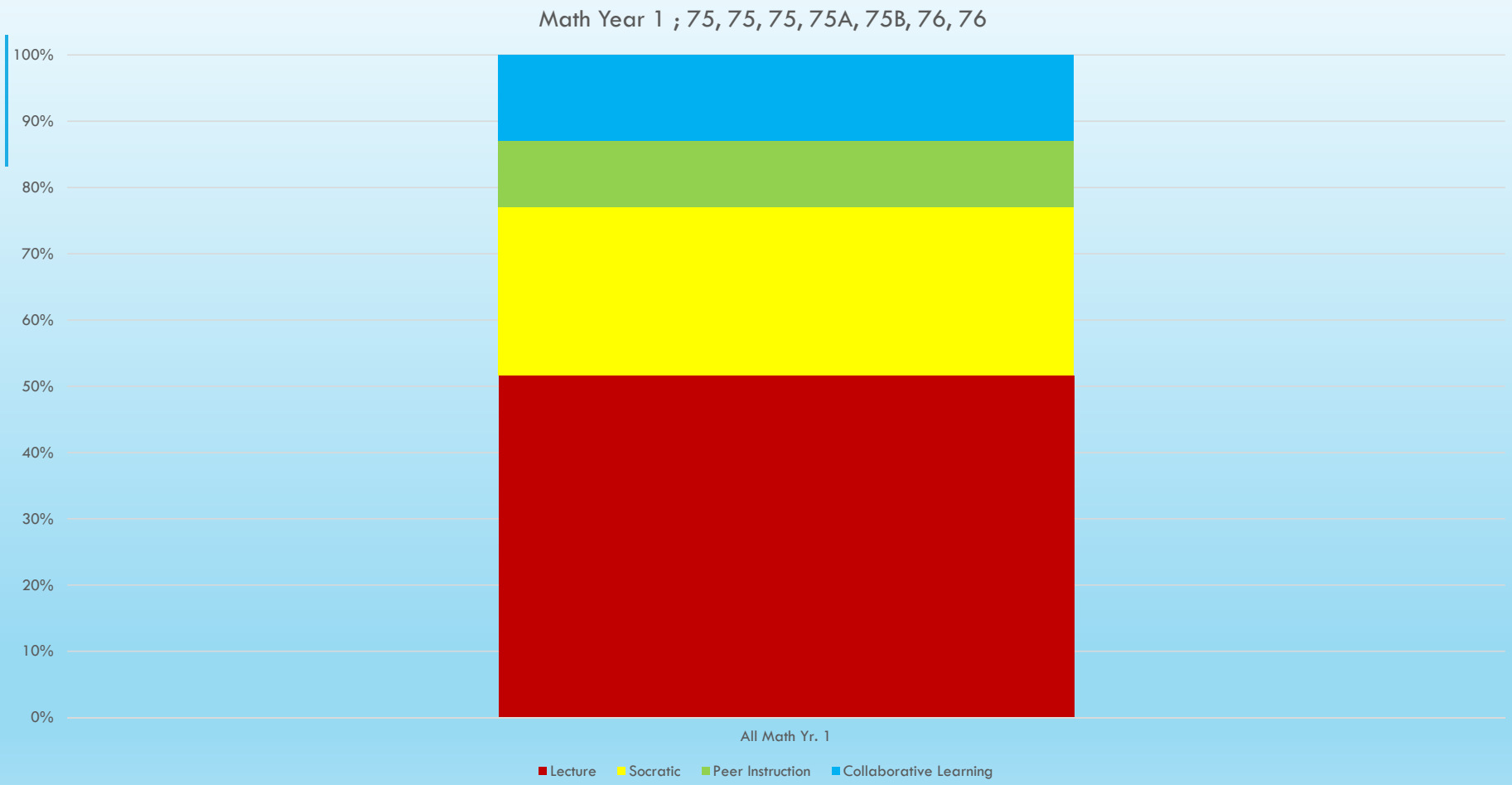
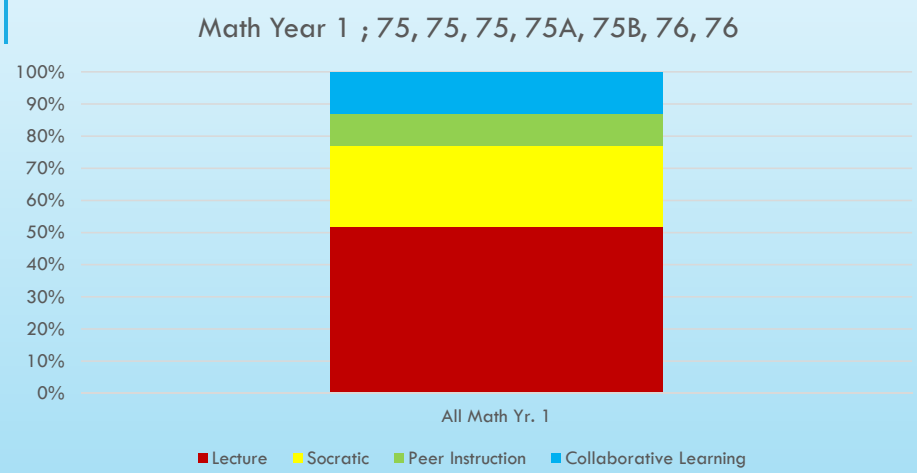
Table 4. The eight COPUS codes used for the cluster analysis that lead to the 10 COPUS profiles

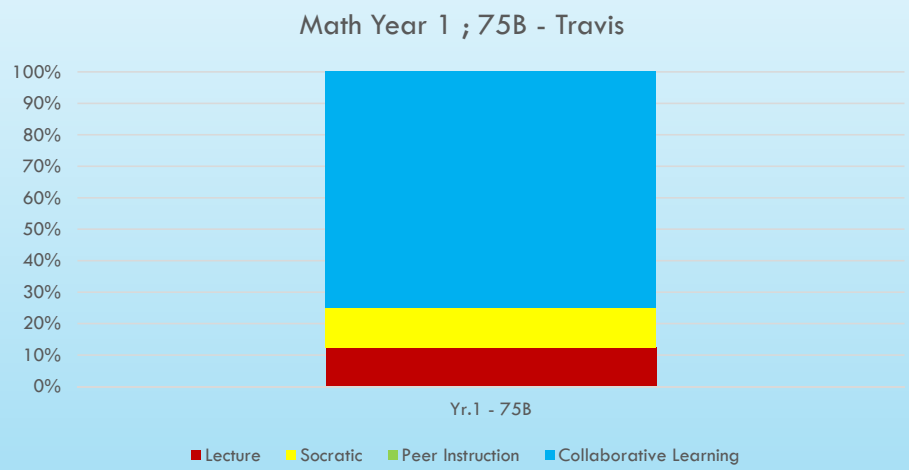
Student codes		Instructor codes	
AnQ-S	Student answering instructor's question	CQ	Asking a clicker question
SQ	Student asking a question	FUp	Follow-up on CQ or activity
GW[a]	Students working in group though various means (worksheet, clicker, others)	Lec	Lecturing
		RtW	Real-time writing on board, etc.
		MG	Moving through class, guiding work

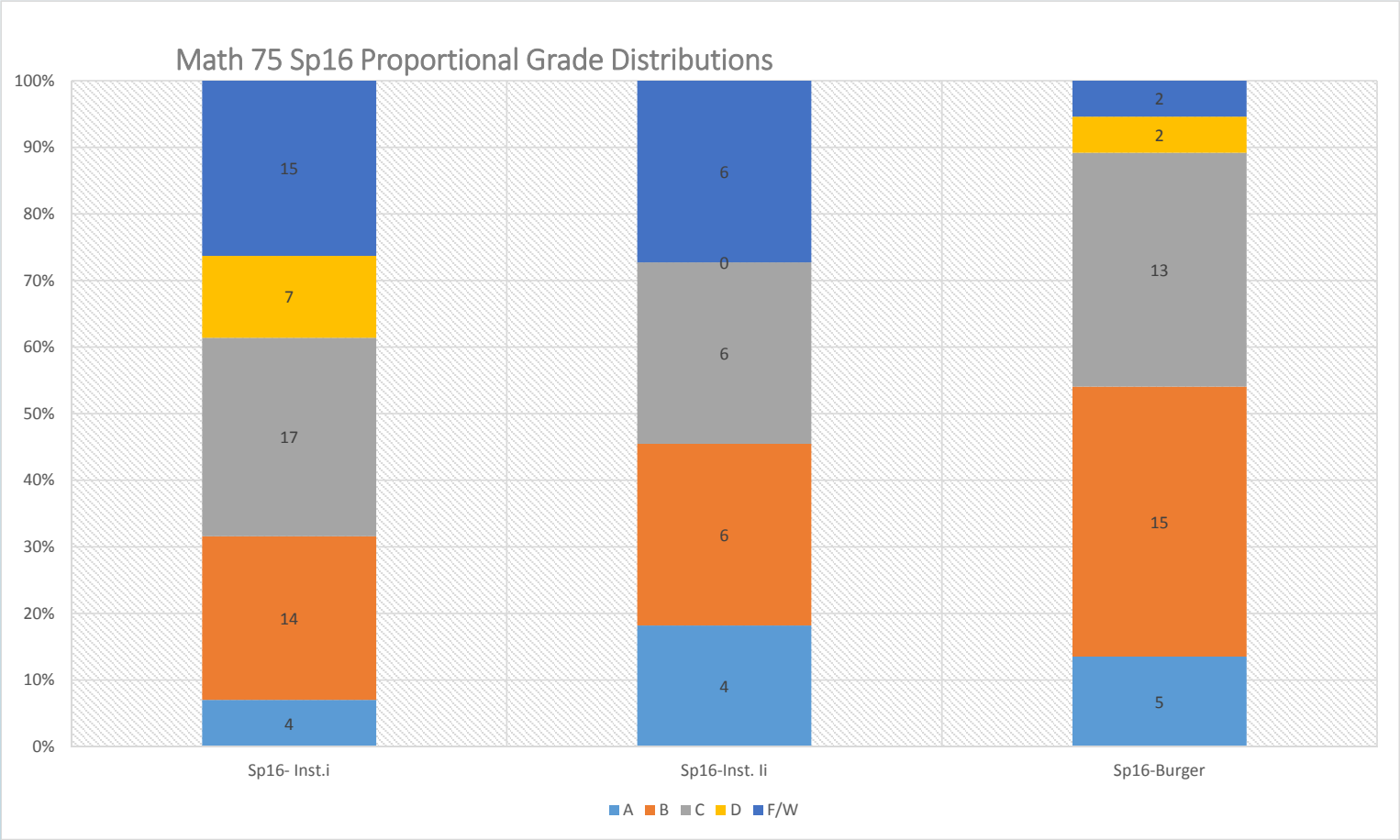
[a]GW is not a code in the original set of 25 COPUS codes; it is a new code that groups the original COPUS codes WG, CG, and OG.


a) Disciplines
Percent of class periods
100%
80%
60%
40%
20%
0%
Collaborative Learning
Peer Instruction
Socratic
Lecture
Chemistry (N=134)
Biology (N=80)
Physics (N=16)
Mathematics (N=11)
Engineering (N=8)
Other biology related disciplines (N=13)
Miscellaneous (N=7)
b) Course Level
Freshman/Sophomore (N=163)
Upper Undergraduate (N=50)
Graduate (N=56)
c) Class Size
Small (1-25) (N=69)
Medium (26-100) (N=101)
Large (>100) (N=99)
d) Classroom Physical Layout
Fixed seats (N=177)
Movable desks (N=45)
Tables (N=47)
e) Faculty Experience Level
0-1 prior year as faculty (N=78)
2-5 prior years as faculty (N=40)
6+ prior years as faculty (N=151)


Math Year 1 ; 75, 75, 75, 75A, 75B, 76, 76
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
All Math Yr. 1
Lecture
Socratic
Peer Instruction
Collaborative Learning


Math Year 1 ; 75, 75, 75, 75A, 75B, 76, 76
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
All Math Yr. 1
Lecture
Socratic
Peer Instruction
Collaborative Learning

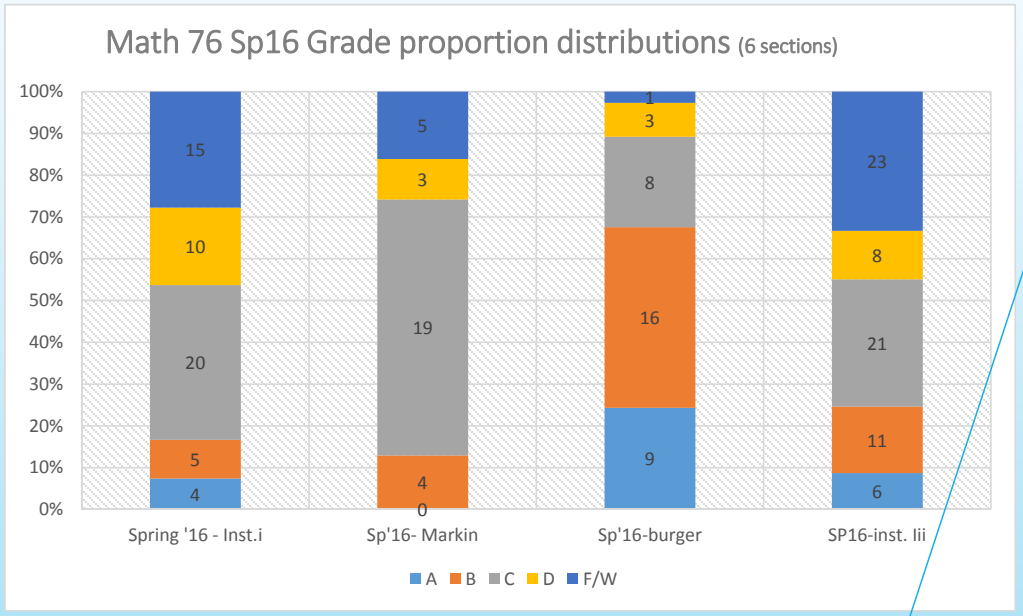

Math Year 1 ; 75B - Travis
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Yr.1 - 75B
Lecture
Socratic
Peer Instruction
Collaborative Learning



Pass rates:
Inst. i – 61%
Inst. ii – 73%
Burger – 89%

$p = .09 > \alpha$
Chi square of distributions.

How best to study/correlate observations and pass rates to provide evidence for the effectiveness of active learning?



This observation was from a lesson style, inspired by Comlan de Souza, that evolved into my most effective active strategy and I believe is leading to an increase in pass rates in 75 & 76.

1. In IT 290 10-15 problems are worked on by groups in a gallery format.
2. The instructor mingles and interacts; and when a problem is verified they can move on.
3. Occasionally the instructor brings the class Together for a comment; or a student presents an important finding/idea/strategy.
4. At the end, students photograph all of the verified solutions (these are their e-notes). *They really enjoy doing that by the way!*

Pass rates:
Inst. i – 54%
Markin – 74%
Burger – 89%
Inst. iv – 55%

$$p = 0.000003 \ll \alpha$$

Chi square of the distributions