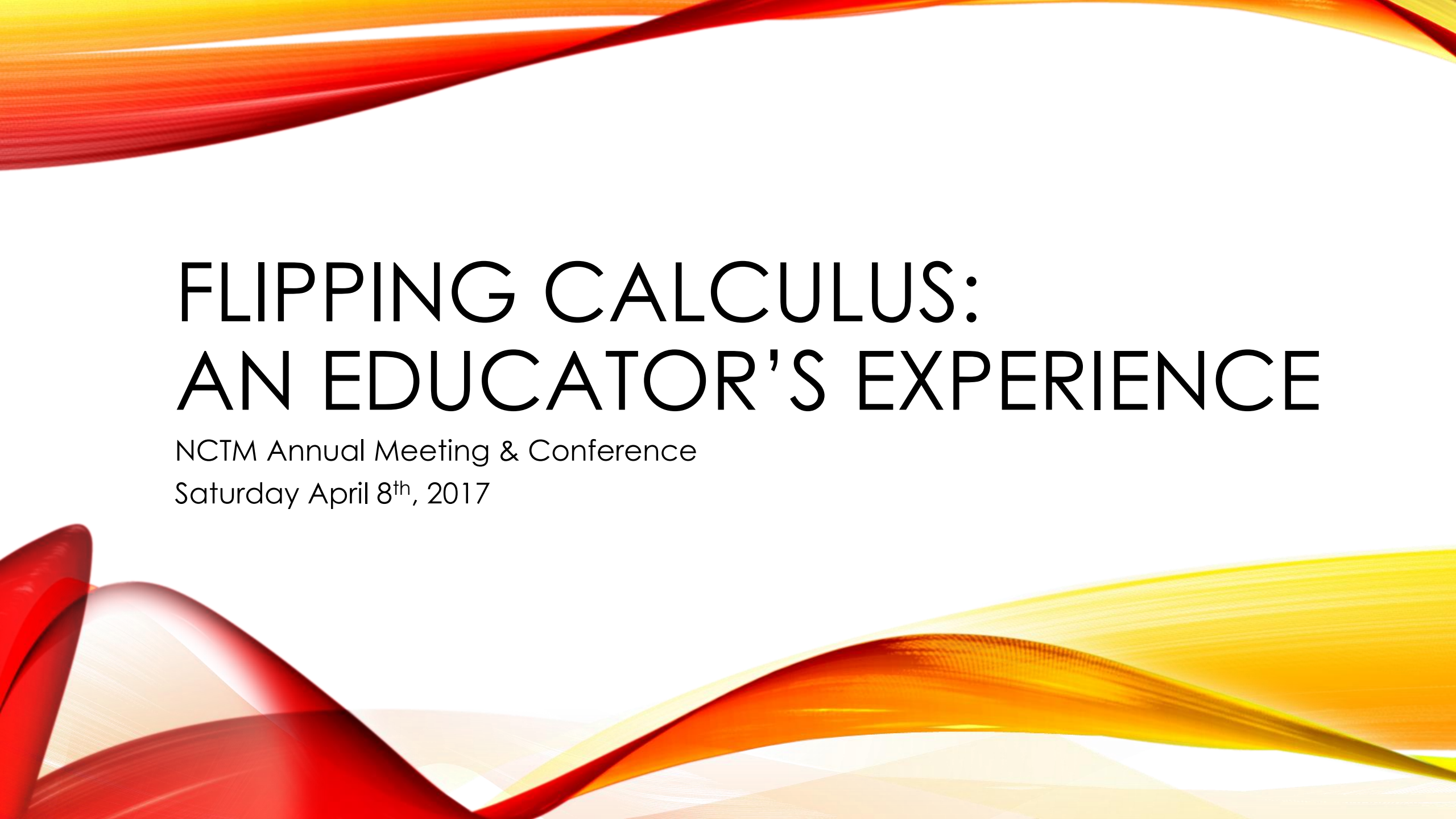




FLIPPING CALCULUS: AN EDUCATOR'S EXPERIENCE

NCTM Annual Meeting & Conference

Saturday April 8th, 2017

SARAH VOLK

- 12th year teaching; all teaching calculus
- Reader for AP College Board for AP Calculus AB
- Currently teaching at Fargo North
 - Fargo Public Schools is 1-1 with devices



WHO ALSO FLIPS OR
HAS TRIED FLIPPING?





NEED FOR CHANGE

- I am doing more math in class than my students!!!
- Work done at home a struggle
- Students not always engaged in lesson
- Students constantly gone for activities
- Relevant use of technology at student disposal
- Work days were my favorite days!
- Calculus students can handle this
- **Access and Equity**

Wah wa-wah wa-wah wah wah wah wa-wah wa-wa wah wah
wah wah wa-wah wa-wah wah wa-wah wa-wah wah wa-wah wa-
wah wah wa-wah wa-wah wah wa-wah wa-wah wah wa-wah ...

Psst ...
so are you
getting any
of this?





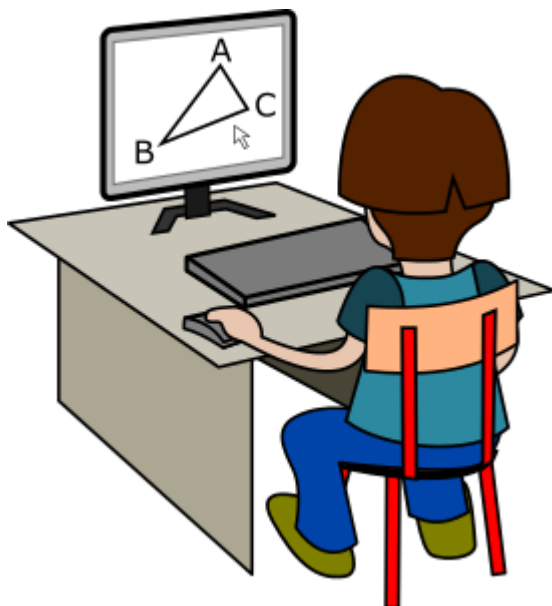
OBJECTIVES

- Define flipped classroom & learning
- Explain my version of flipping
- Share feedback from my current students
- Explain how I created my materials
- Logical next steps
- Participants share about flipping experiences or ask questions

FLIPPED CLASS VS. FLIPPED LEARNING



FROM FLIPPED LEARNING NETWORK



Definition of Flipped Learning

Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter.

[FLIP Pillars Hand Out](#)

The Four Pillars of F-L-I-P™

F

Flexible Environment

Flipped Learning allows for a variety of learning modes; educators often physically rearrange their learning spaces to accommodate a lesson or unit, to support either group work or independent study. They create flexible spaces in which students choose when and where they learn. Furthermore, educators who flip their classes are flexible in their expectations of student timelines for learning and in their assessments of student learning.

F.1

- ☐ I establish spaces and time frames that permit students to interact and reflect on their learning as needed.

F.2

- ☐ I continually observe and monitor students to make adjustments as appropriate.

F.3

- ☐ I provide students with different ways to learn content and demonstrate mastery.

L

Learning Culture

In the traditional teacher-centered model, the teacher is the primary source of information. By contrast, the Flipped Learning model deliberately shifts instruction to a learner-centered approach, where in-class time is dedicated to exploring topics in greater depth and creating rich learning opportunities. As a result, students are actively involved in knowledge construction as they participate in and evaluate their learning in a manner that is personally meaningful.

L.1

- ☐ I give students opportunities to engage in meaningful activities without the teacher being central.

L.2

- ☐ I scaffold these activities and make them accessible to all students through differentiation and feedback.



Intentional Content

Flipped Learning Educators continually think about how they can use the Flipped Learning model to help students develop conceptual understanding, as well as procedural fluency. They determine what they need to teach and what materials students should explore on their own. Educators use Intentional Content to maximize classroom time in order to adopt methods of student-centered, active learning strategies, depending on grade level and subject matter.

I.1	☐ I prioritize concepts used in direct instruction for learners to access on their own.
I.2	☐ I create and/or curate relevant content (typically videos) for my students.
I.3	☐ I differentiate to make content accessible and relevant to all students.



Professional Educator

The role of a Professional Educator is even more important, and often more demanding, in a Flipped Classroom than in a traditional one. During class time, they continually observe their students, providing them with feedback relevant in the moment, and assessing their work. Professional Educators are reflective in their practice, connect with each other to improve their instruction, accept constructive criticism, and tolerate controlled chaos in their classrooms. While Professional Educators take on less visibly prominent roles in a flipped classroom, they remain the essential ingredient that enables Flipped Learning to occur.

P.1	☐ I make myself available to all students for individual, small group, and class feedback in real time as needed.
P.2	☐ I conduct ongoing formative assessments during class time through observation and by recording data to inform future instruction.
P.3	☐ I collaborate and reflect with other educators and take responsibility for transforming my practice.

TIED TO MASTERY LEARNING

The Flipped Mastery Model has five stages:



[Jon Bergmann](#)-flipping guru

MY VERSION OF FLIPPING

- Students watch lecture replacement videos- (2-3 videos/week)
or read filled-in notes
- At the beginning of class I do a “Cliff Notes” version of the topic
- Students begin work on activity while I circulate and facilitate
- I observe student understandings and misunderstandings to follow up with right away or next day
- Weekly formal formative assessment
- End of unit mastery test- I do allow a retest

A TYPICAL DAY- WHAT WOULD YOU SEE?

- Any large group discussions or announcements
- Students then work for about 40 minutes on the content
 - Individually, Partners, Small Groups
- Students must be working on math- unless finished completely
 - Preferably worksheet or correcting, Some watching videos, Some reading notes
- I circulate and answer student questions-supplement holes from videos
- I talk to every student, every day
- Students are self-assessing by correcting answers from the key



DISADVANTAGES AS I SEE THEM

- Student-teacher discourse during initial instruction is missing
- Loss of flexibility in lesson- can't change based on student questions
- Give up control in some ways- teacher not “front and center” visibly
- Time commitment to make videos
- Students are resistant to change



ADVANTAGES AS I SEE THEM

- Student discourse in classroom increased dramatically
- Students maximize time with teacher to ask questions (more efficient)
- Students find a learning style that works for them
- I get to speak to every student every day about mathematics
- Students have access to videos for re-teaching purposes & activity absences
- Frees up class time for task and labs
- Students engaged in productive struggle
 - Very few students come in for help outside of class- no need



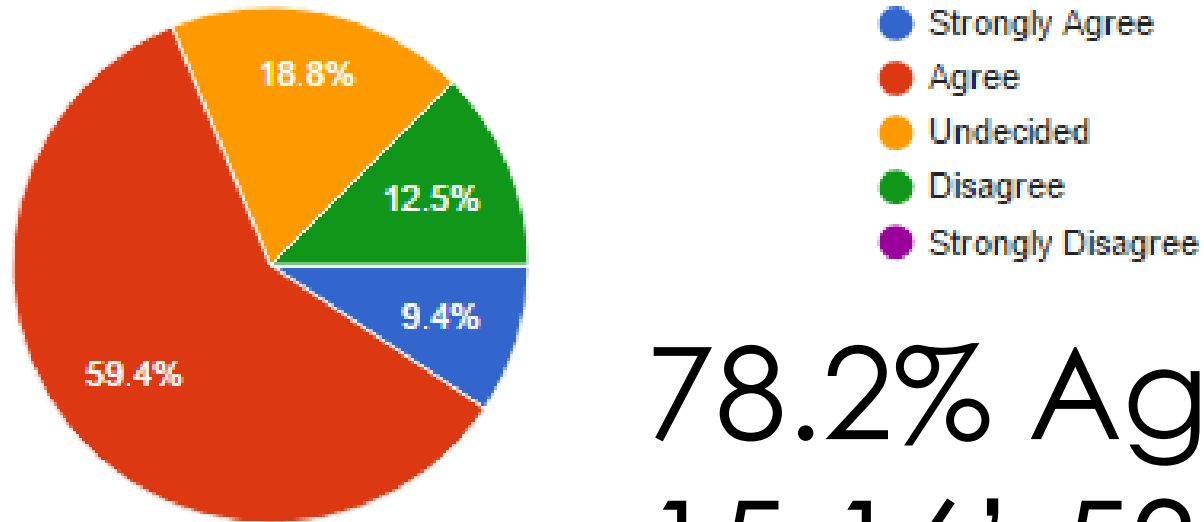
QUESTIONS??

WHAT DO THE STUDENTS THINK?



STUDENT SURVEY DATA

Do you feel flipped learning has helped you learn AP Calculus? (32 responses)



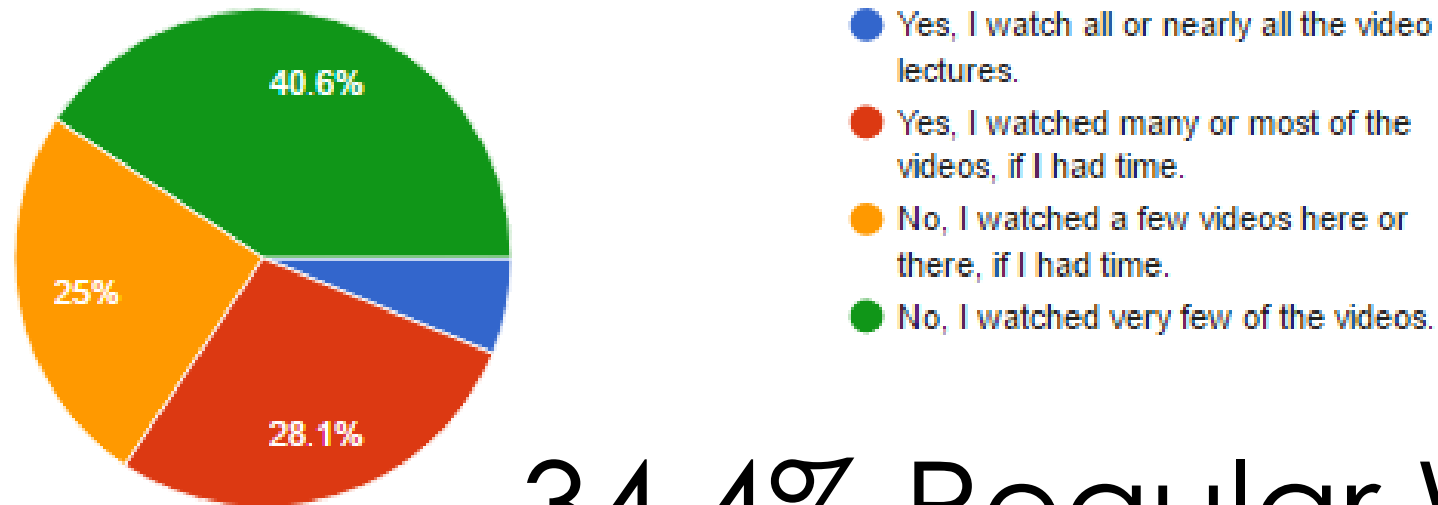
78.2% Agree

15-16' - 53.9% Agree

STUDENT SURVEY DATA

Did you regularly watch the videos Mrs. Volk created as the lecture for this course?

(32 responses)

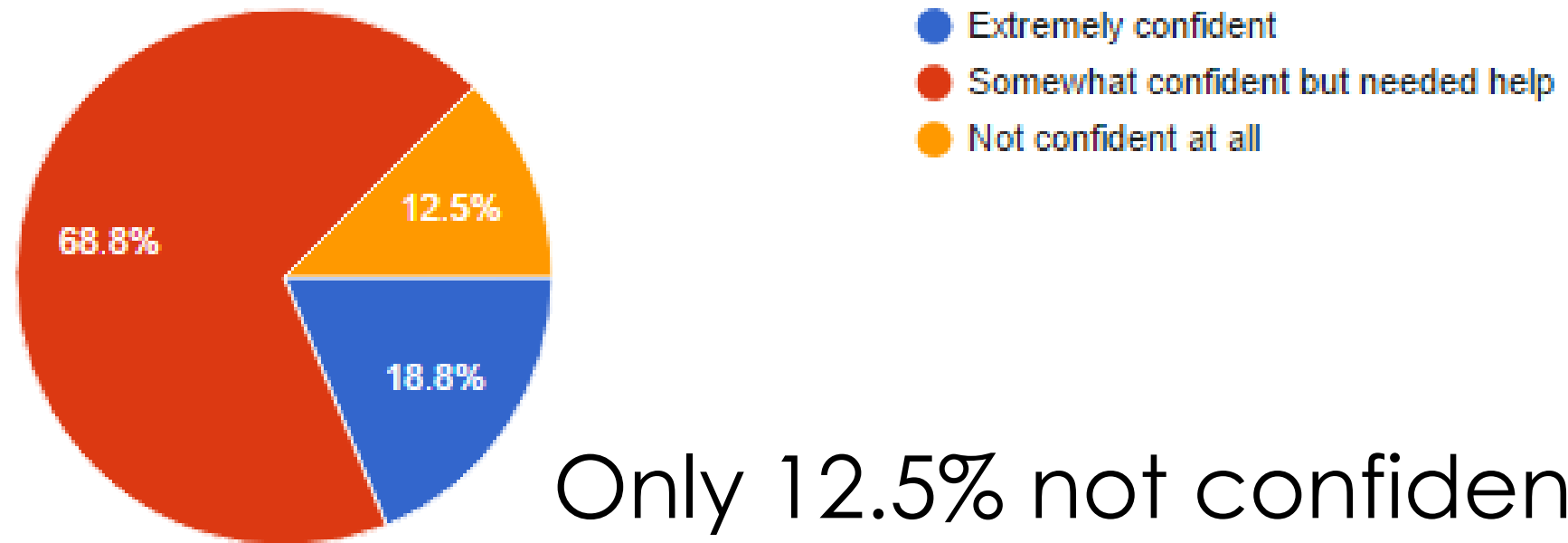


34.4% Regular Watchers

STUDENT SURVEY DATA

After watching the videos but before coming to class, how confident were about doing the problems?

(32 responses)



Only 12.5% not confident

STUDENT SURVEY DATA

How confident do you feel after watching the video and after coming to class and working with others?

(32 responses)

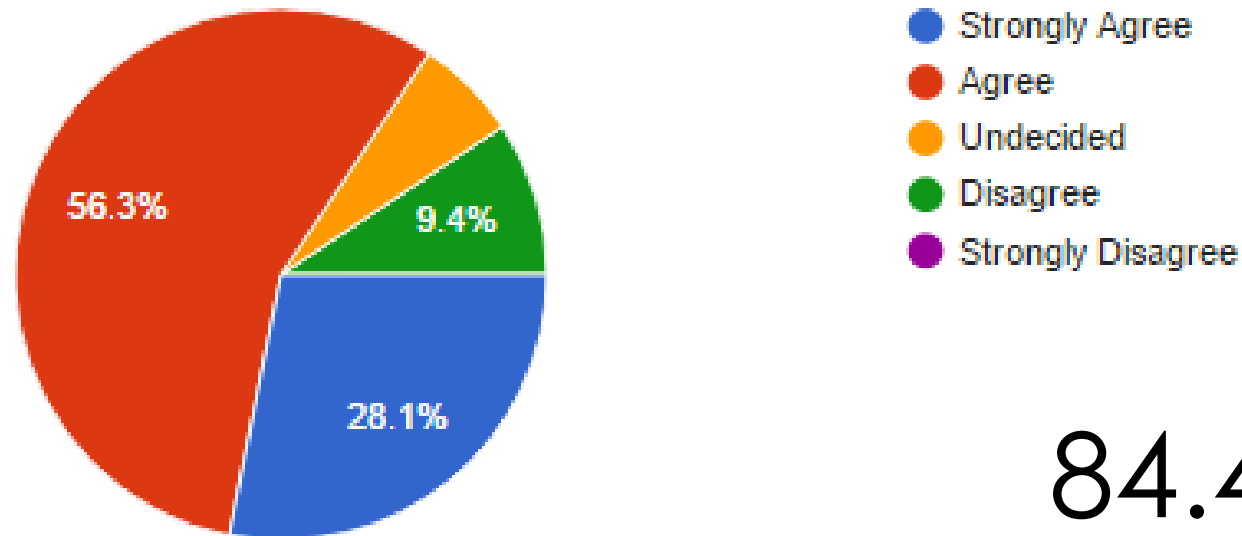


Only 9.4% not confident
Extremely confident more
than doubled from 15-16'

STUDENT SURVEY DATA

Did you feel like flipped learning allowed you to learn with your preference?
For example you could watch the videos, or just read the notes or book, work in class and ask questions, or go back and re-watch videos if needed.

(32 responses)

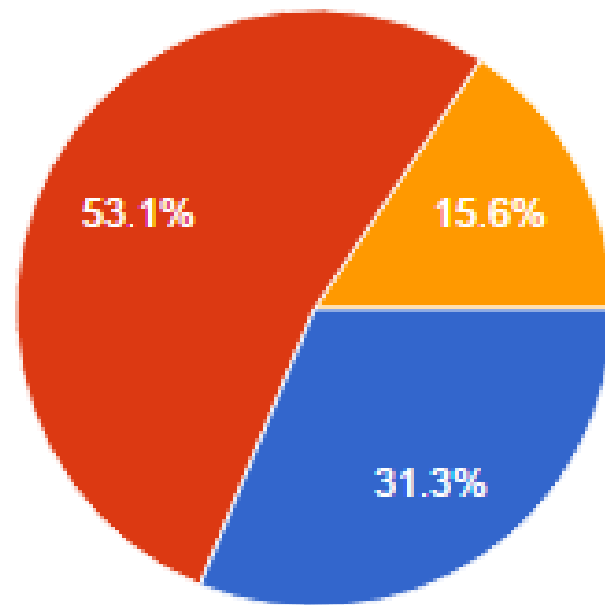


84.4% Agree

STUDENT SURVEY DATA

Do you feel you benefited from class time to have discussions with other students about the material?

(32 responses)



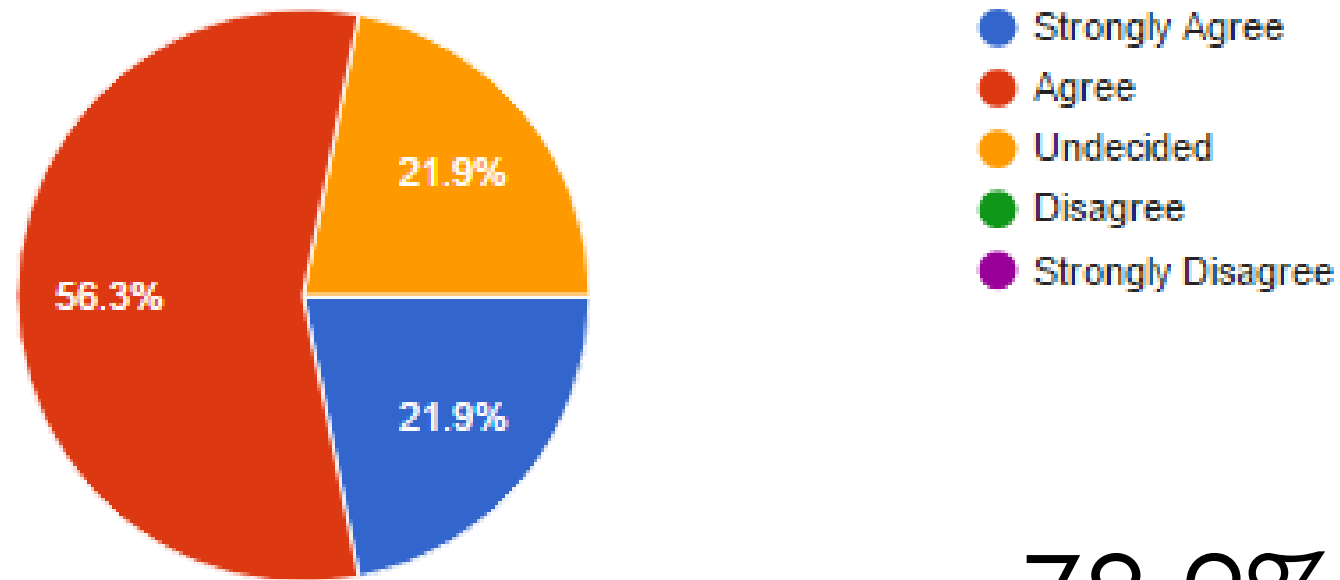
- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

84.4% Agree

STUDENT SURVEY DATA

Do you feel you are more of an independent learner after this experience?

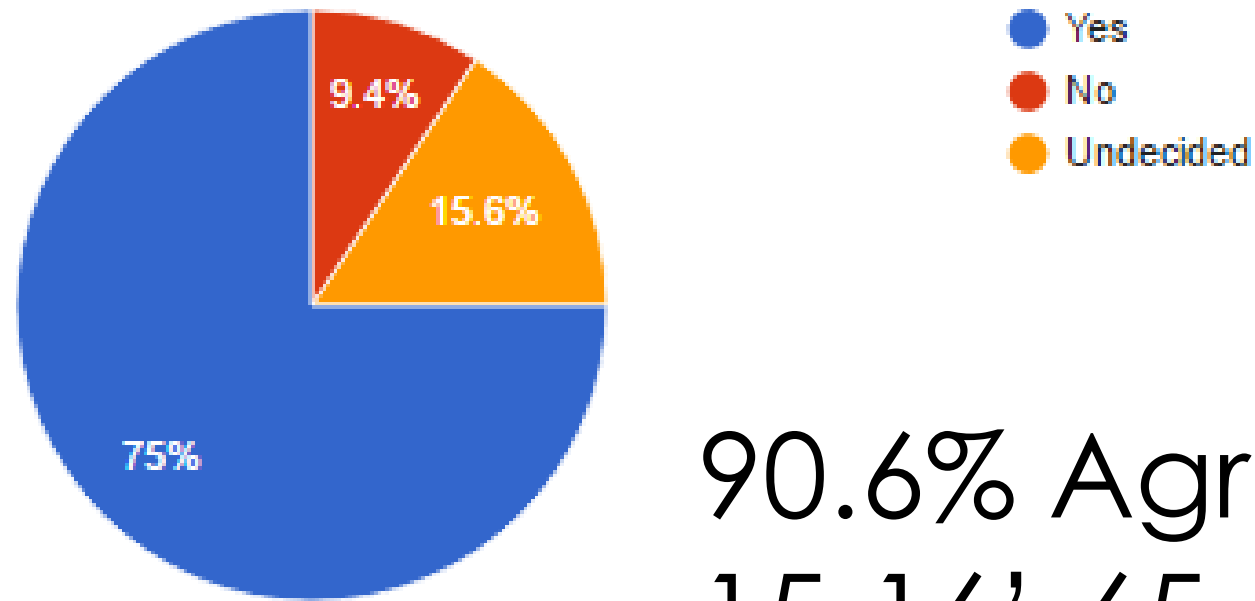
(32 responses)



78.2% Agree

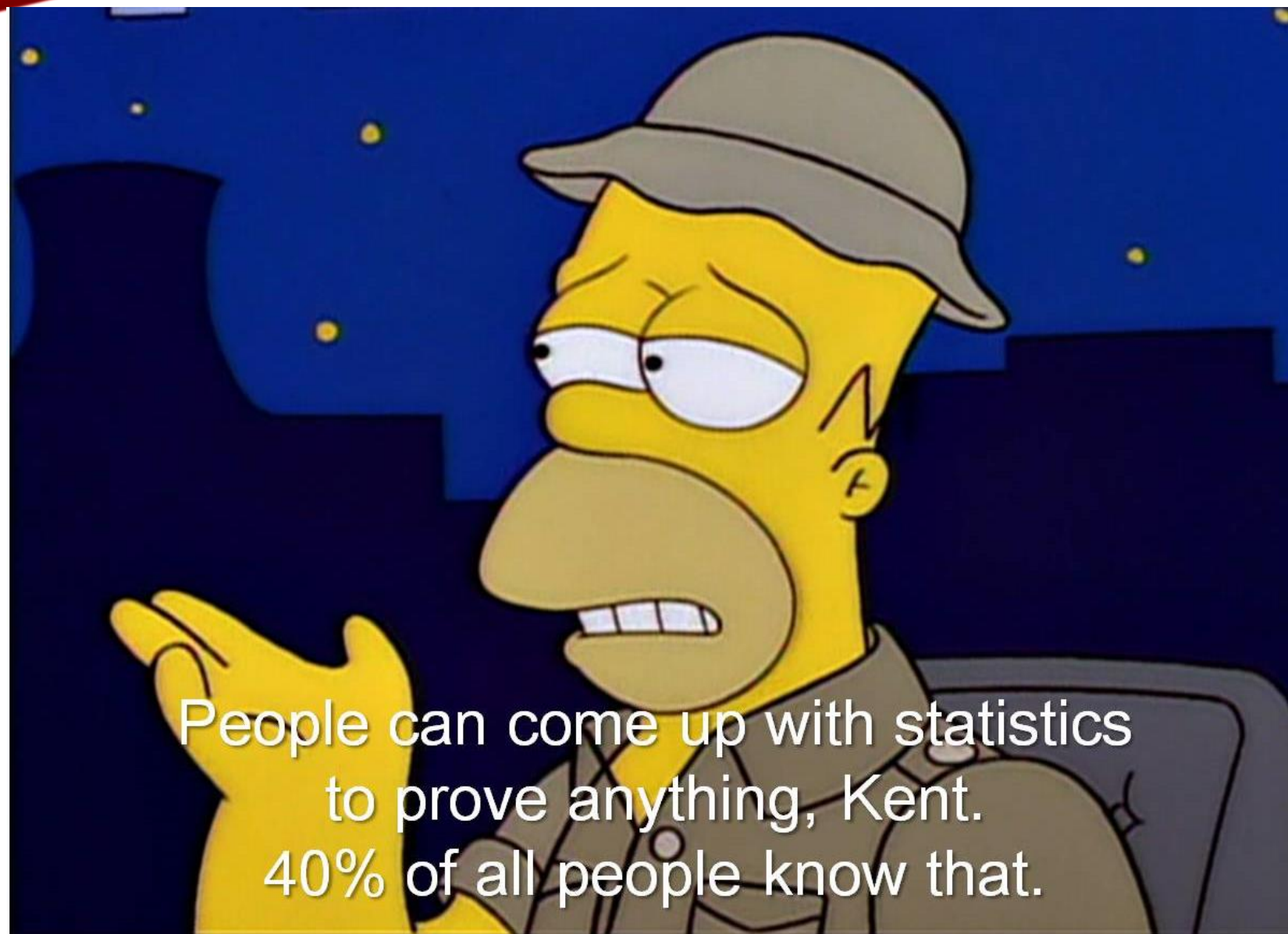
STUDENT SURVEY DATA

Overall, did you find the flipped classroom to be a good experience?
(32 responses)



90.6% Agree

15-16'-65.4% Agree



People can come up with statistics
to prove anything, Kent.
40% of all people know that.

WHAT EFFECT DID FLIPPING
HAVE ON MY STUDENT
SUCCESS?



MY AP TEST DATA TRENDS

Year	Students Enrolled	Take Exam	% Participation	Pass- Earn 3 or higher	% Pass	Mean Score
2010-11	47	36	77%	36	100%	4.11
2011-12	24	18	75%	18	100%	4.27
2012-13	36	29	81%	27	93%	4.24
2013-14	36	30	83%	25	83%	3.63
2014-15	23	21	91%	20	95%	4.14
2015-16	25	21	84%	17	81%	3.95



QUESTIONS??

MATERIALS I USED FOR VIDEOS

- Touch laptop, digitizer pen, headset microphone, glove



- Current slides/lessons for my Interwrite Board
- Screencast-o-Matic- site license, free version too
- Graphing calculator- TI Smartview



PREPARATION FOR VIDEOS

- Took lecture notes and modified to do minimum number of examples
- Modified slides to save time during videos- graphed with calculator ahead of time, include sketches I would have created in class, etc.
- Prepped calculator work- plugged in equations ahead of time
- Printed past years notes to “check” for accuracy while completing videos
- Did a run through mentally of all slides before making the video
- Tried to stay a week ahead of students on videos
- Help from tech coach!!!!



TECHNOLOGY LOGISTICS

- Posted videos to both YouTube and Google Drive
 - Access on any device, could download on device if going somewhere w/o web
 - Minimized technical issues
- In Fargo- Daily Planner for Course Management Software (Could use Moodle, Google Classroom, SharePoint)
 - Lesson plans, links to videos, homework, notes

NEXT STEPS

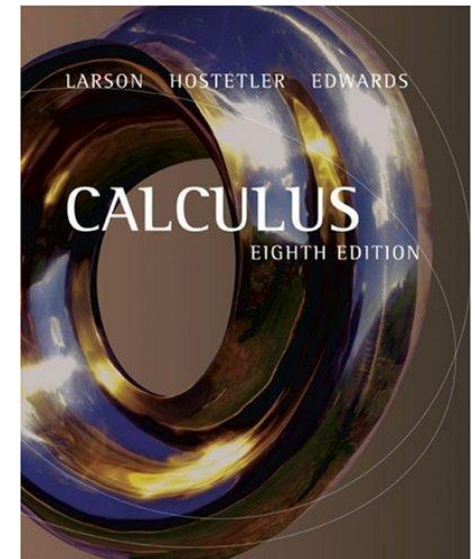
- Student Accountability
 - Create formative questions using Ed Puzzle that would monitor student views and also give students feedback on whether or not they understand
- Make next videos- focus on a standard or skill- not a section from book
 - Shorter videos
 - Not tied to textbook
 - Could be used for various courses
- Algebra 2
 - If not flip, then resource videos
- More hands-on activities during class time (Bergan say's 80% practice-20% go deeper)
- Daily formative assessment

QUESTIONS/SHARE



CONTACT ME

- Sarah Volk, Fargo North High
 - School Email: volks1@fargo.k12.nd.us
- Playlist Link:
 - <https://www.youtube.com/playlist?list=PLXx-Y3atUlGwliyzErsqMuPnXmPk-yUSB>



FLIPPING RESOURCES

- <http://flippedclassroom.org/> a PLC with groups and resources for teachers
- <http://jonbergmann.com/> Jon Bergmann is a flipping guru- newsletter and resources for educators
- <http://flippedlearning.org/>
- YOUR STUDENTS- they will tell you what they need or want!