STUDENT-FOCUSED TEACHING

How to Improve Student Performance,
Boost SRTEs, and Enjoy Teaching

[grad] First draft of SP14 schedule

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MathScheduling Group <psumathscheduling@gmail.com> 11/12/13

to faculty-all, grad, scheduling, Becky

Colleagues,

Attached please find the first draft of the Spring 2014 schedule. Please read over these attachments carefully and reply to this note if there are any discrepancies.

Also, if you wish to switch sections in a course, please contact the instructor of another section of the course and agree upon the switch yourselves before replying to this note.

The Math Department Scheduling Group

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grad mailing list
grad@math.psu.edu
https://www.math.psu.edu/mailman/listinfo/grad

3 Attachments

Graduate Instruct...

Timetable by Cou...

Timetable by Inst...

People (5)

MathScheduling Group

Add to circles

Show details

There is no terror in the bang, only in the anticipation of it.

(Alfred Hitchcock)

Then you step into the classroom...

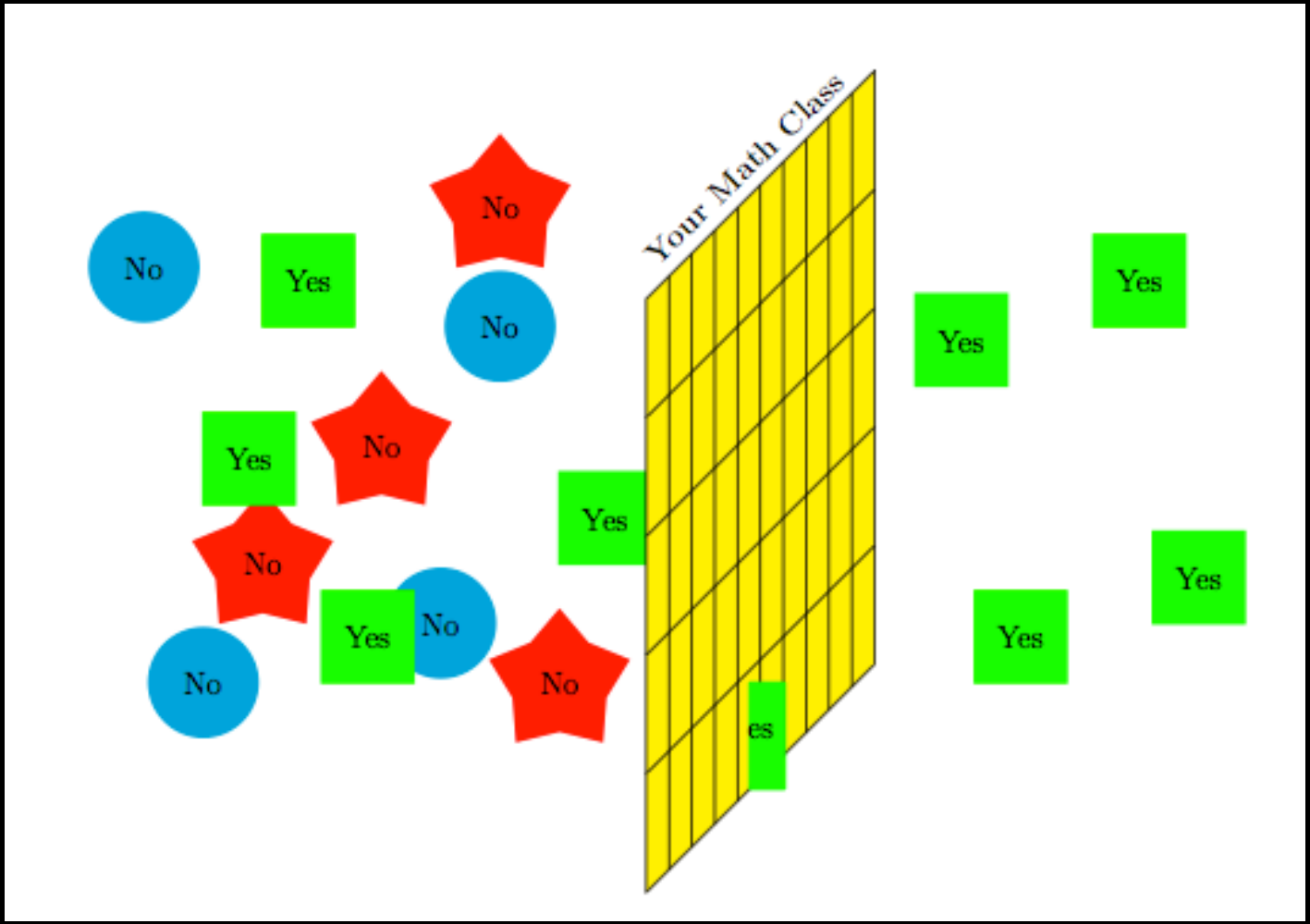
And you start to get used to it.

But at the end, you got mixed student ratings

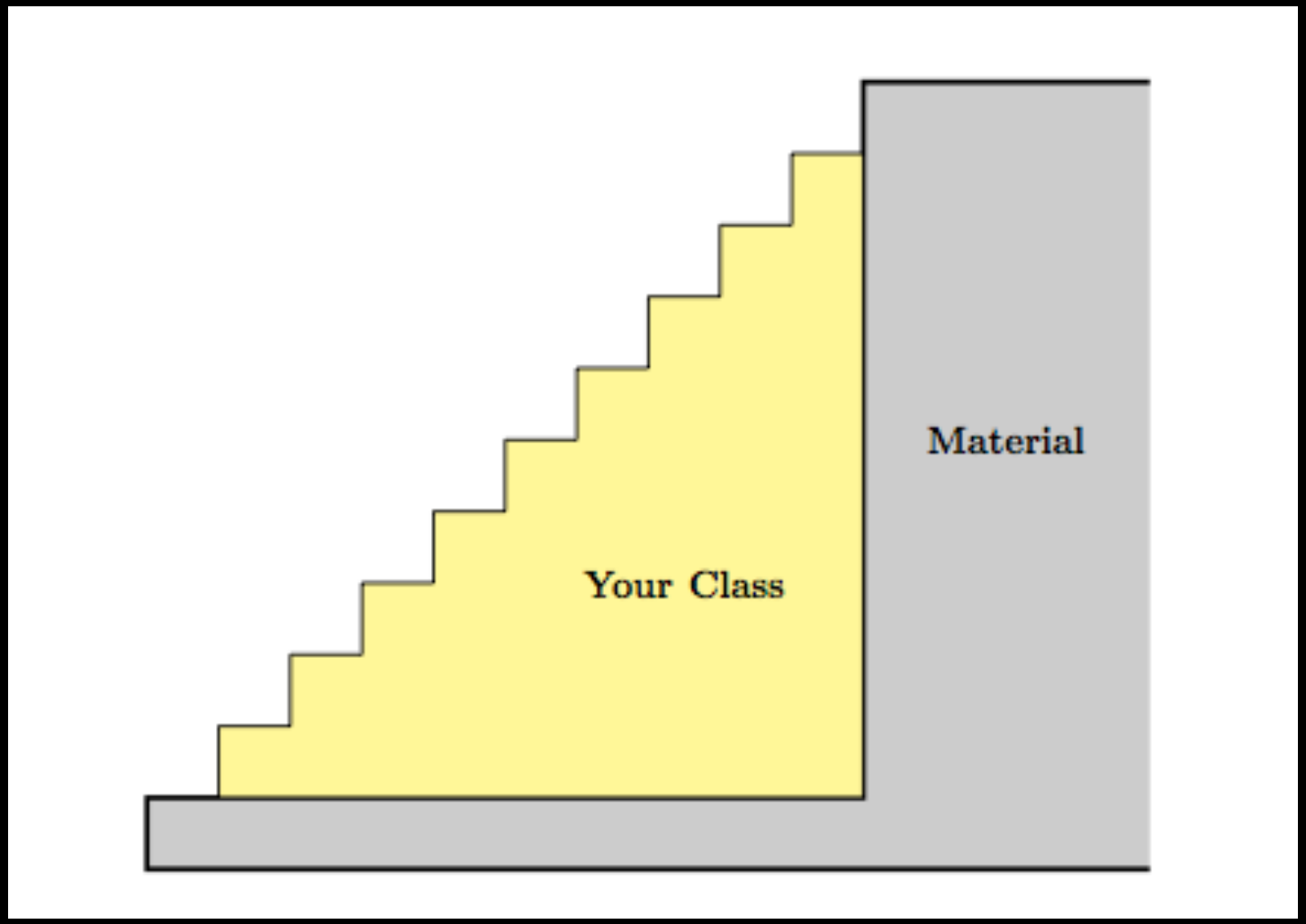
TURNING LEMONGRAB
INTO A MEME
UNACCEPTABLE!!!
quickmeme.com

Why?

Is Your Class a Filter?



Or is Your Class a Support?



What Went Wrong?

- The focus ends up on **content**:
  - Book Examples
  - Connections to Material You Know
  - Observations You Find "Interesting"

- What's wrong with focusing on content?

- ☑ Syllabus
- ☑ Homework 1
- ☑ Homework 2
- ☑ Quiz 1
- ☐ Homework 3
- ☐ Homework 4
- ☐ Exam 1

⋮

You are Teaching to Yourself

Where to Start?

Let’s start with your smartphone.

iPhone
9:41 AM
Wednesday
12
Calendar
Photos
Camera
Maps
Weather
Passbook
Reminders
Clock
Stocks
iTunes
App Store
Game Center
Mail
Safari
Music

Interesting Facts about the iPhone

- One of the best-selling smartphones in the world
- It has consistently high user satisfaction
- It's known for being Intuitive & Stylish

But it is not the phone with the *most* features.

It Could be Beat by Older Phones

iPhone 1 (2007)

- Only pictures

Nokia N70 (2005)

- Had video recording
- Front Camera
- Image Editor

The iPhone was *Designed Better*

- Most Effort Placed in Design
  - Met User Expectations
  - Built on User Knowledge (icons)

- How do they focus on what matters?

Apple Had Clear **Goals**

- Apple set out to make the iPhone with the following goals:
  - "A widescreen iPod with touch controls"
  - "A revolutionary mobile phone," and
  - "A breakthrough internet communications device."

Apple's Goals and Objectives

- A widescreen iPod with touch controls
  - iTunes software uploaded
  - iPod-style music file navigation
  - Sufficient memory for storage (4GB and 8GB)
  - Touch controls
- A revolutionary mobile phone
  - Pocket-sized, light-weight
  - Speakers, headphone jack, microphone
  - Proximity sensor and accelerometer
- A breakthrough internet communications device
  - Wifi & web browsing
  - Camera
  - Large screen and zooming

Goals and objectives
allowed Apple to prioritize.

Goals and objectives
~~allowed Apple~~
allow **you** to prioritize.

What are Goals?

- **Goals** for your students are general statements about their ability and knowledge upon passing your class.
  - Should be on your syllabus
  - long-term outcomes; difficult to measure directly

Bad and Vague Examples

- We will cover: First- and second-order equations; series solutions; Laplace transform solutions; higher order equations; Fourier series; second-order partial differential equations.
- Upon completion of this class, you will be capable of critical thinking, complexity, and communication.

Good Example

- Upon successful completion of this course, you will be able to:
  - explain the basic concepts of statistics
  - summarize numeric data by computing descriptive statistics
  - apply basic probability theory
  - understand confidence intervals
  - test hypotheses applying probability theory
  - explain the differences among various statistical techniques and identify an appropriate technique for a given set of variables and research questions

Summary: Goals

- Goals help...
  - focus your class
  - you prioritize
  - students understand what they're getting by taking this course

What are Objectives?

- An objective is…
  - a sub-goal, i.e. a lesser goal that works towards one or more class goals
  - a measurable/testable statement of a specific ability in students
  - a statement that communicates to a student what is important

OK Lesson Objectives

- Today, we will cover
  - arc length,
  - unit tangent vectors, and
  - curvature.

Good Lesson Objectives

- Checks for completion:
  - ❑ I can calculate arc length.
  - ❑ I can find the unit tangent vector.
  - ❑ I know two different three-dimensional equations for curvature and I know one two- dimensional equation for curvature.

Summary: Objectives

- Objectives help...
  - focus your lesson plans
  - students assess their learning
  - students know when they need extra help

Remark: Definitions

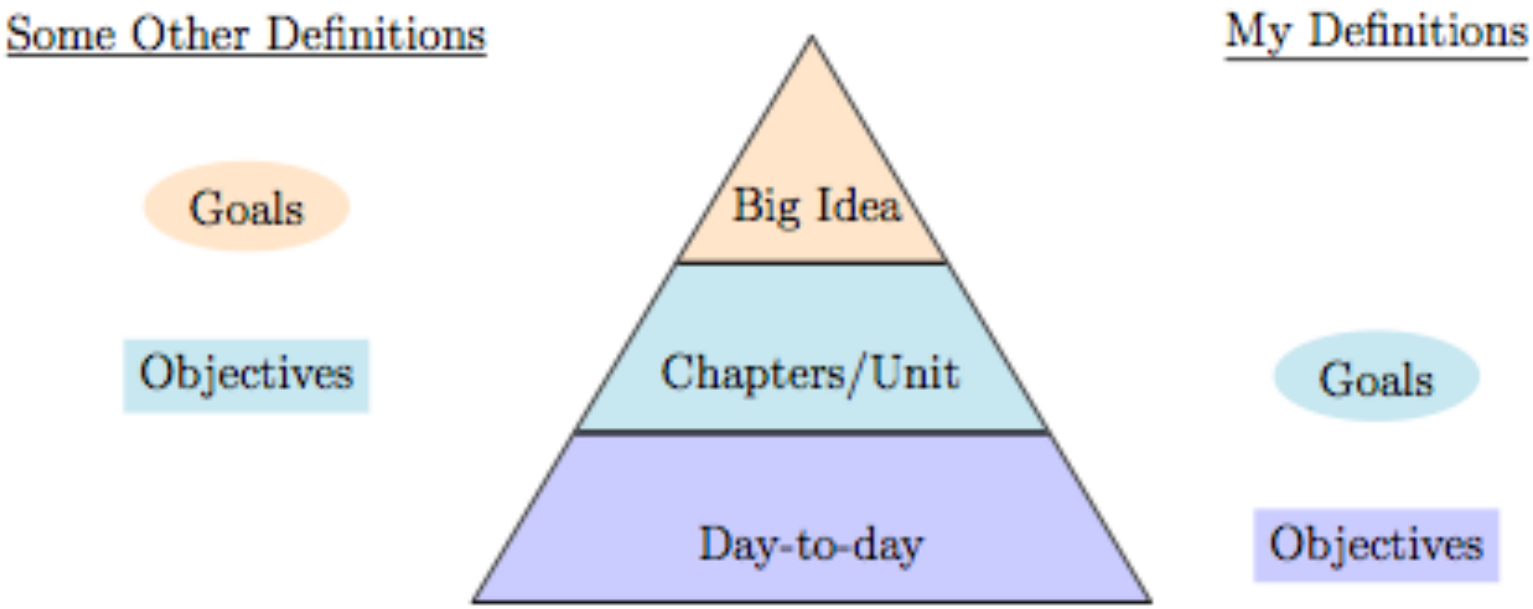
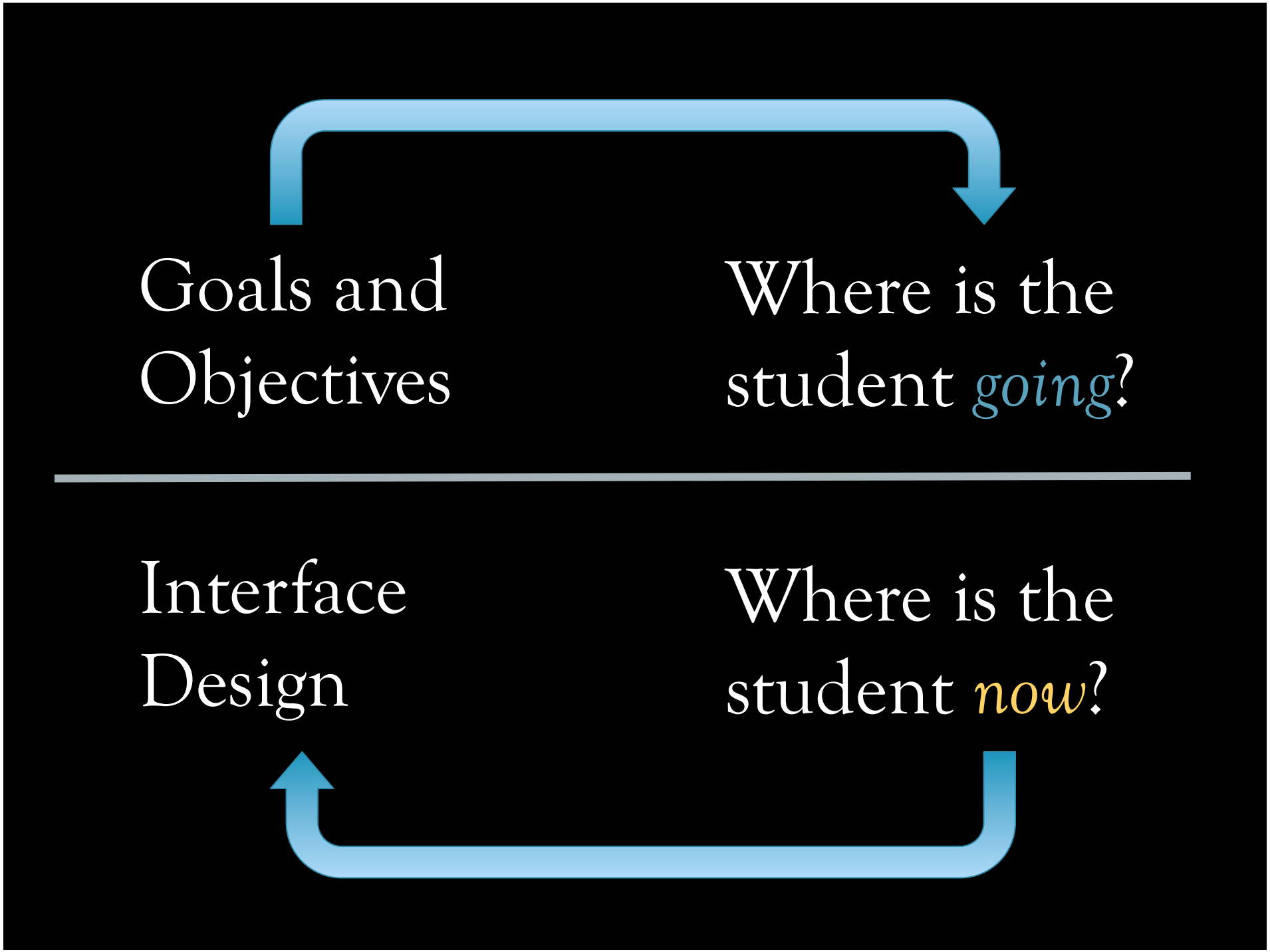


Figure 2: Differences in definitions of goals and objectives

So... Are we done?

Goals and Objectives

Where is the student *going*?


Goals and Objectives
Where is the student going?
Interface Design
Where is the student now?

User Interface Design (UID) Basics

- Designers seek to answer **three** questions about their users:
  - **What does a user** *expect* from this product**?**
  - **What does a user** *know* going in**?**
  - **How will the product fit into the user's** *normal workflow and daily activities***?**

Student Interface Design (SID) Basics

- Teachers seek to answer **three** questions about their students:
  - **What does a student** *expect* from this course**?**
  - **What does a student** *know* going in**?**
  - **How will the course fit into the student's** *normal workflow and daily activities***?**
    - **What motivates the student to work on your class?**
    - **What distracts your student from your class?**

Expectations are premeditated resentments.

- Alcoholics Anonymous

Student Expectations

- They expect the class to be relevant to their major
  - Know their majors
  - Say *something* about applications
    - "You'll see this when ..."
    - "You'll use this a lot if ..."
- They will rarely value (formal) proofs; many will see it as a waste of their time.
  - Indicate where proofs can be found instead of deriving
  - If derivation is necessary, explain why.

Student Expectations

- Younger and non-STEM students expect the required work to be sufficient for success.
  - If that is not true, be explicit.
    - List recommended reading
      - Don't just say Chapter X.
      - List chunks than can be skipped.
      - Highlight something to read carefully.
    - List recommended problems (test their ability)
      - Solutions? Feedback? Help?

KNOWLEDGE IS POWER...
THE POWER TO MAKE OTHER PEOPLE FEEL STUPID.
www.UShumor.com

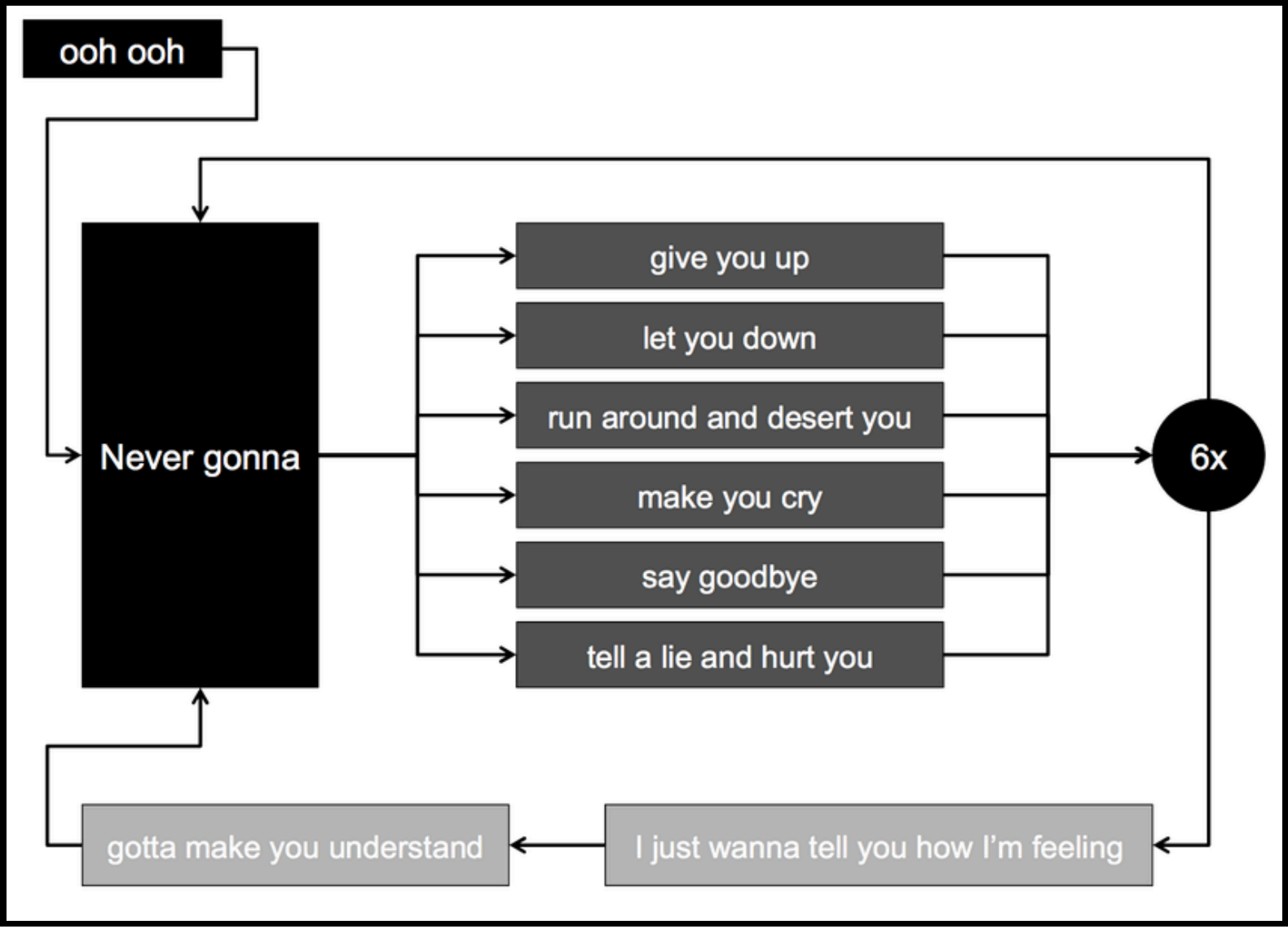
Student Knowledge

- Students will meet, exceed, or fail to satisfy the prerequisites.
  - For those who **don't satisfy** prerequisites:
    1) Do a review
    2) Do a homework or quiz on review
    3) Intervene early; meet and discuss what they need to do. Be specific.
  - For those who **exceed** prerequisites:
    - Create a culture that values a challenge
    - Provide optional work to impress.

Student Knowledge

- Stimulate their brain with **things they already know**.
  - Cultural references
  - News
    - Avoid any negative **value judgments** of any people.
    - Keep comments broad
      - "That's really tragic." Or "That's interesting, what did you think?"
  - Jokes
    - Jokes should be **self-directed**.

Student Workflow



Student Workflow

- How does the work from your class fit into their daily schedules?
  - What is your vision of workflow?
  - Is there another way students could approach your class?
  - How do you work around that discrepancy?
    - Student motivation
    - Competing student obligations

Student Workflow

- What you envision:

Monday	Tuesday	Wednesday	Thursday	Friday (Hw 12.1-3 Due)	Weekend
Lecture	Read 12.3	Lecture	Read 12.4	Lecture	Read 12.5
Exercises 12.2		Exercises 12.3		Exercises 12.4	

- What probably happens:

Monday	Tuesday	Wednesday	Thursday	Friday (Hw 12.1-3 Due)	Weekend
Lecture		Lecture	**FREAK OUT!**	Lecture	

Student Motivation

- What motivates students to think about your class?
  - Appreciation of their work
    - Know names and acknowledge ideas
      - "Let's try Joe's suggestion…"
  - Gratification of completing tasks
    - Make tasks easier to achieve—smaller, frequent assignments is better than longer, infrequent
  - Helping others
    - Thank students for making corrections
    - Encourage group work

Student Motivation

- What motivates students to try? (cont.)
  - Positive reinforcement of abilities
    - Highlight strengths in feedback
      - "Clever idea!"
    - Do not let students say, "I'm not a math person."
  - Perception of progress
    - Highlight progress in written feedback or privately in person. And be sincere!
      - "Great improvement! I'm so proud of you."

Competing Student Obligations

- Motivation may not be enough if your class is low priority.
  - Your class is low-priority if:
    - General education requirement (many 0-level)
    - 2.0 credits class
  - Solution: Make more things required
    - Frequent Quizzes
    - More but smaller homework assignments

Other Tips

- Use color to help your audience sort through information
- Include "mini breaks" every 5-10 minutes.
  - Pause
  - Joke/Conversation
- Present information in multiple ways
  - Verbal (say everything important)
  - Written (write everything important)
  - Experiential (make it part of the homework)

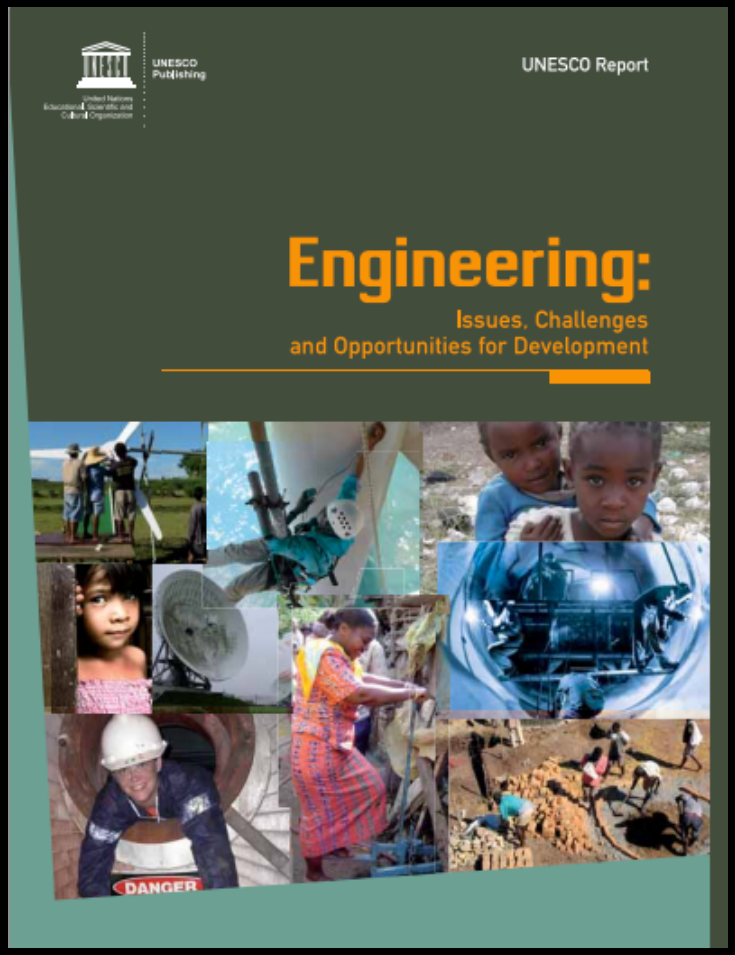
Other Tips

- Pace yourself with the audience
  - "Ok, what is the next step." (Don't be afraid to wait!)
- Express that you care about their education
  - "I really want you to get this because its important."
- Improve your ability to read people
  - Read more novels/literature.
  - Learn about other cultures and histories.

Last Tip: Learn!

- How to Learn Math MOOC
  - By Jo Boaler, Stanford
- How Learning Works
  - By Susan A. Ambrose, Michael W. Bridges, Michele DiPietro, Marsha C. Lovett, Marie K. Norman
- Mindset
  - By Carol Dweck, Stanford
- The Power of Habit
  - Charles Duhigg, NY Times
- Presentation Zen
  - Garr Reynolds

What You Do Matters



Thank you!