Networked Interactions for Class Engagement (NICE) with PRS
University of Southern California

…but first, one last homage to:

The Large Lecture
Networked Interactions & Classroom Engagement with PRS “Clickers” (NICE PRS)

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*From the organization formerly known as:*

The Center for Scholarly Technology
University of Southern California (USC)
What are your expectations for this session?

A. I want 20 new ideas
B. I want to be able to transform large lectures at my institution
C. I want to be entertained
D. I want to learn the technology behind this stuff
E. I want to learn what impact this has on student learning
F. I want to learn what impact this has on faculty and their teaching strategies
G. I want a new assessment mechanism

First Question for PRS response

0% 0 of 50

10
What is the primary value to faculty in using Concept Questions with PRS responses?

A. Entertain students with nifty technology
B. Increase student attendance
C. Recognize their own tacit knowledge
D. Bruise their ego
E. Discover student preconceptions

Second Question for PRS response
5 Parts of Today’s Session

- You Participate:
  1. A quick PRS experience

- Short Presentation then You Engage in a Demonstration:
  2. Pedagogical Methods of NICE

- Short Presentation & Discussion:
  3. Implementation & Technology of NICE PRS

- An intellectual activity:
  4. NICE in the “How People Learn” Framework

- Another short Presentation & Discussion:
  5. Analyzing Learning Outcomes & Implementation
Part 2: Pedagogical Methods of NICE

Short Presentation then You Engage in a Demonstration
Pedagogical Methods of NICE

- Concept Questions (CQ) with PRS responses
- Peer Instruction
- Just-in-Time Teaching
- Learning Journals

Four Methods within NICE initiative
USC’s NICE initiative is...

Concept Questions (CQ) with PRS responses

- Instructor projects multiple-choice question focused on a core concept
- Students commit to and “vote” on an answer anonymously with PRS clicker
- Histogram displays distribution of all answers voted on by students
- Instructor may ask for a 2nd vote revealing changes in students responses and thinking

Peer Instruction

Just-in-Time Teaching

Learning Journals
USC’s NICE initiative is...

Concept Questions (CQ) with PRS responses

Peer Instruction

Just-in-Time Teaching

Learning Journals

➢ Around Concept Questions, students discuss their responses, thus:
  ➢ Sharpening vocabulary on the topic
  ➢ Clarifying their own thinking
  ➢ Illuminating gaps & contradictions
  ➢ Dislodging misunderstandings easier
  ➢ Analyzing incorrect reasoning
  ➢ Recognizing correct reasoning
USC’s NICE initiative is...

- Concept Questions (CQ) with PRS responses
- Peer Instruction
- Just-in-Time Teaching
- Learning Journals

- Instructor poses “warm-up” questions online for students to respond to before class
- Right before class, instructor quickly reviews collection of student responses
- Instructor prepares upcoming class meeting around students’ responses (conceptions, misconceptions, difficulties)
- Students and instructor engage in ongoing feedback loop to track learning
USC’s NICE initiative is...

- Students track their own reflections about their assignments and their own learning.
- Students document their learning progress over time.
- Instructors are more fruitful in guiding and advising students.
- Instructors see whether students are learning what they intended them to learn.

Concept Questions (CQ) with PRS responses

Peer Instruction

Just-in-Time Teaching

Learning Journals
Concept Questions (CQ) with PRS responses

Peer Instruction

Just-in-Time Teaching

Learning Journals

USC’s NICE initiative is...

... are the focus of today’s session.

sometimes *incompletely* referred to as “PRS” (simply the technology) or “Peer Instruction” (coined by Eric Mazur.)
Typical NICE PRS Sequence

Instructor poses multiple-choice question

Students vote on the possible answer

Teachers and students review distribution of votes

Students discuss their responses

Teachers and students review distribution of votes

Students vote again
Instructor poses multiple-choice question

Students vote on the possible answer

The vast majority got the answer correct

Teacher gives brief explanation of the correct answer
If Most Get it Wrong First Time

Teacher poses multiple-choice question

Students vote on the possible answer

Majority have an incorrect solution

Teachers and students review distribution of votes

Students vote again

Teacher gives an extended explanation of the concept
Which of the following requires adaptive expertise?

A. Taking an X-ray of a right index finger
B. Reinventing undergrad education for the 21st century
C. Designing a Likert-scale public opinion survey
D. Reciting the times tables up to 150
E. Early identification of grandma's Alzheimer’s Disease
F. Differentiating a logarithmic expression
G. Inventing an entirely new mode of transportation
Part 3:
Implementation of NICE PRS at USC

Short Presentation and Discussion
The Seven C’s of NICE

- Community - Support and Guidance of Practitioners
- Classroom - PRS enabled auditoria and rooms
- Computer - Laptop with Powerpoint & TurningPoint
- Clickers - Purchasing, Distribution, and Publisher Deals
- Concept Questions - Heart of a NICE courses
- Curriculum - Specific strategies for NICE courses
- Continuous Analysis - An active feedback loop
1. Community

- Instructors new to the NICE methods can learn from the experiences of other faculty.
- Instructors build informal collaborative partnerships toward a shared goal.
- Instructors and staff build relations that help support the goals of both.
- NICE CoPs meet face-to-face on the 3rd Friday of each month.
- CoP participants influence further developments in ways of facility planning, academic and technical support, and more.
2. Classroom

Options for Classroom Access

- Use an Existing PRS-Enabled Classroom
- Request Your Class be Moved to an Existing PRS-Enabled Classroom
- Request Funding of a New PRS-Enabled Classroom
- Use a Cart to Bring PRS to Your Current Classroom (for smaller classes)
- For short-term/trial use, reserve one of two special PRS-enabled classrooms
The Seven C’s of NICE

3. Computer

Preferred Platform:

- Windows PC
- PowerPoint
- TurningPoint PRS Software (free from publishers and/or Learning Center)

Alternate Platform:

- MAC OSX
- Interwrite PRS software (free from Interwrite hardware vendor = GTCOCalcomp)
4. Clickers

Modes of Clicker Distribution:

- Students purchase from USC Bookstore and are responsible for own clicker
- Departments purchase, manage, and distribute and retrieve at class time

Considerations for Students Purchasing and Managing Own Clickers

- Faculty must contact USC Bookstore to take secure clickers for students
- Basic retail cost of a clicker is deemed comparatively low
- In cases supported by publishers, student receive significant discount (contact Bookstore for details)
- Students may use clicker for multiple courses yielding greater value
- Students may re-sell clickers and recoup cost
5. Concept Questions

- Question design replaces lecture note preparation
- Good question criteria is different from exam, quiz, or homework questions.
- Avoid computational or simple factual questions that probe memory over understanding
- Comparison, prediction, and causal relationship questions get students to reason qualitatively and to draw conclusions from a conceptual model.
- Ambiguity is useful to highlight key variables and meaningful subtleties.
- Broadly spread histograms of responses are catalysts for hearty peer discussions.
- Sequences of related questions in different contexts develop a complex idea
- Extra information in questions help students determine what information is necessary.
- Preconceptions are illuminated by questions posed before topic is presented
- Be aware of students’ cognitive load or overload with many short but meaty questions.
The Seven C’s of NICE

6. Curriculum

- Not all material that students are “responsible” for should be explicitly addressed in class.
- Class time is best used to build solid understanding of core concepts.
- Pre- and post-class readings and homework can address the rest.
- Exams & other performance metrics should support the concept and reasoning centered focus.
- “Multi-pass learning” where an idea is developed through multiple visitations in varying contexts spread over time.
- Emphasize to students that Concept Questions are for learning, not evaluation.
- Emphasize that confusion is inevitable to learning. They should not expect to fully understand concepts on first pass.
- Focus on the reasoning behind an answer rather than their correctness.
- Respond to the full spectrum of answers before indicating which one is correct.
- Downplay notion of “incorrect” by emphasizing conditions in which each answer is correct.
7. Continuous Analysis

- Response data from each question or each class session can be captured from TurningPoint.
- “Multi-pass learning” enables an analysis of the progress students make in understanding a core concept.
- Analysis of student understanding around specific teaching practices can help inform future teaching strategies.
Part 4: NICE in the “How People Learn” Framework

An Intellectual Activity
The “HPL” Framework
The Four “Centerednesses”

- **Learner**
  Connection of the strengths, interests, and preconceptions of learners.

- **Knowledge**
  What students should know and be able to do when they finish with the materials or course. This requires that students are provided with the foundational knowledge, skills, and attitudes needed for successful transfer.

- **Assessment**
  Multiple opportunities to make students' thinking visible so they can receive feedback and be given chances to revise and to learn about their own learning.

- **Community**
  Students in an environment where they feel safe to ask questions, learn to use technology to access resources and work collaboratively, and receive help to develop lifelong learning skills.
Outcomes of CQ with PRS and Peer Instruction

- Class Discussion
- Articulation of Reasoning
- Anonymous Feedback
- Knowledge of Class Positions
- Awareness of Others with Same Difficulties
- Personal Privacy
- Lack of Embarrassment
- Peer Interaction
- Non-Confrontational Competition
- Cheering & Enthusiasm
- On Same Side as Instructor
- Pride in Class Achievement
- Pride in Class Participation
### Classroom Processes of NICE PRS

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Part 5:
Analyzing Learning Outcomes & Implementation

Another Short Presentation and Discussion
Key Factors in Student Learning

- Prior Knowledge & Naïve Concepts Mediate Learning
- Learning is Constructive – not Receptive
- New Knowledge Built from Existing Knowledge
- Metacognition: Thinking about what you Think

Learning & Participation shaped by:
- Interest
- Identity
- Feelings
- Motivation
- Attitudes
Research on NICE PRS

- **Similar outcomes from a variety of practitioner-researchers**
  - Increased participation in class
  - Increased motivation and interest
  - Improved conceptual understanding
  - Better feedback to the instructor

- **But quality of evidence for outcomes is limited**
  - Studies do not use comparison groups
  - No common or widely accepted measures used for outcomes
  - Little understanding of how results might vary by characteristics of individual learners

- **And there is little implementation research to tell us which instructional strategies are most effective**
Potential Research Questions

- Student response to particular strategies?
- Trajectory of faculty and student adoption?
- Support needs?
- Student motivation and participation?
- Student & Instructor satisfaction?
- Variance in implementation and strategies?
- Impact on overall learning and achievement?
- Effects on Instructor Collaboration around teaching?
- Effects of Continuous Evidence of Teaching Effectiveness?
- Impact on Instructor Confidence as “Teacher”
- Impact of Frequent Data on Instructors’ Reflection Habits?
- Influences on Institutional Changes in Faculty Roles & Incentives?

... And at your institution, what would you want to know and why???