

## Educational Research and Evidence-based Education



...one path in a maze of opportunity



Michael A. Posner, Ph.D., PStat  
Associate Professor of Statistics  
Villanova University

## ONE PATH...

- ❖ Entering the maze
- ❖ The path I have chosen
  - ❖ PARLO (A Paradigm of Formative Assessment)
  - ❖ Statistics Education Research
- ❖ Reflections on this path

## Entering the Maze

- Early passion for being an educator
- My “stabilizer” during my Ph.D. program
- Employed at a “Comprehensive University”
- Formative Assessment Seminar (William/Donnay) and Young Women’s Leadership Charter School
  - Educator -> Try out the system, buy into it...or not
  - Educational Researcher -> Evaluate the system
- My kids were born, life changed  
...and so did my research focus
- Which leads me to the path I have chosen...



## Motivational Questions...

- How do we assess what students know?
  - Lecture...“Any questions?”...2 nods (front row)....move on
  - Exams (handout)
- Which student deserves a higher grade?
 

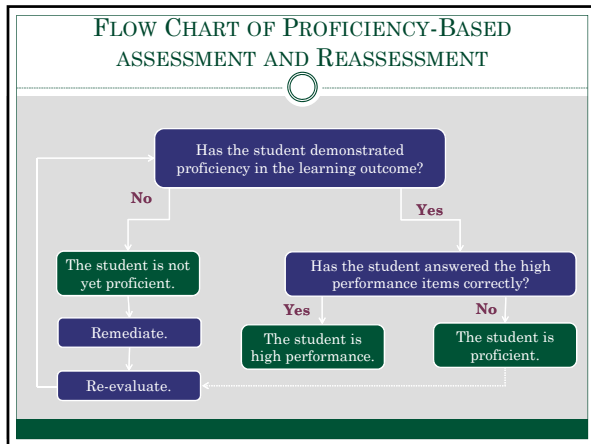
Exam 1	Exam 2	Exam 3	Project	Final
80	84	82	C+	70
54	70	86	C+	88
70	76	74	A-	74
- Why do we evaluate students this way?
  - Answer: Makes evaluation easier and it’s defensible

## THE PARLO ASSESSMENT PARADIGM


- ❖ Well-defined **Learning Outcomes** ensure that students, teachers, and parents/guardians understand the scope and specific goals of each course.
- ❖ **Proficiency-based Assessment** clearly communicates students’ skills and knowledge to future teachers, universities, and employers.
- ❖ **Reassessment** transforms the classroom to a student-centered learning environment that encourages students to remediate and master material they did not understand when it was first taught.
- ❖ Also referred to as Standards-based Assessment, Outcomes-based Assessment, and Mastery Learning

## Theory Behind PARLO

- **Formative Assessment**
  - Assessment FOR Learning
  - William & Black: “all activities that teachers and students undertake to get information that can be used diagnostically to alter teaching and learning
- **Teaching/Learning through Feedback vs. Grades**
- **There is no math gene**
  - Gauss: “It is not knowledge, but the act of learning, not possession but the act of getting there”
- **Accumulating knowledge/skills rather than points**



### Evidence-based Education




“Far too few districts are ... using **data** to track how much progress a student is making and where that student is struggling. That’s a resource that can help us improve student achievement!”

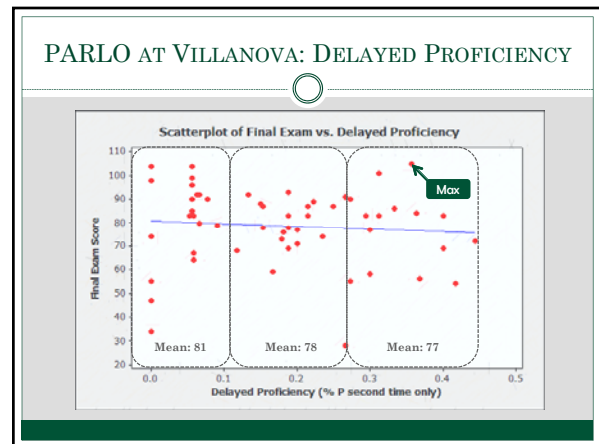
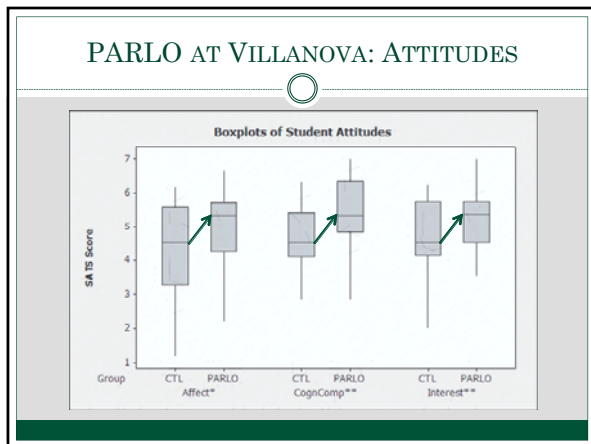
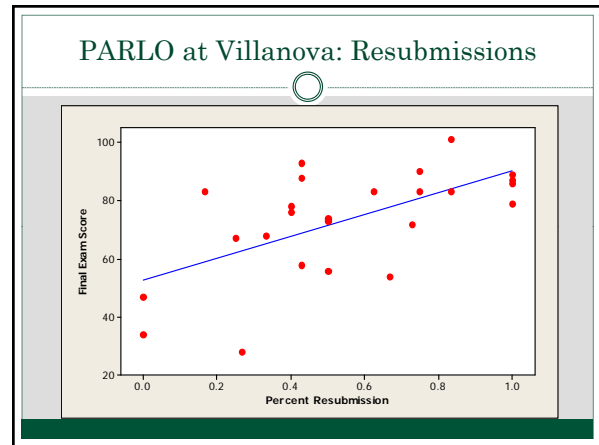
-- President Barack Obama, March 9, 2009

“I am a deep believer in the power of **data** to drive our decisions. **Data** gives us the roadmap to reform. It tells us where we are, where we need to go, and who is most at risk.”

--- Arne Duncan, 4th Annual IES Research Conference, June 8, 2009



- ### PARLO Evidence
- ❖ PARLO-like systems currently used in many districts nationally
  - ❖ Young Women’s Leadership Charter School (Chicago)
    - ❖ Highest grad rate of non-selective public schools
    - ❖ >95% of graduates admitted to college
    - ❖ >85% of initial cohort still in college in 2005-06
  - ❖ Quakertown Community School District
    - ❖ Lead to increased performance on standardized tests
  - ❖ Villanova University - intro statistics for non-majors
    - ❖ Students who resubmitted more did better on final exam
    - ❖ Students demonstrating proficiency the second time performed equally well on final exam
    - ❖ PARLO class showed better attitudes towards statistics





## Challenges in Implementing PARLO

- Requires teacher buy-in & engagement
- Requires many teachers to adopt new instructional and assessment strategies
- Challenges some teachers' beliefs about how to teach mathematics
- Challenges some teachers' beliefs about how students learn mathematics

## Successful Implementation of PARLO

### *Preliminary findings*

- ❖ Philosophical & pedagogical match between PARLO theory & teachers' beliefs about teaching and learning
- ❖ Teacher shifts much of the work to students
- ❖ The 'learning contract' is understood (teachers and students understand their responsibilities in the classroom)
- ❖ Effective use of Tracker
- ❖ Teacher Support – PLCs, colleagues, on-site support
- ❖ Administrators support and understand PARLO

## Changes in Teachers' Instructional & Assessment Practices

- *This is a grading policy that I have been waiting for all my career, I just didn't know I was waiting for it.*
- **I feel like a brand new teacher again because I am looking at different ways to reach the different kids.**
- *I have a student who was at the lower end of the interquartile range. She now has one of the highest grades in the class because of this. She's really been on top of it.*
- **Formative assessment helps me catch little errors along the way...I can respond with detailed notes on these little slips of paper...I want to check their learning right now. Students can also write notes on their exit slips, 'I don't understand.' 'Can I come in tomorrow for help?' And it's a good way to touch every single kid on the way out the door.**

## Administrators' Perspectives on PARLO

- *As the Supervisor of Secondary Curriculum at [King] School District, I attended the PLC yesterday to talk with our teachers & see how they are doing. I left on a high! Our 4 teachers are so excited about PARLO. They said their students have shifted away from the accumulation of points to wanting to be highly proficient in a skill area. That is a huge jump for our students to take.*
- *As a believer in performance-based assessment & a practitioner in this over 20 years ago when I taught vo-tech ed, I have firsthand experience on the benefits of this type of assessment. I am so pleased that our teachers are a part of this pilot program. It can truly change student attitudes towards learning.*

## My Personal Outcomes

- Impacting the world outside of my classroom
- Meeting others who share my passion
- Learning from educational researchers
- 2010 Villanova University Faculty Award for Innovative Teaching

## Other Educational Research

- CAUSEmos Research Cluster
  - Understanding Prerequisite Knowledge for Sampling Distributions
  - Statistics is FUNdamental
- Attitudes and Motivation (SATS used in PARLO)
  - Instructor characteristics that impact student attitudes
  - The impact of the first day of class on student attitudes
  - How attitudes are related to content mastery
  - The relation of attitudes and content mastery to long-term retention
- Leveraging the Power of Choice in the Classroom
- Propensity Score Analysis in Educational Research

### Reflections on This Path

- Data provide stronger evidence of effectiveness
  - A good practitioner (in any field) stays current on research
- (Almost) all large-scale studies started as small-scale studies
- Recognize that your students don't learn the same way that you did
- Create opportunities, foster collaborations, do what you love doing
- The maze of life doesn't have one ending - embrace the external forces that impact your career

### Confucius says...

If your plan is for **one year**,  
**plant rice.**

If your plan is for **ten years**,  
**plant trees.**

If your plan is for **one hundred years**,  
**educate children.**