

Peer Instruction experiences in culturally varying pedagogic environments

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Peer Instruction / Flipped Class

- Peer Instruction is an interactive teaching method developed by Harvard physics professor Eric Mazur in the 1990s.
- Peer Instruction is a **student centered** method where the students learn and teach each other under expert (teacher) supervision and direction
- The method mandates **preparation** on behalf of both the students and the teacher **before class is to meet**

In fact most new material must be read by the students in advance of the class meeting!

Some of the tools typically encountered in the Peer Instruction Methodology

- Different perspective on how material is to be taught
- Clickers & other Just In Time monitoring devices
- Interactive web content
- Relevant reading material - for Peer Instruction methodology

Peer Instruction in Steps

- **Preclass:** The teacher assigns pages/notes to be read by students in advance of class meeting (night before)
- **Preclass:** The teacher also assigns 2 homework questions to be answered by students based on that material students read. The questions are designed in a way to both
 - a) appraise student's understanding of material they read
 - b) challenge students understanding of what they read
- **Preclass:** Each student must provide feedback through the class webpage about
 - a) what they found difficult OR
 - b) what they found interesting in what they read

Pre-class (JiTT) Just in Time Teaching

Home Assignment

Reading Assignment

which involves information transfer. Can be reading, listening, movie, etc...

Online Assignment

2 conceptual questions

These questions are given to students in relation to material read

1 feedback question

Write what was more difficult about reading OR
What was most interesting

Students

Review feedback

To find common difficulties that students may have

+

Design Questions

To be given during the next lecture

Teacher

During-class

Visit those who work alone or on their laptops.
Participate in group discussions

Quick Summary of difficult topics

Based on feedback students left: actually post the exact text student wrote

Start Concept Testing

On these questions students had difficulties with

If >70% understood then move to the next topic

If between 30% and 70% then let students talk to each other and poll again

If <30% understood then questions are too hard

Follow up question

Which will make students think again about their choices

Idea: do a problem on the board and let students pick which of the 5-6 steps were wrong

Change questions

Change learning level of questions

Pedagogic Advantages of PI Method

- **Asynchronous learning**
Teacher interacts with students outside the classroom
- **Positive feedback for the students**
They see their very own question displayed in whole class
Students see that their comments are important!
- **Student active participation**
before and during class in small discussion groups
- **Employs the JiTT method** with a web-based study assignment and interactive learner classroom:
the instructor monitors “Just in Time” the pre-class homework submissions in order to adjust the impending class direction and plan of work

Past Experience in USA with Peer Instruction

Small Classes (30) – ODEs & Calculus

- Students are familiar with clickers but not Peer Instruction
- In the vast majority students welcome the different teaching style
- USA teaching structure is well suited for Peer Instruction
- Experience is based on only limited application of method (not for the full duration of the semester)

How PI was implemented at LTH

- Use of clickers OR
Create web-based voting system (accessible via mobile)



What are clickers / How they are used



- Clickers which can communicate wirelessly and in real time information from the students to the teacher



- Used in conjunction with Just in Time Teaching (JiTT) to provide immediate feedback

Benefits of Clickers



- Increase class participation and improve attendance
- Spark debate and discussion in class
- Provide easy grade opportunities
- Instructors can use clickers as a tool to gauge students' understanding
- Act as a quiz/exam delivery system

How PI was implemented at LTH

- Use of clickers OR
Create web-based voting system (accessible via mobile)



- Create class webpage to inform and interact with students
<http://ctr.maths.lu.se/matematiklth/personal/sopasak/PI/choose.htm>



- Need a properly designed textbook + lecture notes on the internet

Linear Algebra Class **Implementation** at LTH

Large (105 students) Class – Fall 2012

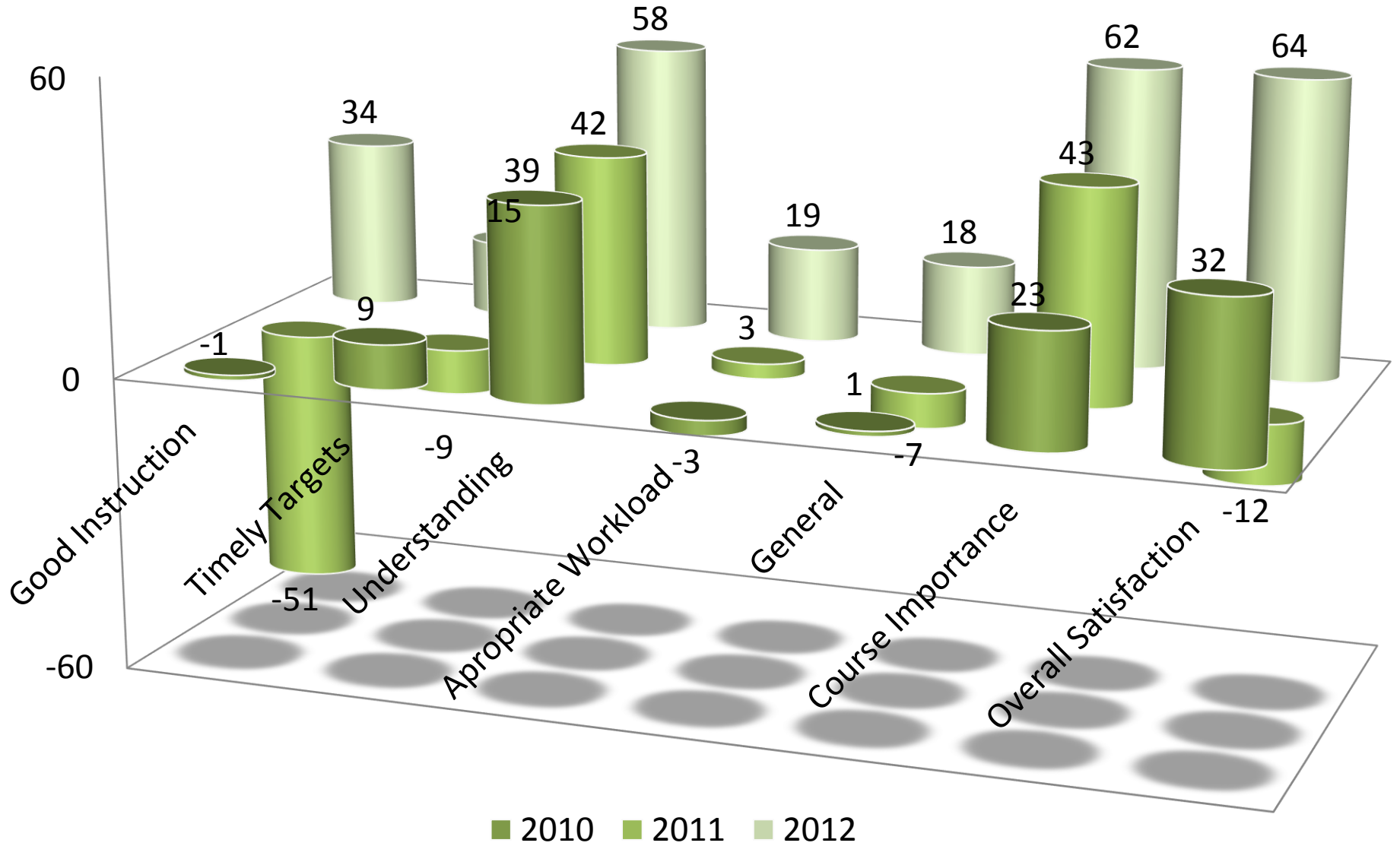
- **(Day One)** Announce and explain immediately in class the method Peer Instruction and the way it will be carried out:
Web-page, voting system, etc...
- **(Day One)** Explain the pre-class and during class procedure in great detail (in particular that the teacher will not teach)
- **(Day One)** Allow students to create “local” teams of 3-4 persons/team
- **(Day One)** Provide the first and only traditional lecture in terms of an outline of the topics and direction of the course

Linear Algebra Class **Implementation** at LTH

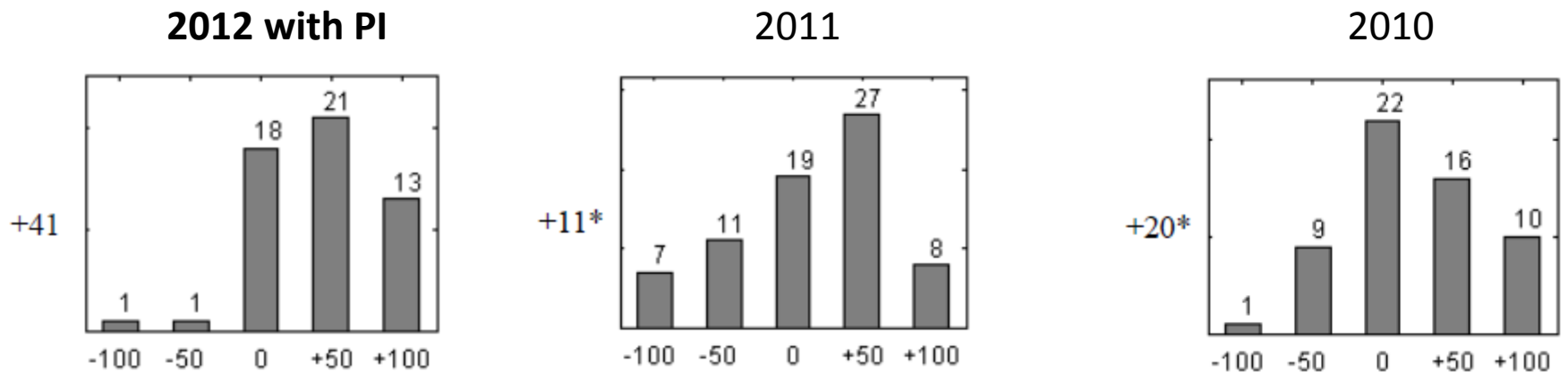
Large (105 students) Class – Fall 2012

- Students gave it a chance by trying to perform the pre-class work
- Rather quickly (within 2-3 days) approximately 10 students decided to instead attend a parallel class with the traditional teaching style not requiring any pre-class work from students (passive learning)
- As time progressed pre-class work ethics started to degrade
- This resulted (for those students) in reduced understanding and reduced participation in the discussions during class
- This prompted me to have to:
 - 1) downgrade the level of difficulty of pre-class assignments and
 - 2) at the beginning of the class provide a rather extensive and more detailed overview of the reading assignment

Statistics: PI in 2012 vs non-PI from previous years

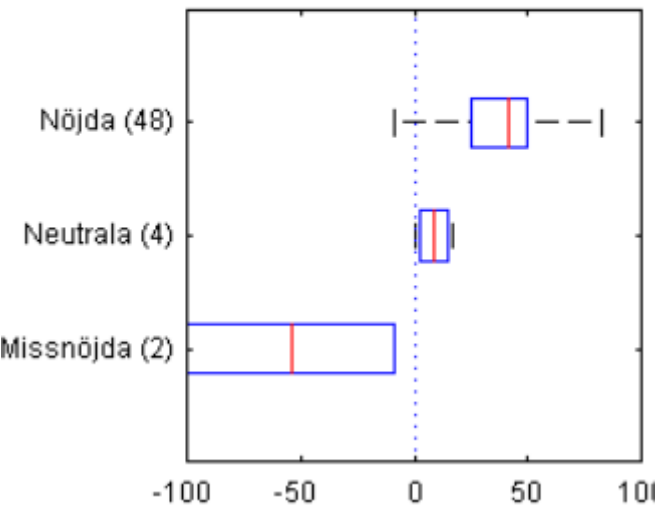


Kursen har gjort att jag känner mig säkrare på att angripa nya och obekanta problem

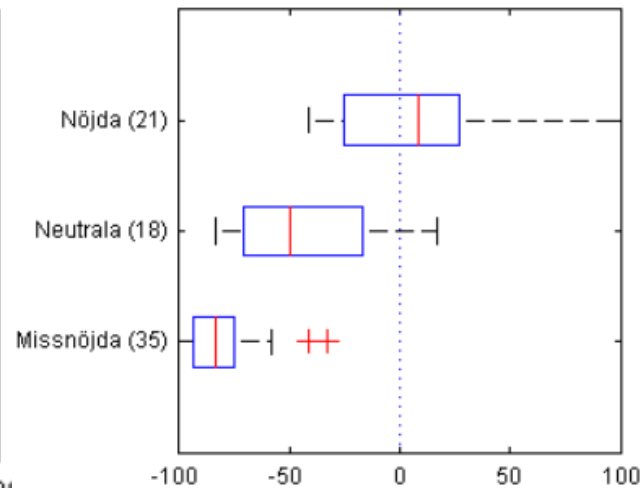


Good Instruction question

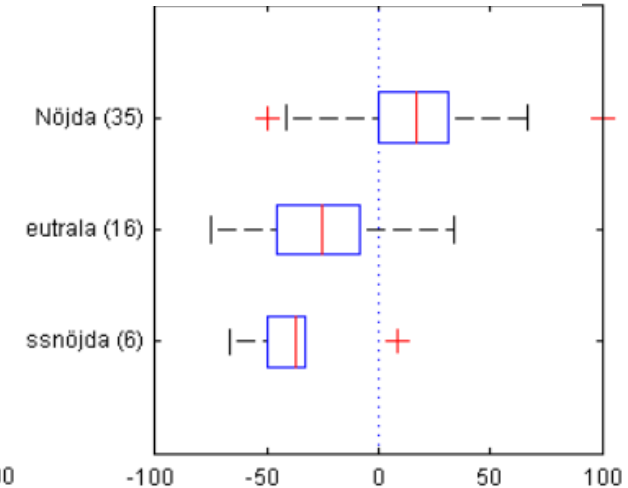
2012 with PI
(+34)



2011
(-51)



2010
(-1)



Food for thought from Students

The best part about the course

- Det nya inlärningsystemet (5)
- Nya tankesätt
- The lectures focus on understanding
- Kommunikationen mellan läraren och studenterna
- Föreläsningssanteckningarna under föreläsningen
- Ett för mig nytt sätt att räkna matte på gjorde kursen intressant.
- Bra grundtanke med annorlunda struktur på kursen men fungerade kanske inte fullt ut.
- Fantastisk pedagogik – utstuderad och strukturerad metod. Bra med de interaktiva delarna
- Riktigt motiverad och förstående föreläsare. **Han såg verkligen till att vi förstod innan han gick vidare och anpassade föreläsningarna efter hur vi ville ha dem.** Fungerade förvånansvärt bra med det nya sättet att föreläsa (kmr inte ihåg vad det hette dock)
- Det var intressant att testa ny undervisningsmetod under föreläsningarna. Jag tyckte att det fungerade bäst när vi hade halva föreläsningen med genomgång och den andra halvan var Concept questions
- Det nya inlärningsystemet. Föreläsare Alexandros Sopasakis var mycket pedagogisk, såg till att alla förstog innan han gick vidare.
- **Intressant undervisningsform. Bra att vi fick vara aktiva under föreläsningarna – då lär man sig som bäst. Men eftersom kurslitteraturen var svår att förstå så hängde man inte alltid med. Som bäst var det när vi först fick en kort genomgång/repetition av Alexandros och sedan fick tänka till själva genom att svara på frågorna.**

Satisfied, **unsatisfied**

Food for thought from Students

What should change in the course

- Kurslitteraturen. Våldigt svår att ta till sig. (10)
- En övning till i veckan. (5)
- Jag hade önskat att föreläsningarna var lite mer strukturerade. På ett sätt var det bra att vi fick tid att lösa problemen själva under föreläsningarna men när man inte förstod satt man bara av tiden. Jag tycker alltså att det hade varit bättre om han föreläste hela tiden.
- Peer Instructions var en bra tanke, men boken borde bytas ut för att detta ska fungera.
- Metoden Peer-instruction fungerade inte särskilt bra. Det var bättre när vi blandade föreläsning med förståelseproblem.

Final Results & Thoughts

- Overall students did very well!
According to CEQ data collected, significant improvement was reported.
- Student feedback was collected regularly (through web-page) during the term.
- Students realized that they could stir the class and that this was their class!
- Students did not stick with the reading and pre-class work
- In the future a “stick and carrot” approach which gives incentives to students to do the pre-class assignment will be tried
- An appropriate textbook for Peer Instruction must be used

Thank you!

Comments & suggestions are more than welcome!!!

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All student comments follow below (rolls for 2 minutes)...