UNIVERSITY OF TWENTE.

PEER INSTRUCTION AND READING TEST

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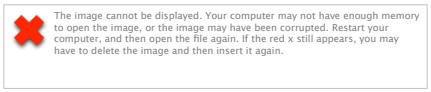
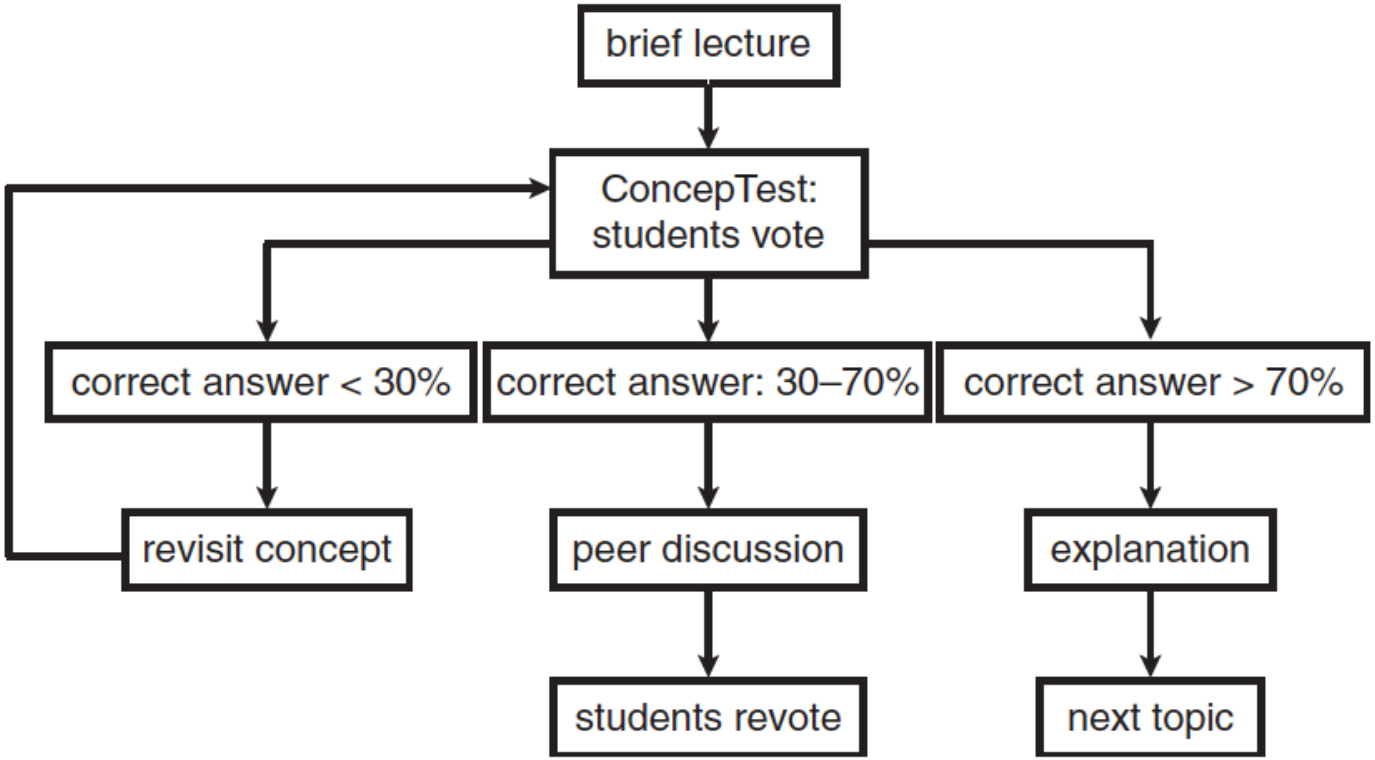
WHY PEER INSTRUCTION?

- Teach by questioning instead of teach by telling
- Actively engage subjects in the lectures
- Provides feedback to the student *and* the lecturer



OVERVIEW PEER INSTRUCTION

- Each round takes about +20 minutes
- Repeat 3-4 times per lecture



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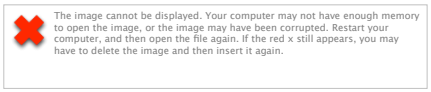
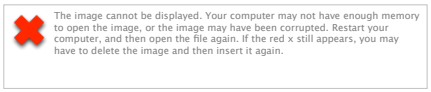
HOW TO VOTE?

	Raising hands/flash cards	Polling “app” – online software
Pros	+ Easy + No/little preparation	+ Easy + Anonymous + Quantitative (allows analysis of results) + Appeals to student
Cons	– Look what others answered – Not quantified	– Requires little preparation



EXAMPLE SOFTWARE - SOCRATIVE

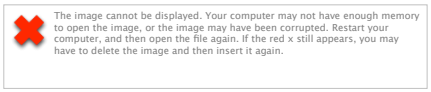
- Go to m.socrative.com
- Enter room number: 849797
- Wait for question



POLLING

- Quick quiz – unprepared
  - Multiple choice
  - True/false
  - Short answer

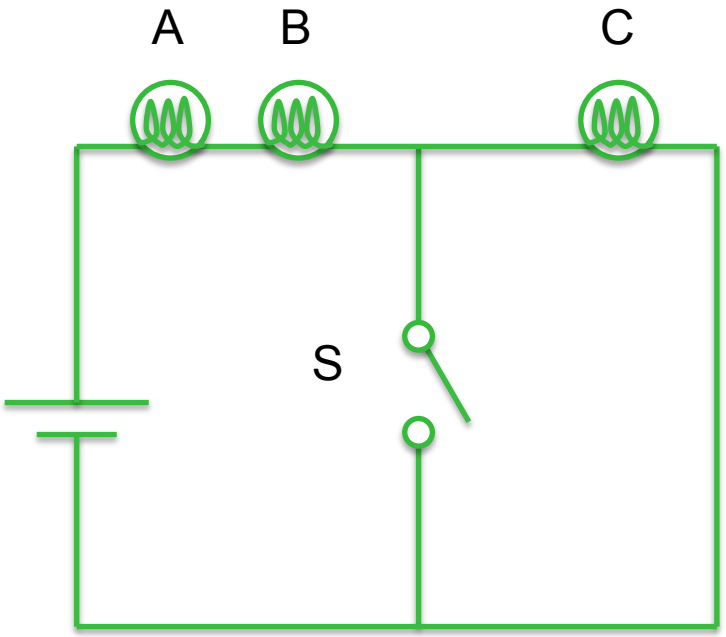
- Perform prepared quiz
  - Possibility to import from excel (template available to make questions)
  - Repeat every question two times, to re-assess after discussion



CONCEPT QUESTION

When S is closed what happens to the intensity of C?

A. Increases
B. Decreases
C. Unaltered



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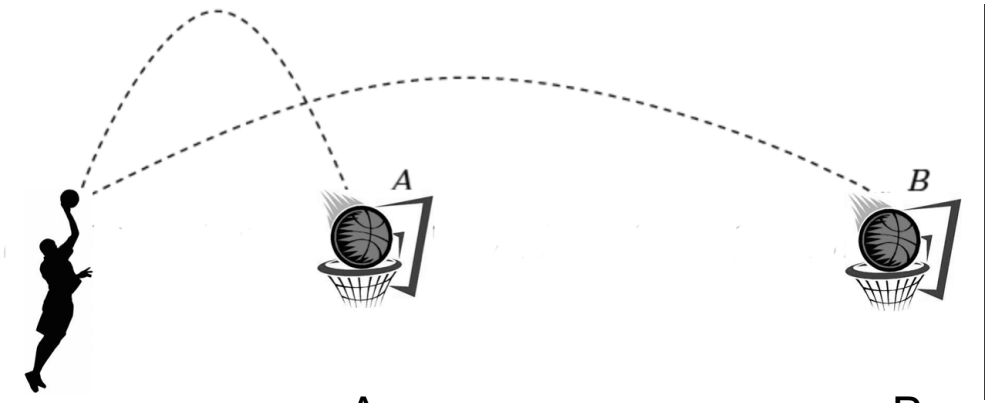
CONCEPT QUESTION

In which situation does it take the **most** time for the ball to hit the basket?

A. Nearby basket – ball is thrown higher
B. Faraway – ball is thrown less high
C. Takes an equal amount of time



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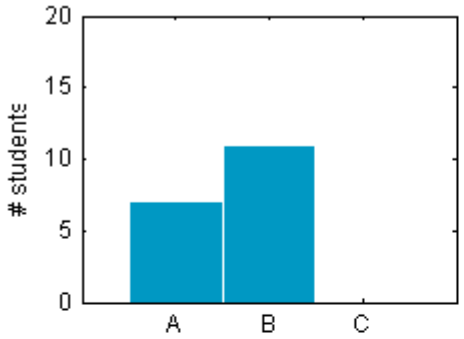
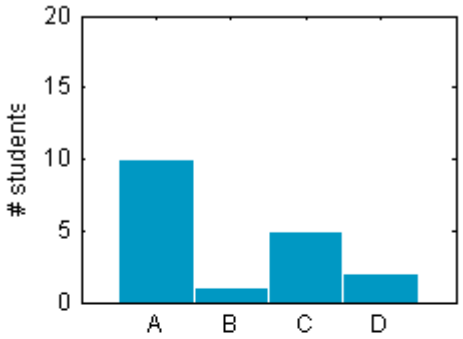
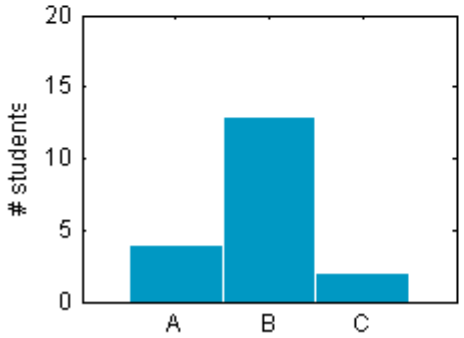
GOOD (CONVERGENCE) AND BAD QUESTIONS

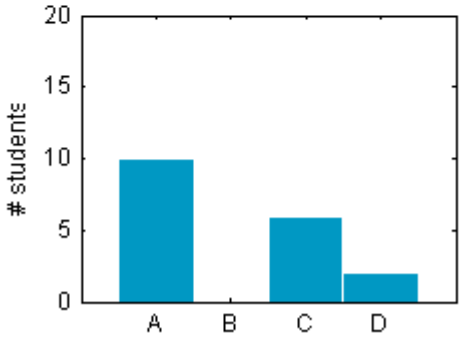


Would a decrease of the weight factor for motor cost (effort) in the cost function result in a faster or slower response to perturbations?
A Slower
B Faster
C No effect



Does the function of the the otolith organs and the semicircular canals change in the weightless environment of space?
A Only function of otolith organs changes
B Only function of semicircular canals changes
C Function of both change
D Both will keep working as normal





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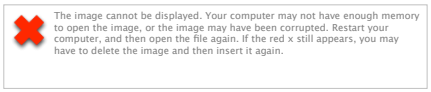
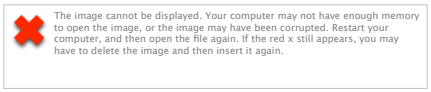
For peer-instruction to be effective a good preparation is essential

- otherwise there will be no lively discussions



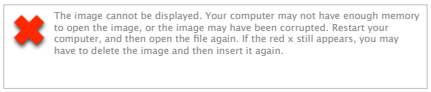
READING TEST

- Online survey (Blackboard) consisting of 3 questions that students fill in after reading the course material
  - Snapshot of how well the student understood the course material
  - Question 1 and 2 are really about the content
  - Question 3 is always:
    - What did you find difficult or confusing about the reading? If nothing was difficult or confusing, tell us what you found most interesting. Please be as specific as possible.

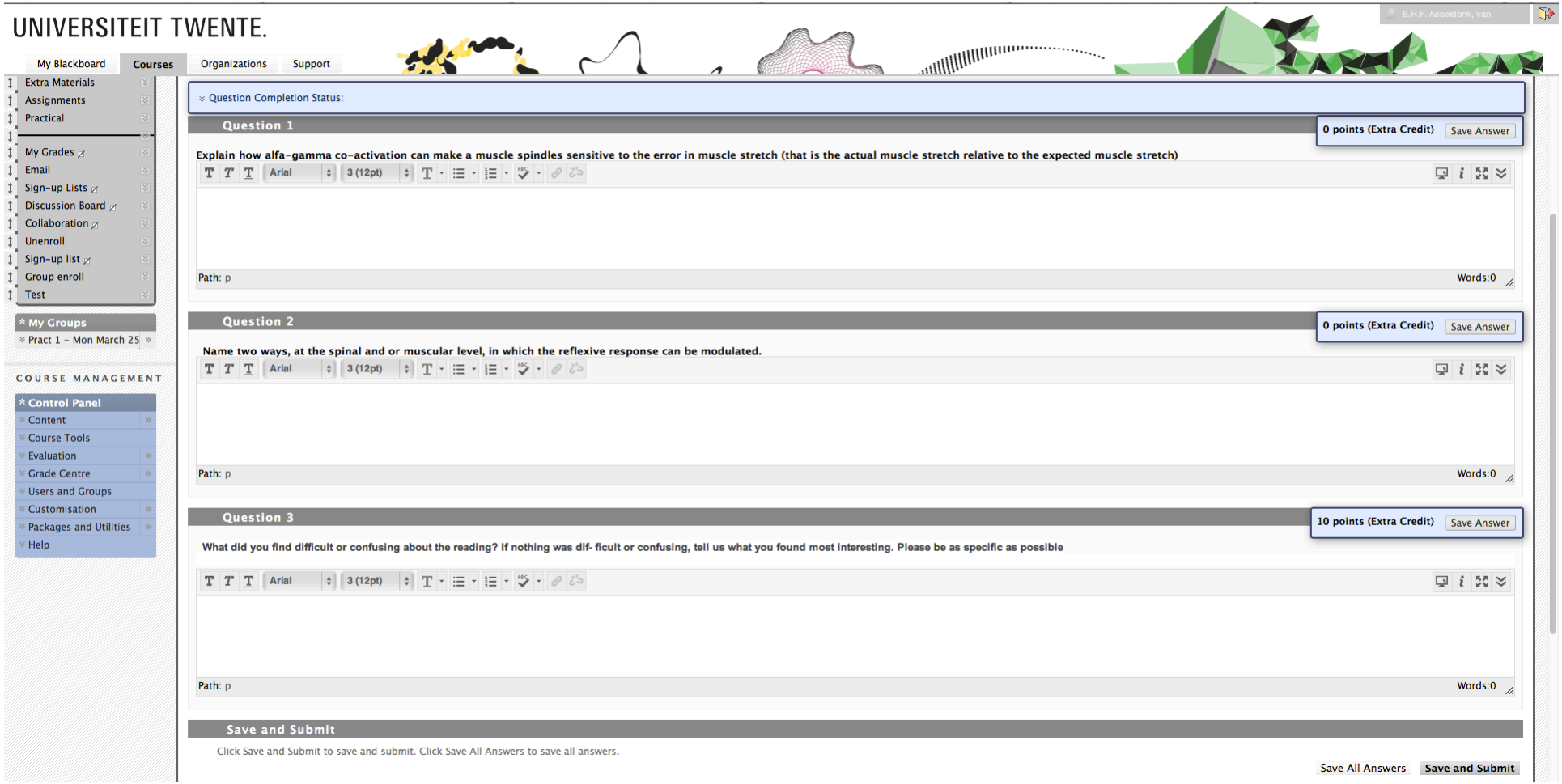


READING TEST (CONT.)

- Survey needs to be handed in at 23:59 the day before the lecture
- Answers ideally used to adapt the content of next day's lecture, otherwise next year's lecture
- Attempts are graded on **effort**, not on correctness
- Grading
  - Last year: each completed assignment 0.1 bonus point
  - This year: each completed assignment 0.7 % of total grade



EXAMPLE READING TEST IN BLACKBOARD



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Test Statistics: LI.2 - Test reading

The statistics are calculated based only on the attempts being used in the grading option (Last attempt, First attempt, Lowest Score, Highest Score or Average of Scores). If Average of Scores is the grading option, then all attempts are included in the statistics.

Name	LI.2 - Test reading
Score	0
Attempts	28 (Total of 28 attempts for this assessment)
Marked Attempts	0
Attempts that Need Grading	28
Instructions	
Alignments	

Question 1: Short Answer

Average Score 0 points (Extra Credit)

Explain how alfa-gamma co-activation can make a muscle spindles sensitive to the error in muscle stretch (that is the actual muscle stretch relative to the expected muscle stretch)

Sample Answer

Unanswered Responses

0

Given Answers

gamma neurons innervate the intrafusal muscle fiber while alfa neurons innervate the extrafusal muscle fibers. Activation of gamma neurons shortens the polar regions of the intrafusal fiber, which leads to an increase in firing rate of the sensory endings and thus provide a mechanism to adjust the sensitivity of the muscle spindles.

alpha-gamma co-activation makes sure that the sensitivity of muscle spindles is maintained, because it maintains tension in the muscle spindle during active contraction. Thereby it ensures the responsiveness of the spindle at different lengths. Alpha-gamma co-activation relates the change in spindle length to the change in expected muscle length. Thereby, firing rate is related to the difference between actual and expetpected muscle stretch and it makes the muscle spindles sensitive to the error in muscle stretch.

The muscle spindle firing rate is maintained within a range of muscle fiber lengths, by co-activating the alfa and gamma neurons, which prevents the muscle spindles from unloading. Because of the co-activation, total unloading does not occur. In fact, since the alpha and gamma signals are related, the sensitivity of the spindles is adjusted to follow a certain trajectory the muscle needs to make. When this does not happen due to some disturbance or error, the spindles will start firing signals to adjust the muscle contraction and succesfully follow the trajectory.

The motor innervation os the intrafusal muscle fibers comes from small-diameter motor neurons, called gamma motor neurons (extrafusal muslce fibers will be innervated by alfa motor neurons). Contraction of intrafusal muscle fibers does not contribute to the force of muscle contraction, but the innervation of the gamma motor neurons causes shortening of the polar regions of the intrafusal regions. This results in

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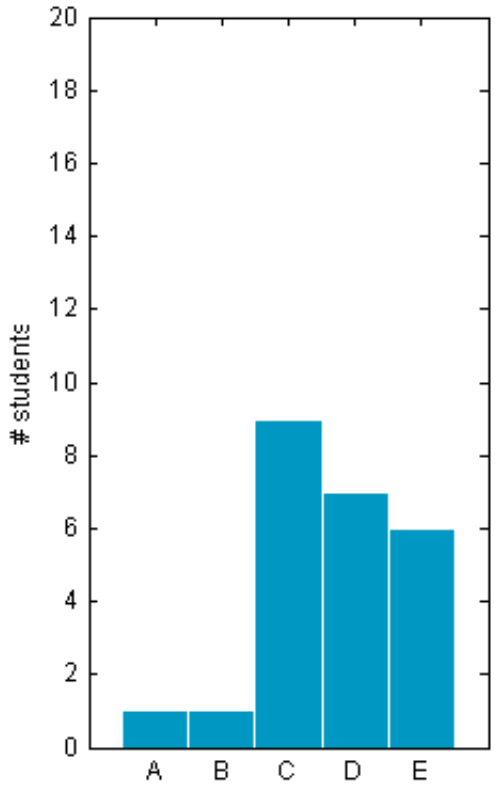
EVALUATION READING TEST

±90 % spends at least 1 hour on preparation and ±50% at least 2.5 hour



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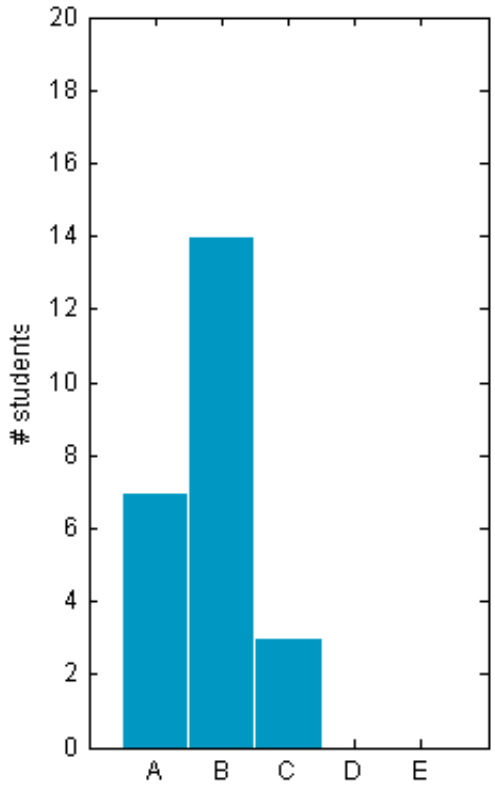
How many hours did you on average spent on preparation for the lecture (reading + performing reading test)
A No preparation
B <1
C 1-2.5
D 2.4-4
E >4

EVALUATION READING TEST

±90 % actively uses the course material in making the reading tests



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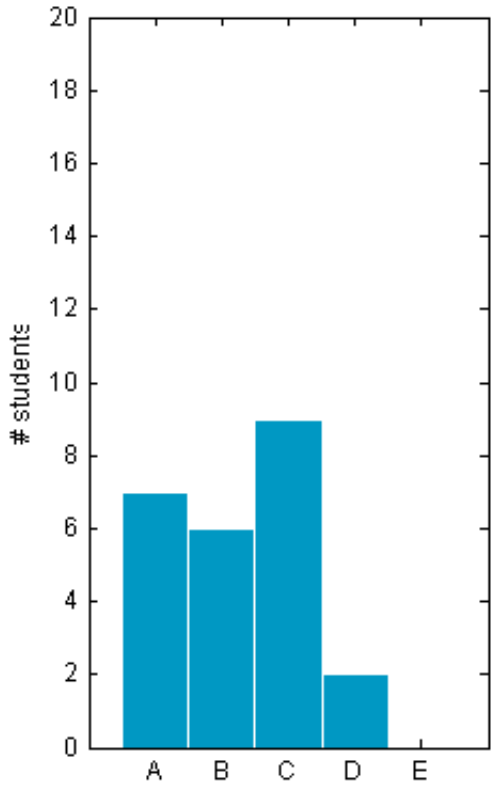
Performing the reading tests made me think about and actively use the course material
A Strongly agree
B agree
C neutral
D disagree
E strongly disagree

EVALUATION READING TEST

The possibility to earn 0.1 bonus point is a crucial incentive for ±50 %



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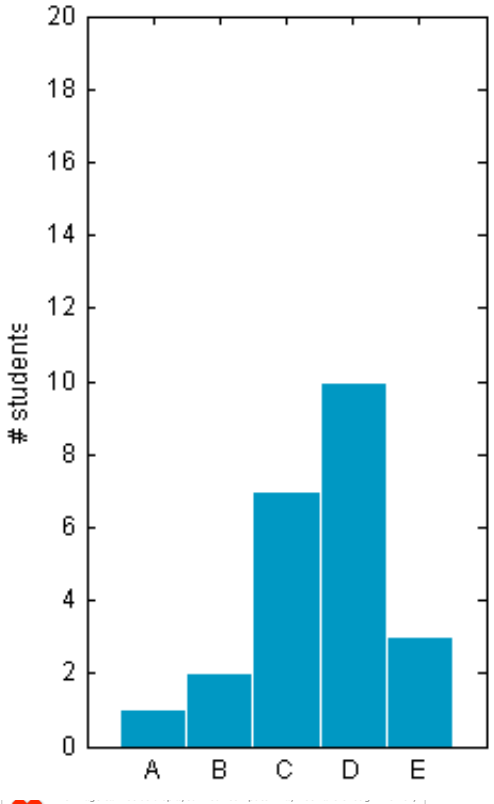
The possibility to earn 0.1 bonus point was the most important incentive to perform the reading test
A Strongly agree
B agree
C neutral
D disagree
E strongly disagree

EVALUATION PEER INSTRUCTION

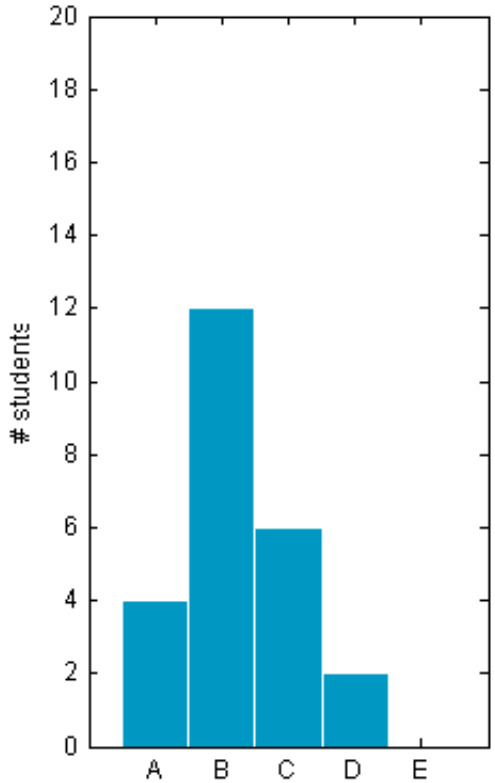
±87% grades the reading tests with >=7 and ± 56% with >=8



My overall opinion about the use of reading tests to improve learning and understanding of the course material
A <=5
B 6
C 7
D 8
E >=9

EVALUATION PEER INSTRUCTION

±70 % agrees that PI made them actively engage in the lecture



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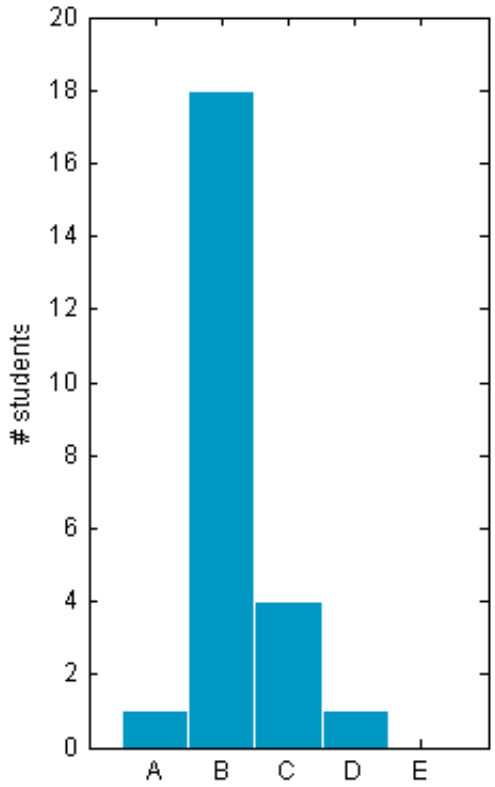
The peer instruction questions made me actively engaged in the lecture
A Strongly agree
B agree
C neutral
D disagree
E strongly disagree

EVALUATION PEER INSTRUCTION

±80 % believes that PI contributes to understanding the course material



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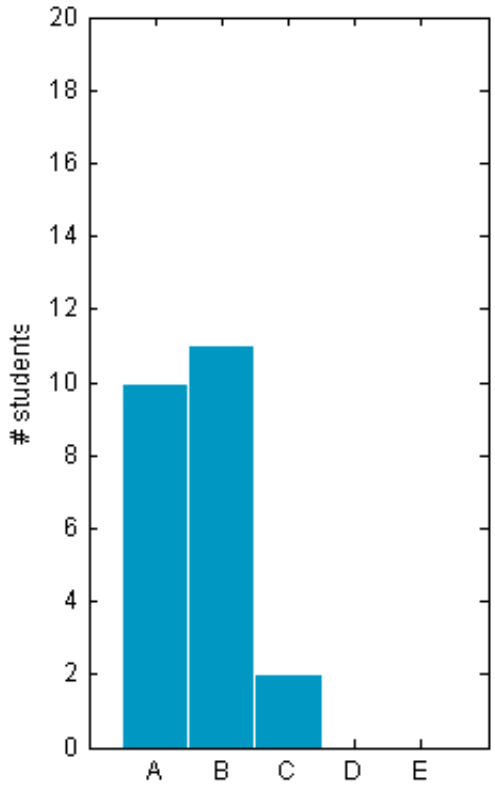
Answering the peer instruction questions and discussing eachothers' answers contributed to my understanding of the course material
A Strongly agree
B agree
C neutral
D disagree
E strongly disagree

EVALUATION PEER INSTRUCTION

±90 % thinks that we should continue to use PI



We should continue to use reading tests and peer instruction in next year's course
A Strongly agree
B agree
C neutral
D disagree
E strongly disagree

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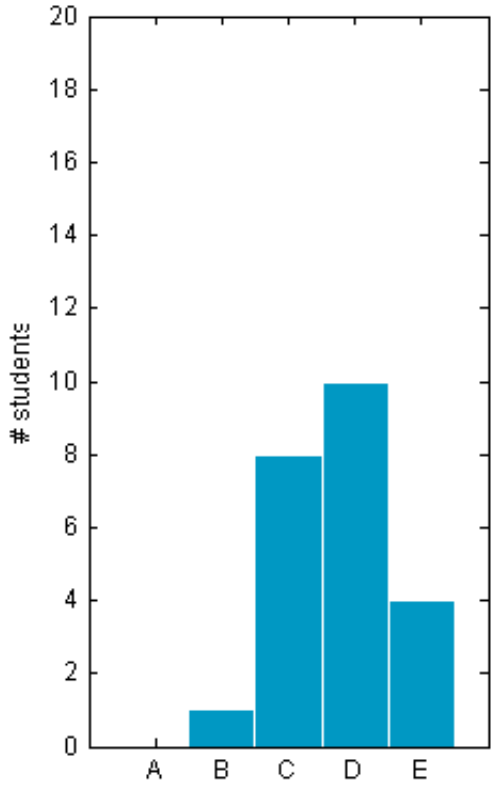
EVALUATION PEER INSTRUCTION

±95 % grades the PI with >=7 and ±61% with >=8



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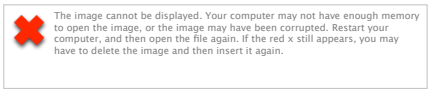
My overall opinion about the use of peer instruction to improve learning and understanding of the course material
A <=5
B 6
C 7
D 8
E >=9

IN SUMMARY

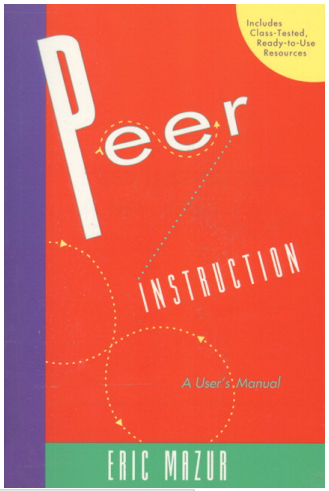
- Peer-instruction + reading tests
  - Promotes thinking about challenging subjects
  - Students “teach” each other, best way to really learn something is to teach it
  - Provides continuous feedback to the individual student and lecturer
  - Peer instruction costs considerable amount of time, no time left to *tell* all those things you “really” need to *tell*.

  - Students really liked this way of lecturing



RESOURCES

- Eric Mazur
  - Publication:Mazur (2009) Education. Farewell, lecture? Science 323:50-1
  - Website: http://mazur.harvard.edu/education/educationmenu.php
  - Inspiring lecture: http://collegerama.tudelft.nl/Mediasite/Play/e899a540bbcf40efb9c285b9f7304573
- Software: www.socrative.com
- Book



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