Active learning and Perusall: Sharing Practices for Successful Learning Engagement

Congreso Internacional de
Lingüística Computacional y de Corpus
22 October 2020

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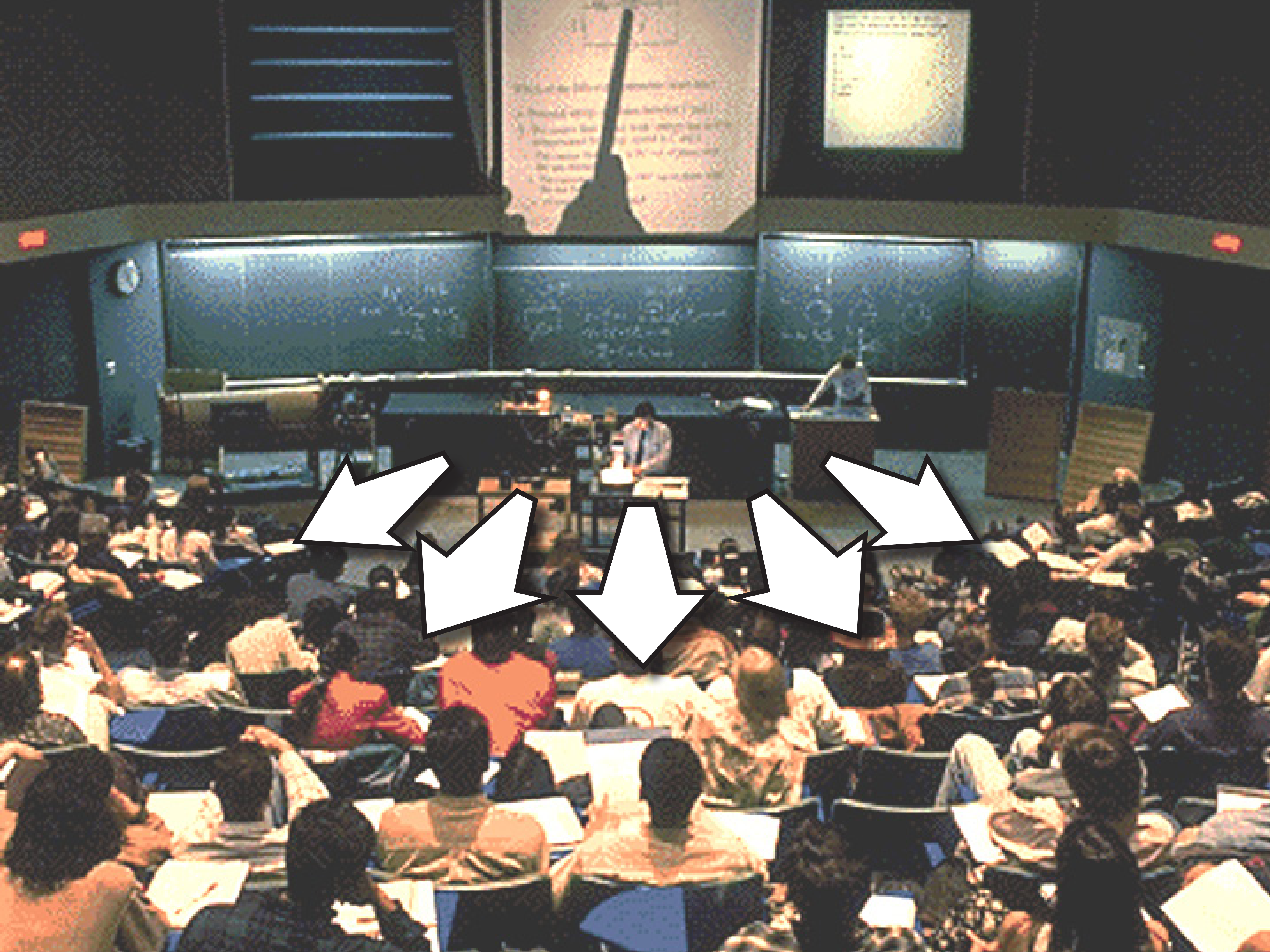
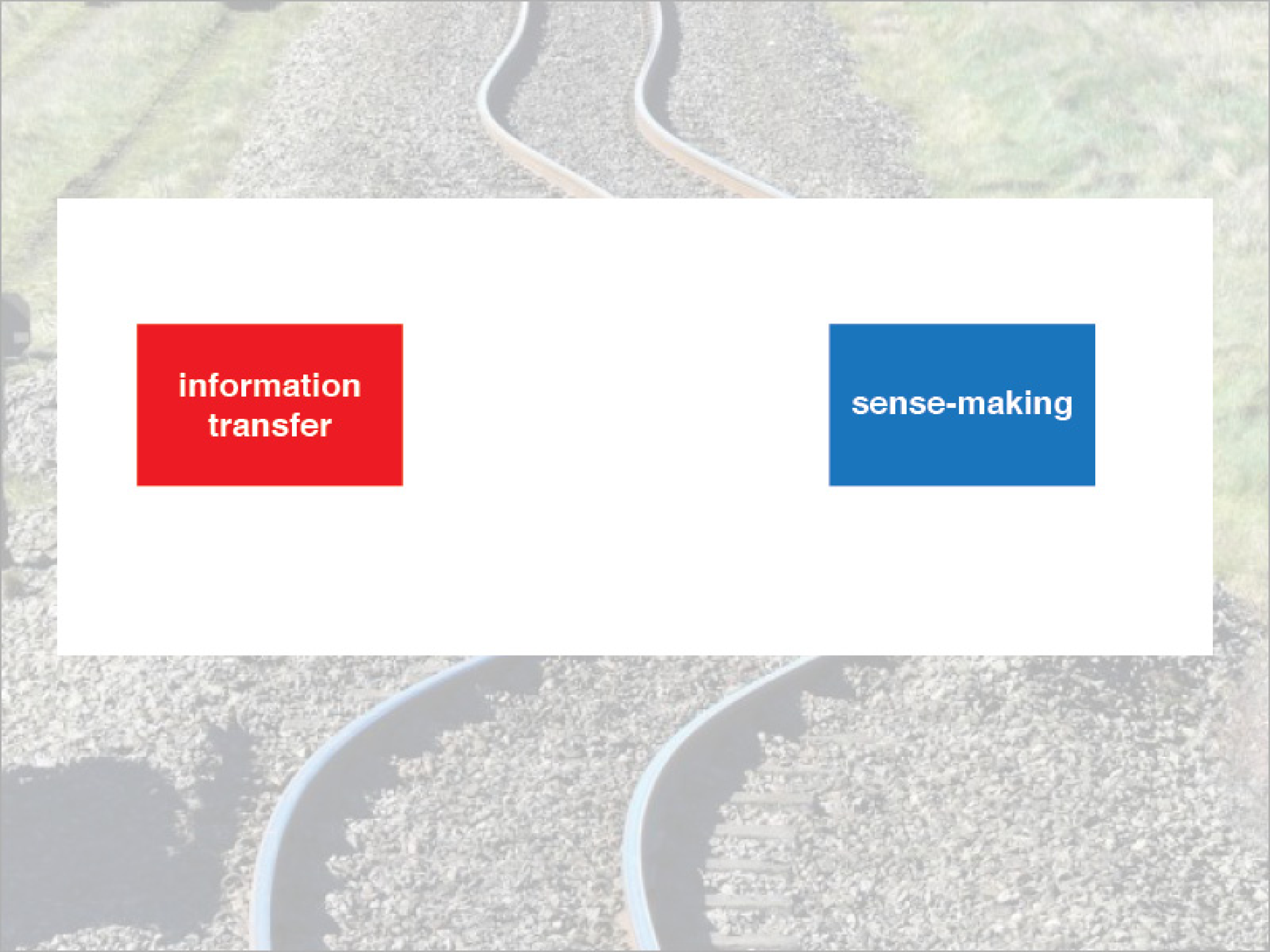
an illusion. . .




information transfer
sense-making

in class

information transfer

sense-making

in class

information transfer

out of class

sense-making

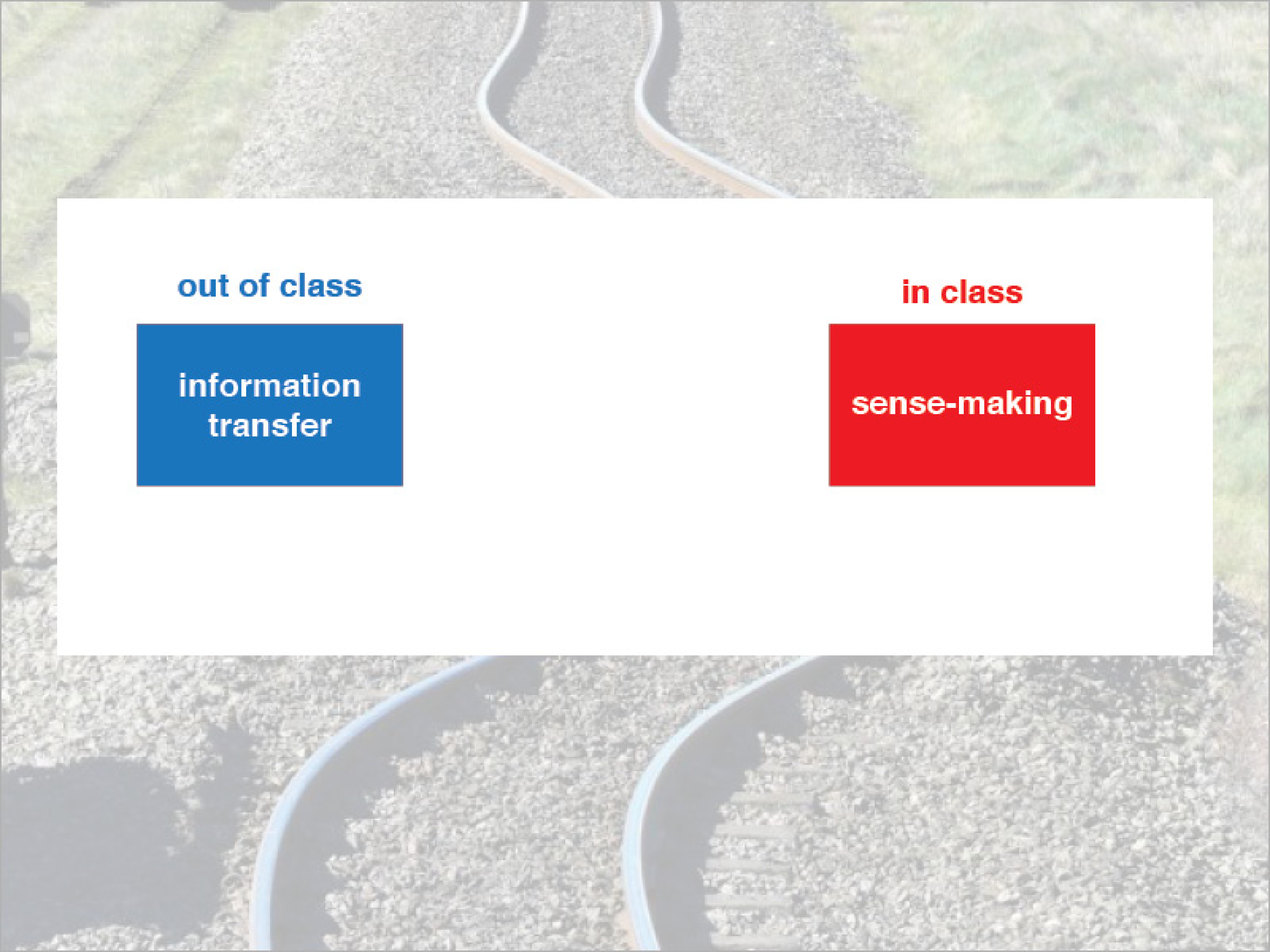
Should focus on THIS!

in class

information transfer

out of class

sense-making


out of class
information transfer
in class
sense-making

out of class

information transfer

in class

sense-making

Peer Instruction

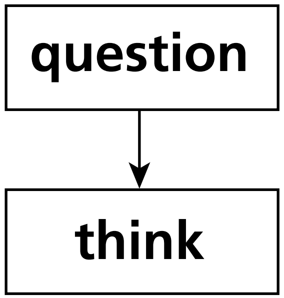
Peer

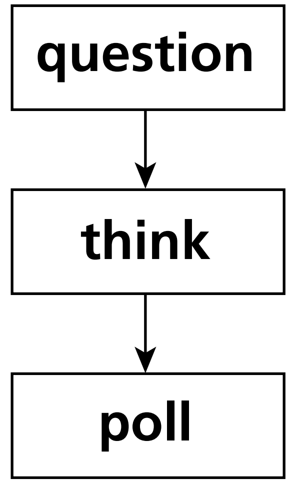
INSTRUCTION

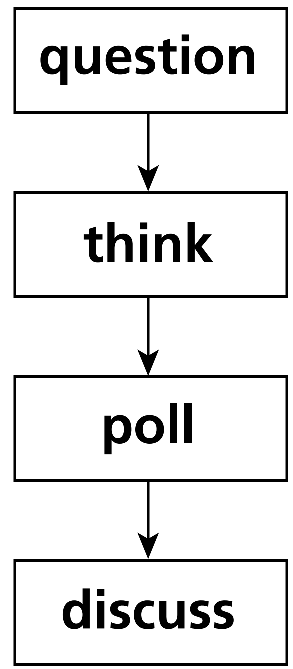
1. transfer of information (out of class)

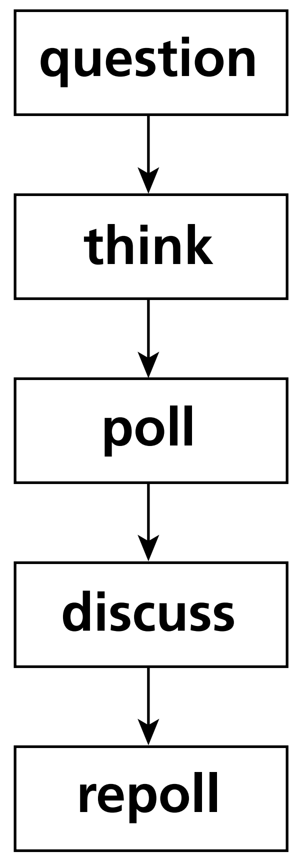
2. assimilation of that information (in class)

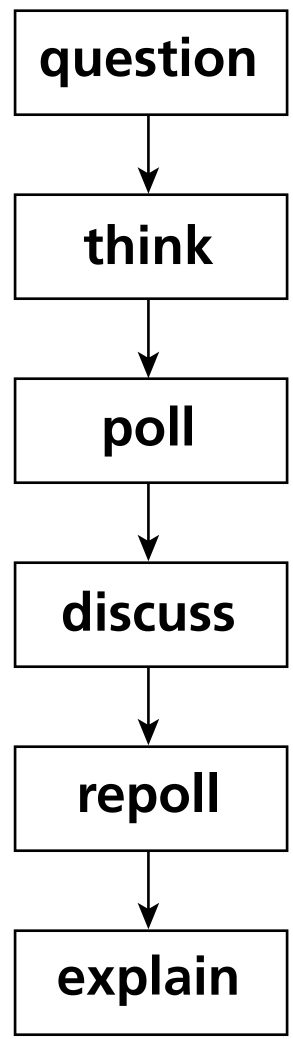
question

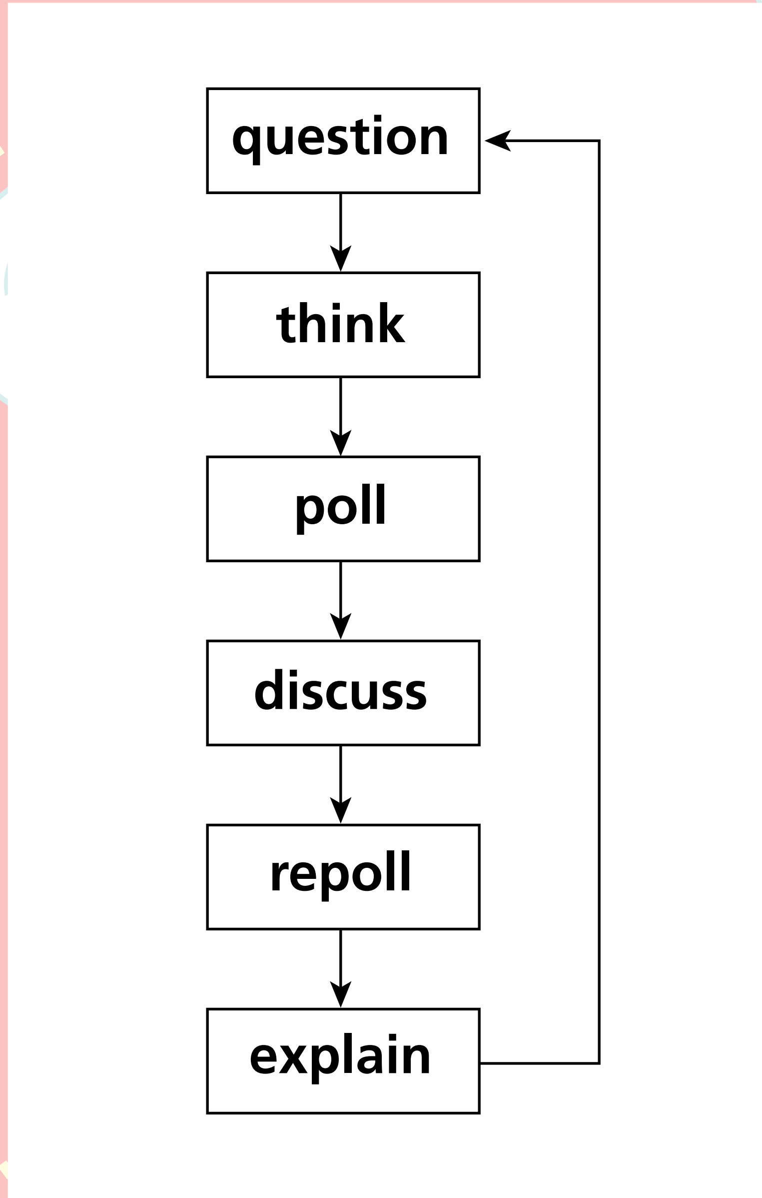

question
think

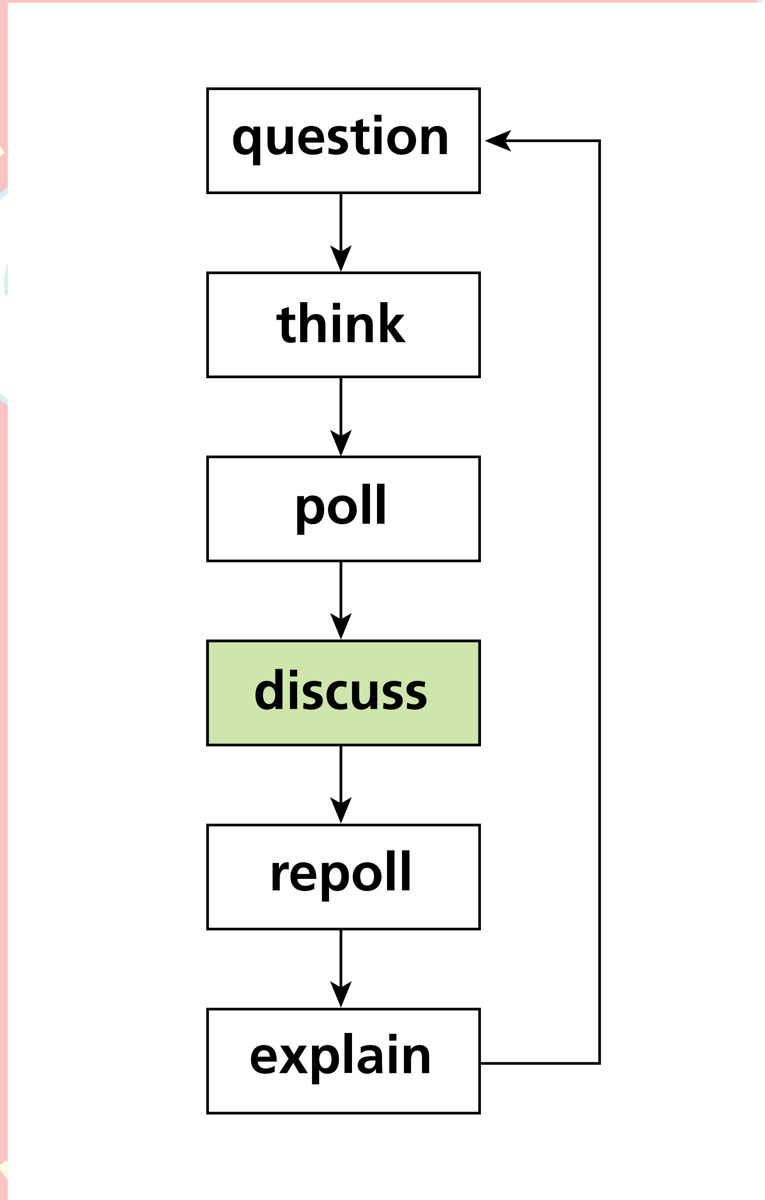

question
think
poll


question
think
poll
discuss

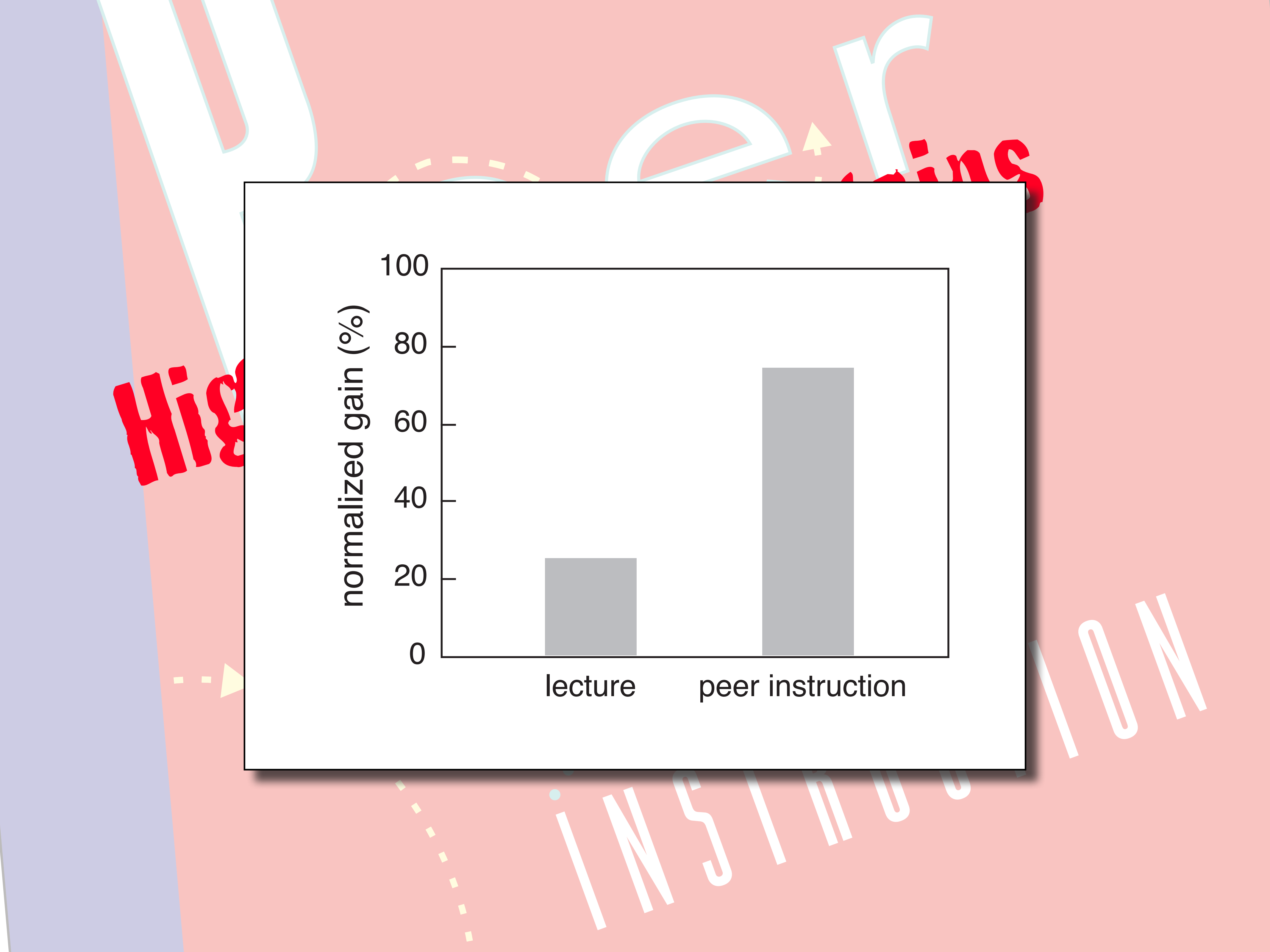

question
think
poll
discuss
repoll


question
think
poll
discuss
repoll
explain


question
think
poll
discuss
repoll
explain

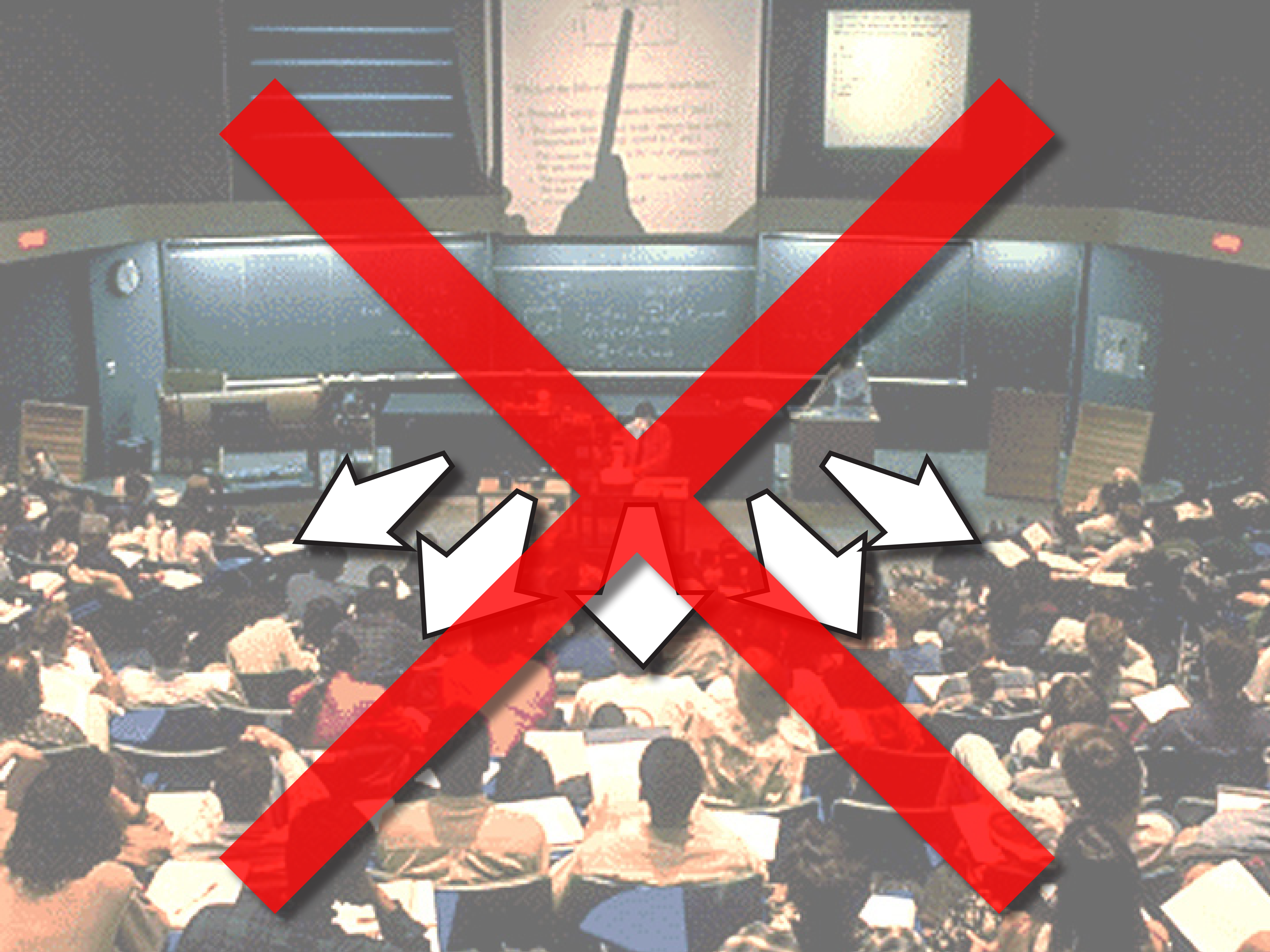

question
think
poll
discuss
repoll
explain

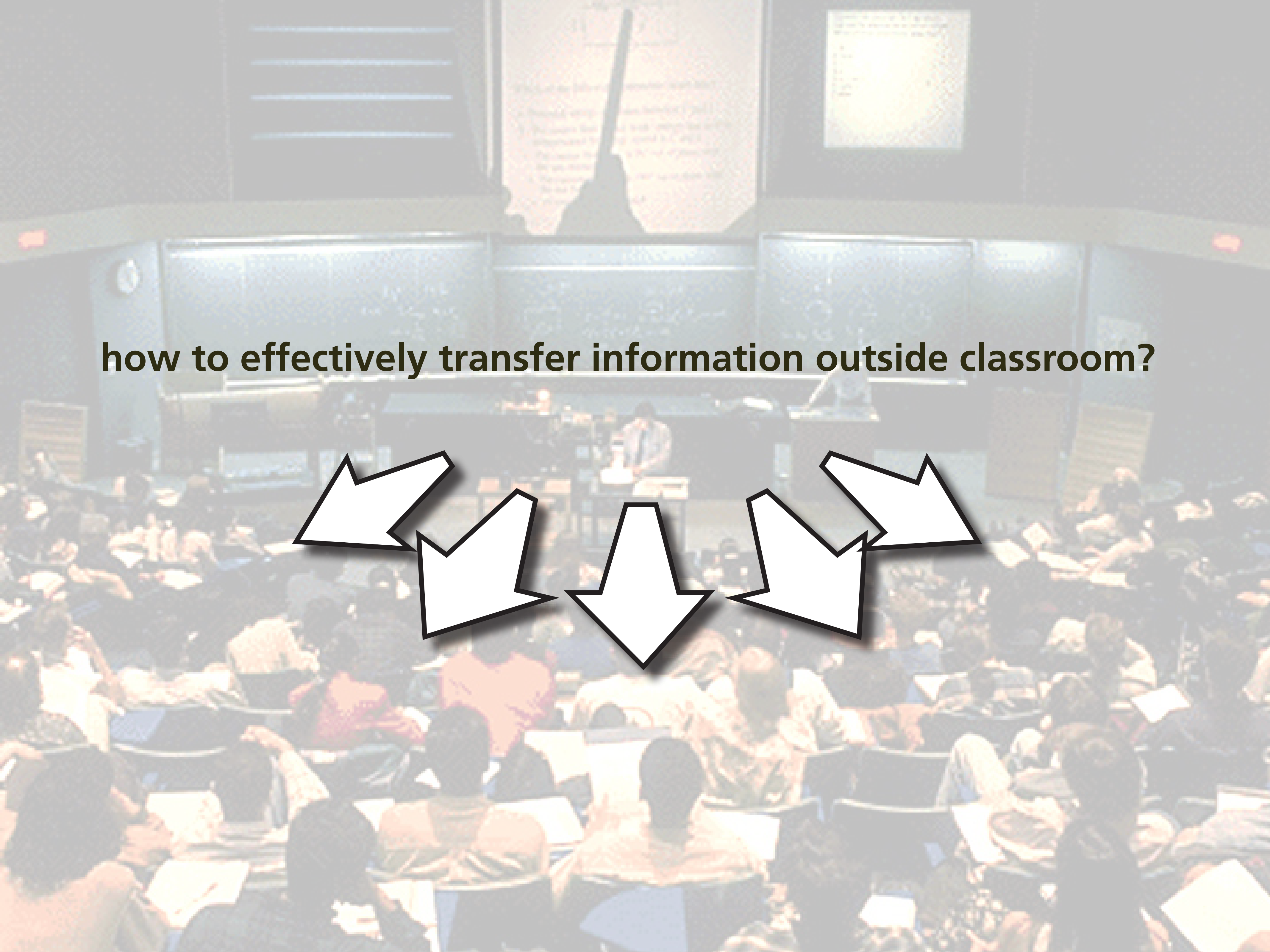

Peer
INSTRUCTION
Higher learning gains



normalized gain (%)
100
80
60
40
20
0
lecture
peer instruction

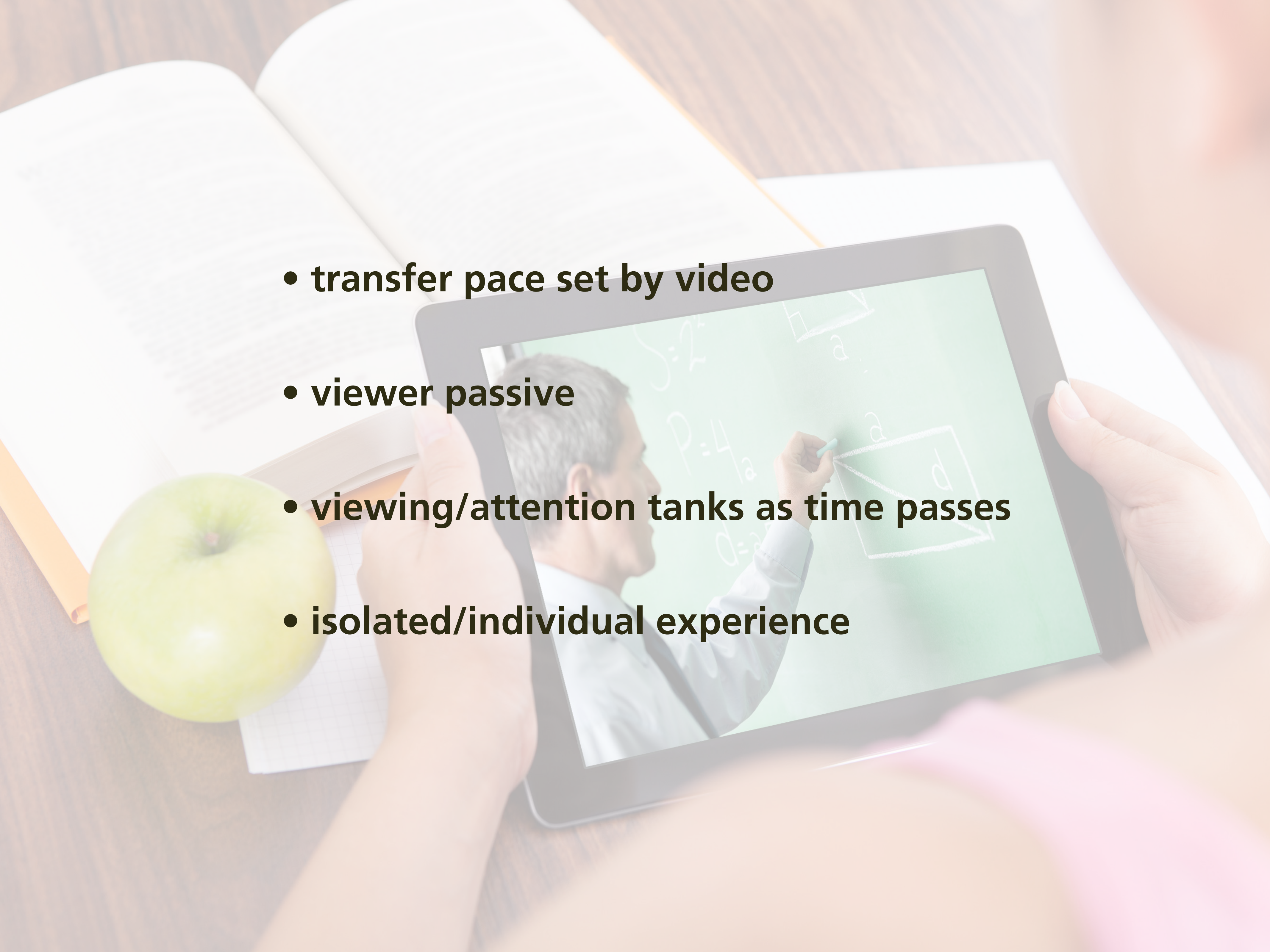

Peer
INSTRUCTION
Higher learning gains
Better retention




how to effectively transfer information outside classroom?

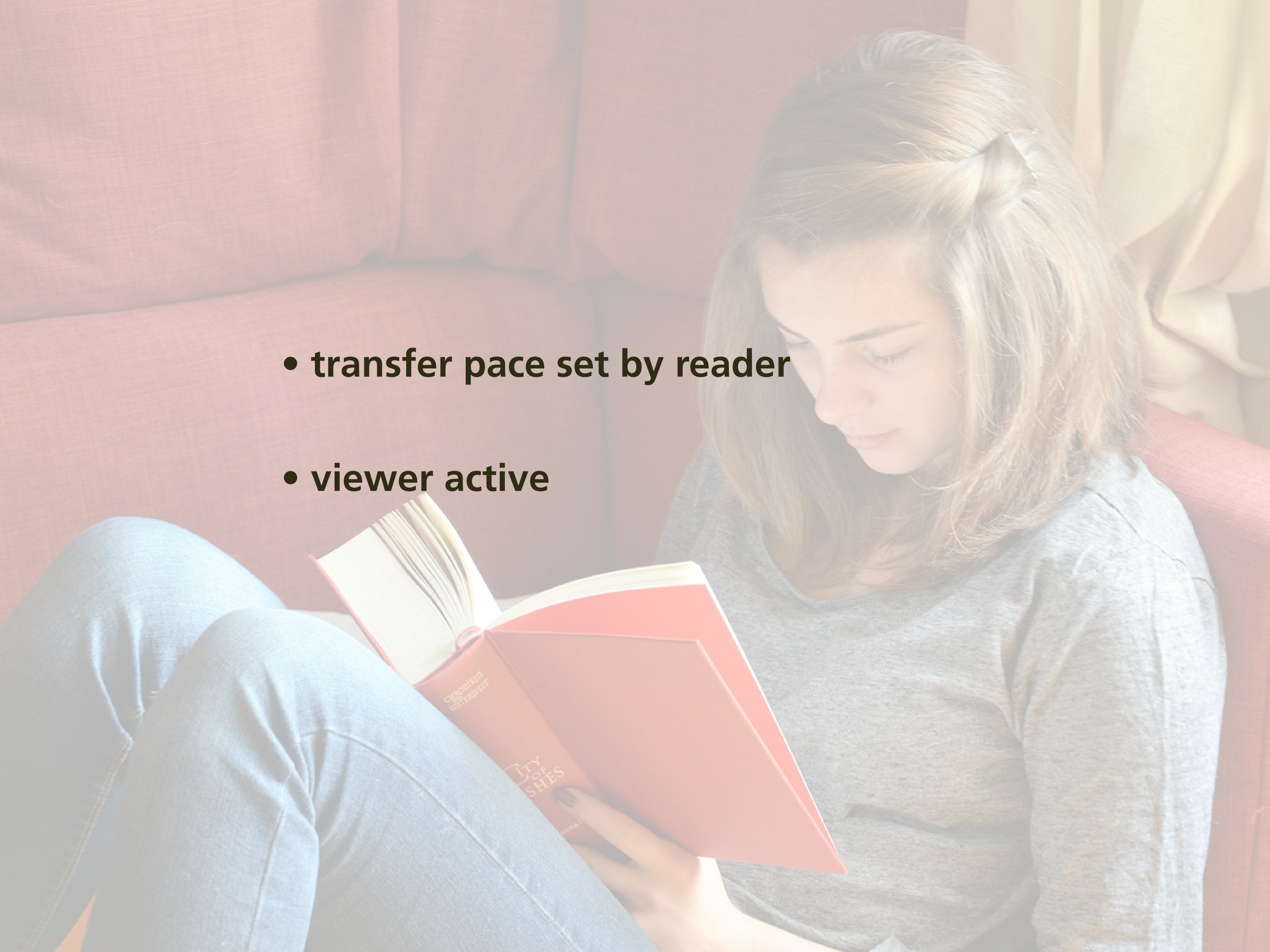

P=4a


but…



- transfer pace set by video
- viewer passive
- viewing/attention tanks as time passes
- isolated/individual experience

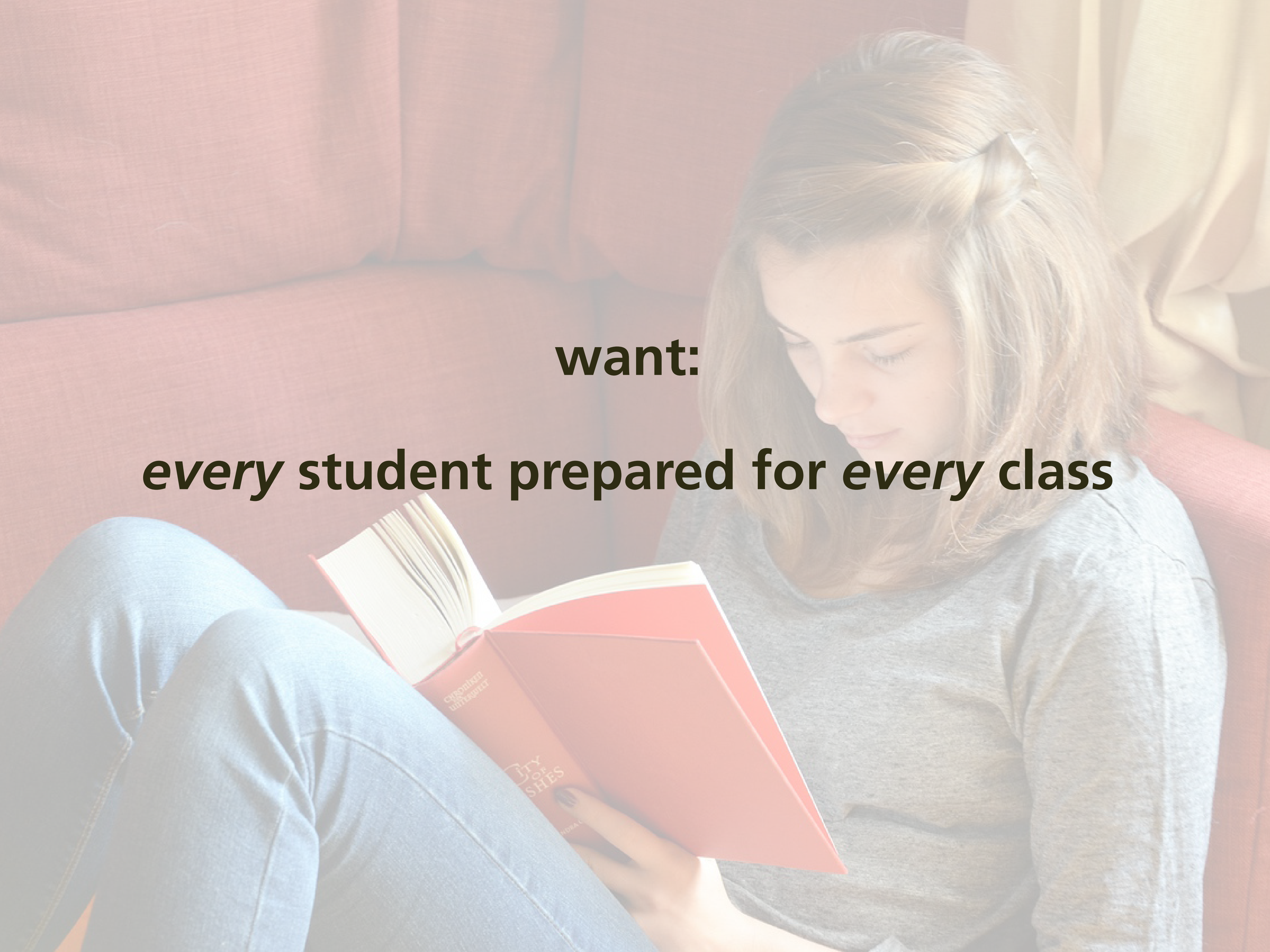

we’re simply moving this outside classroom!

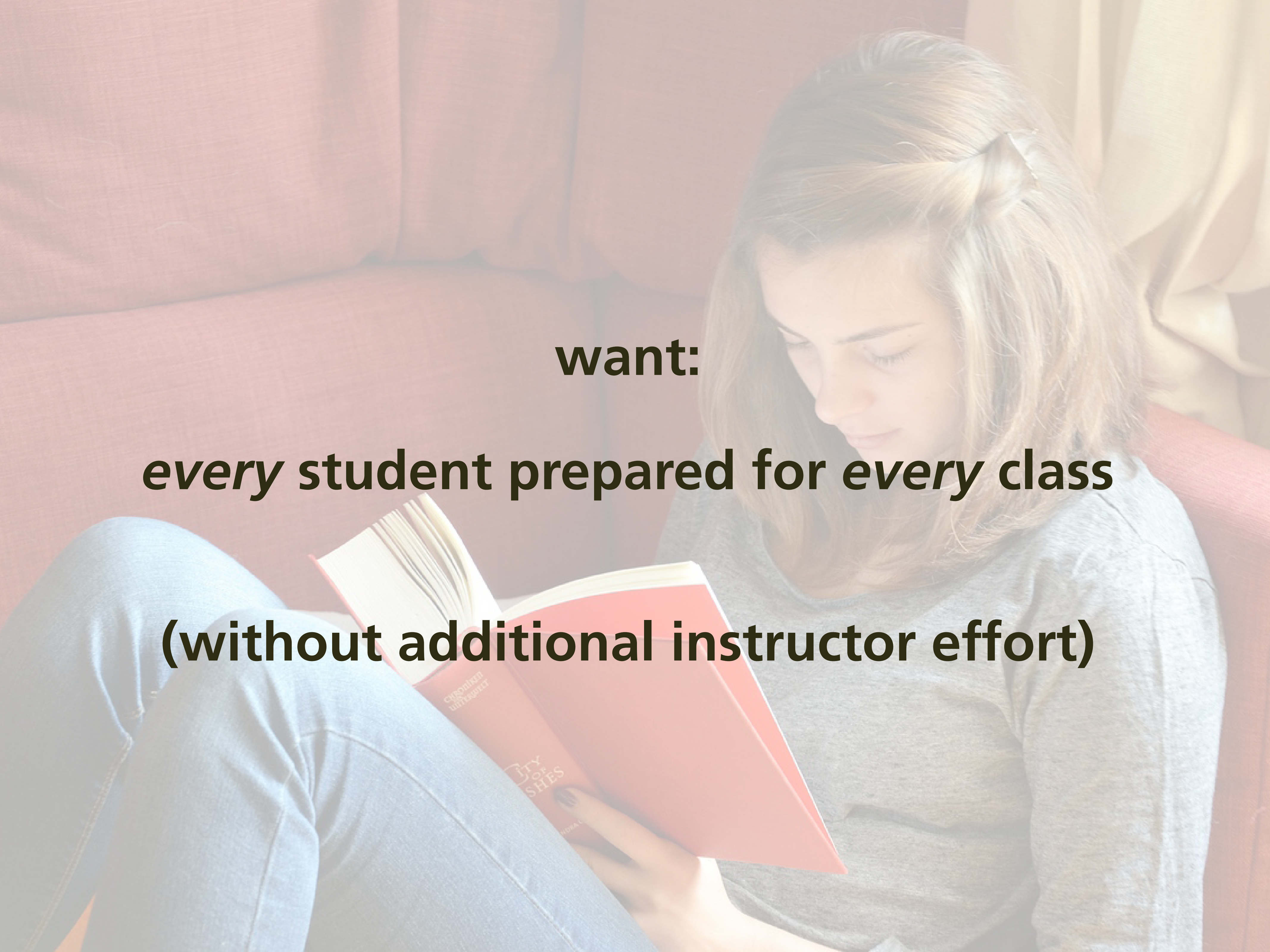


- transfer pace set by reader
- viewer active


but…


isolated/individual experience &
no real accountability


want:
every student prepared for *every* class



want:

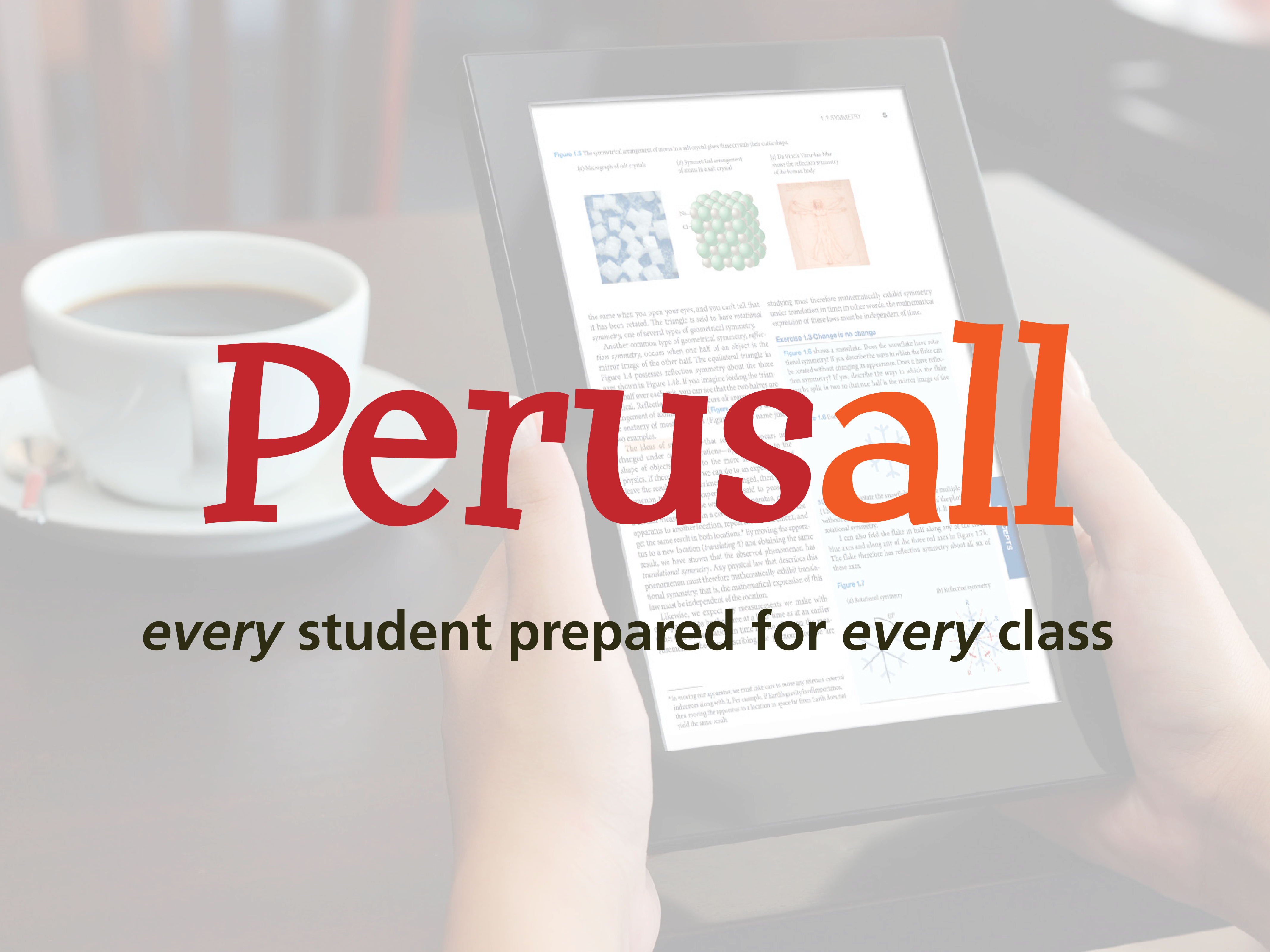
every student prepared for *every* class

(without additional instructor effort)

Solution

turn out-of-class component

also into a social interaction!


Perusall
every student prepared for every class

social learning platform

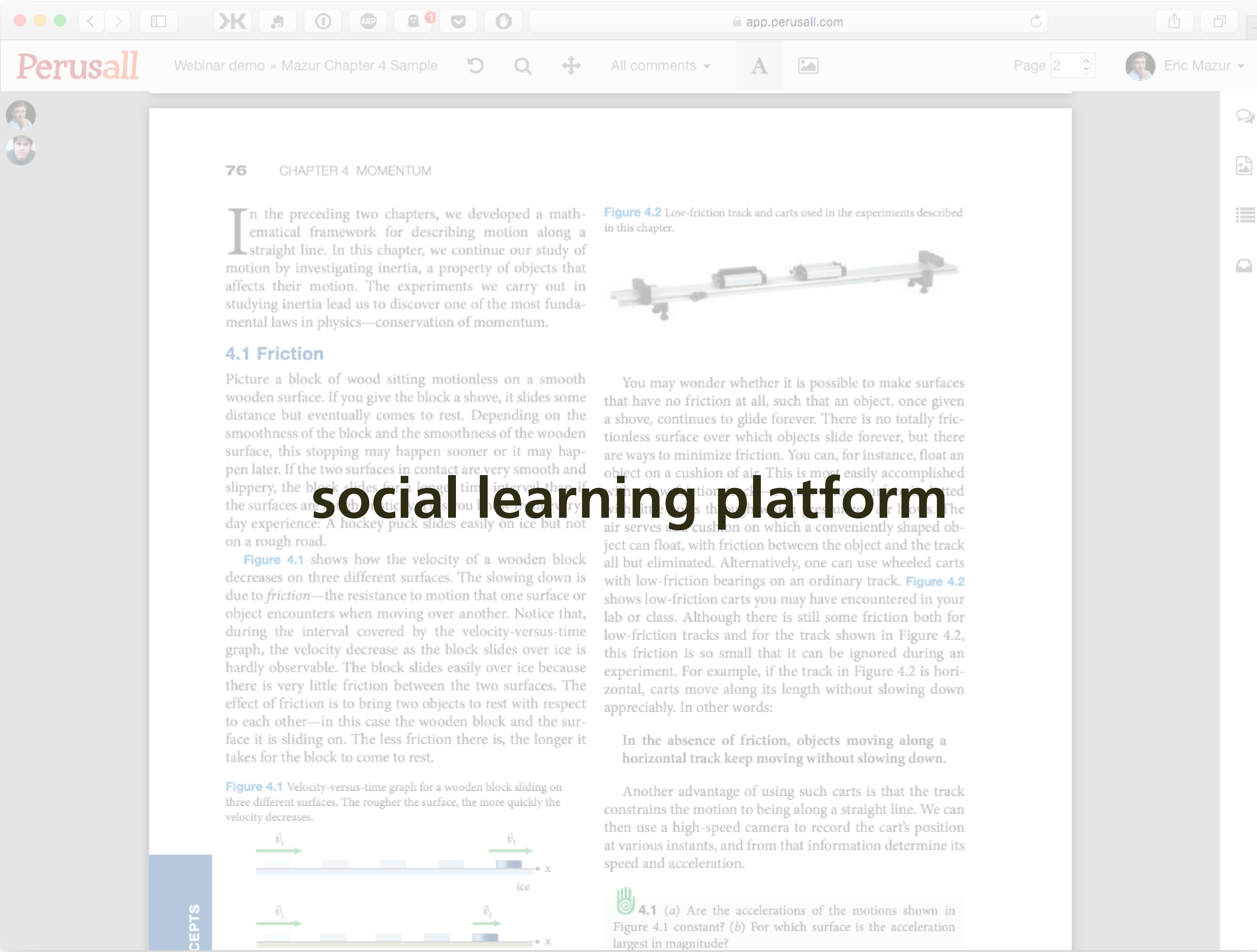


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Figure 4.1 Velocity-versus-time graph for a wooden block sliding on three different surfaces. The rougher the surface, the more quickly the velocity decreases.

$\vec{v}_i$ $\vec{v}_f$ x ice

$\vec{v}_i$ $\vec{v}_f$ x

Figure 4.2 Low-friction track and carts used in the experiments described in this chapter.

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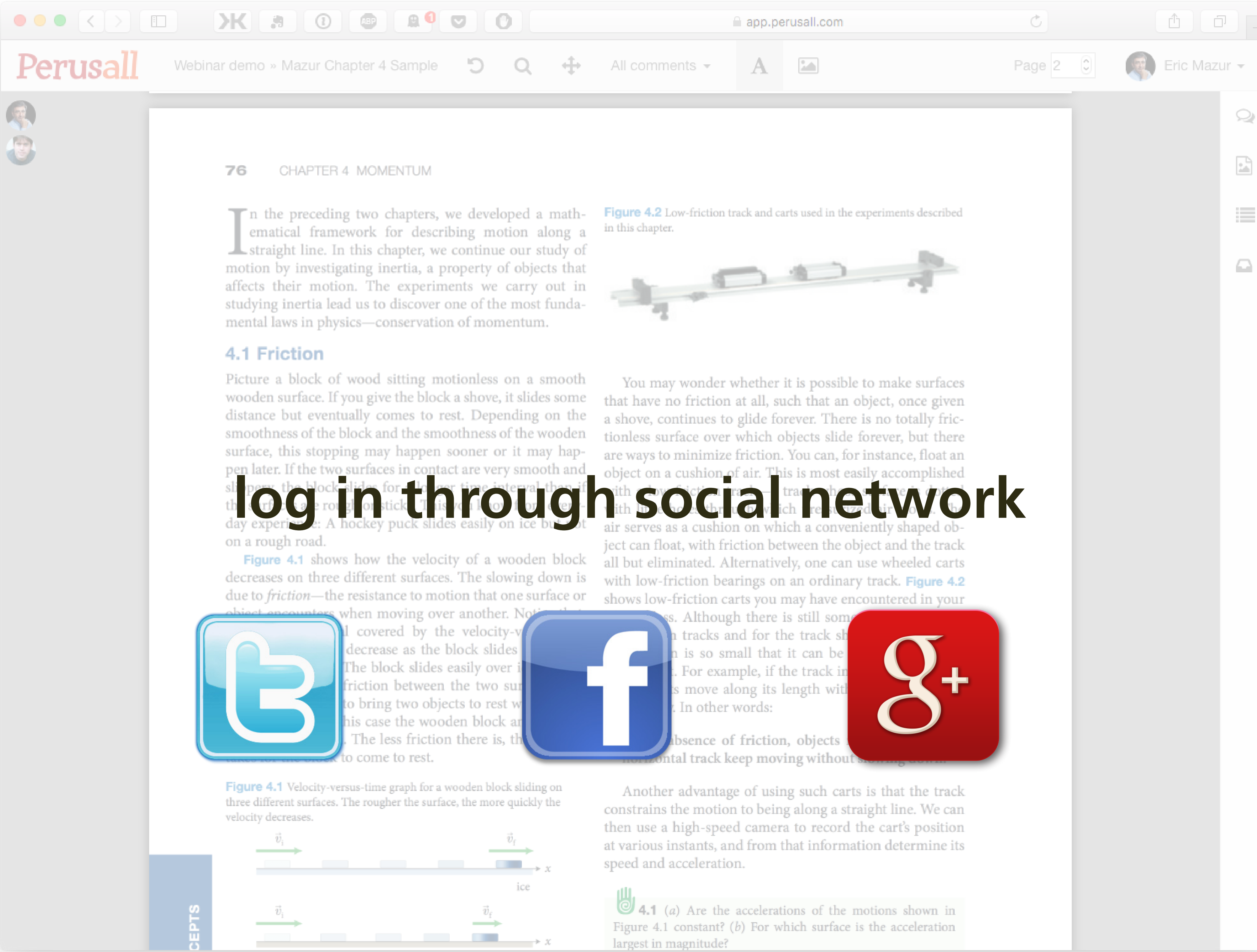
CEPTS

log in through social network



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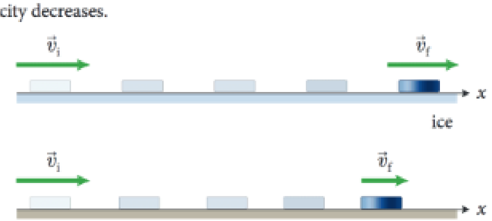
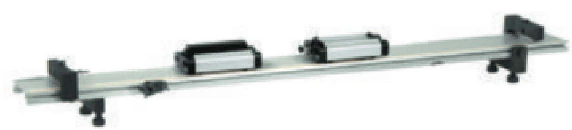


CEPTS



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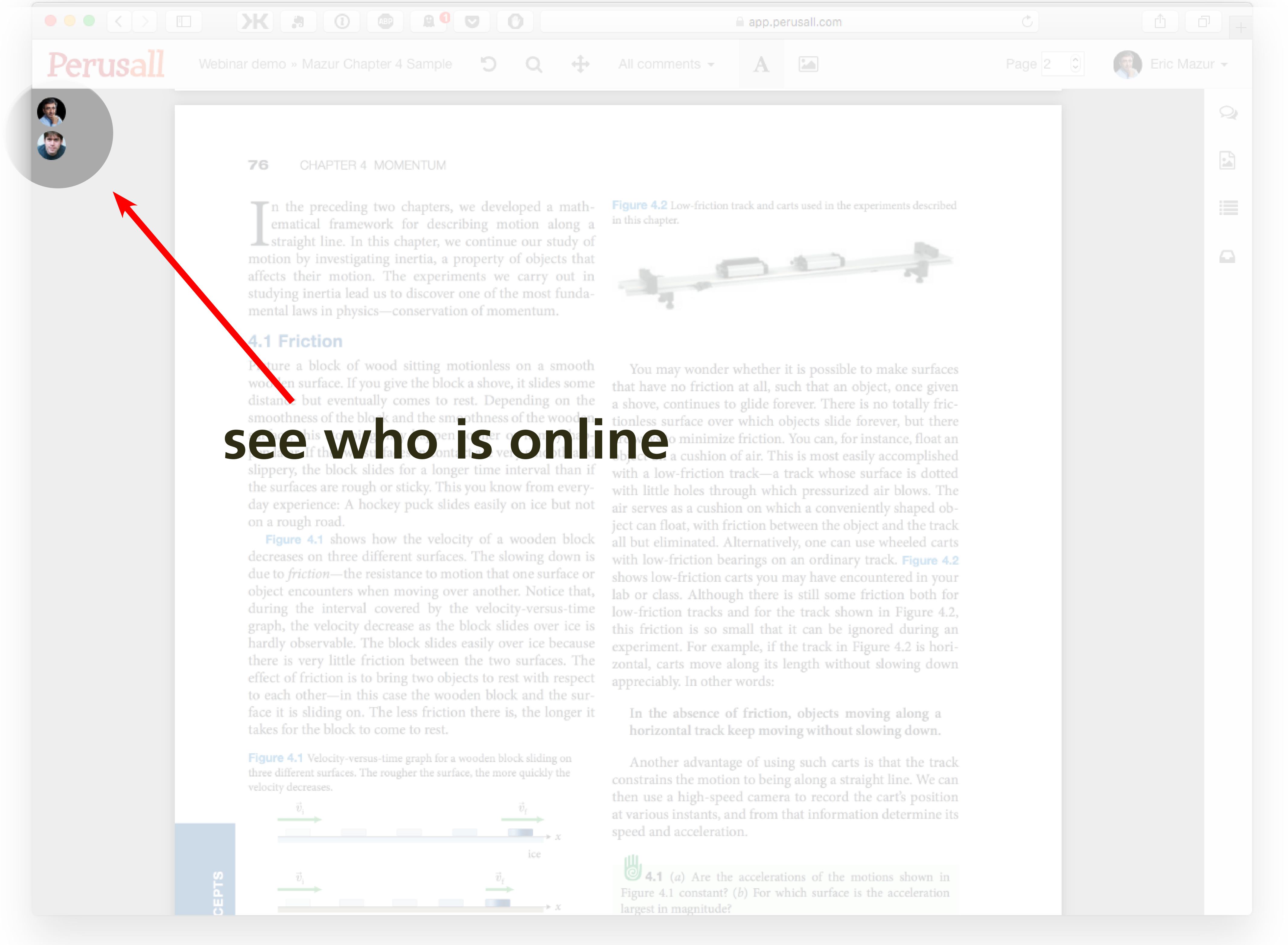

76 CHAPTER 4 MOMENTUM

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app.perusall.com

Perusall Webinar demo » Mazur Chapter 4 Sample All comments Page 2 Eric Mazur

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highlighting text…

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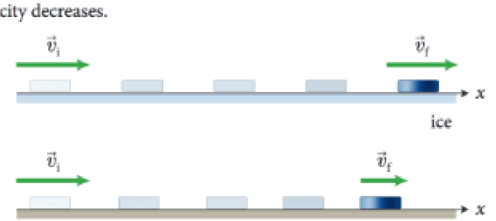

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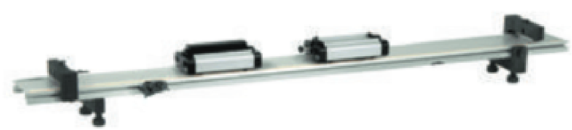

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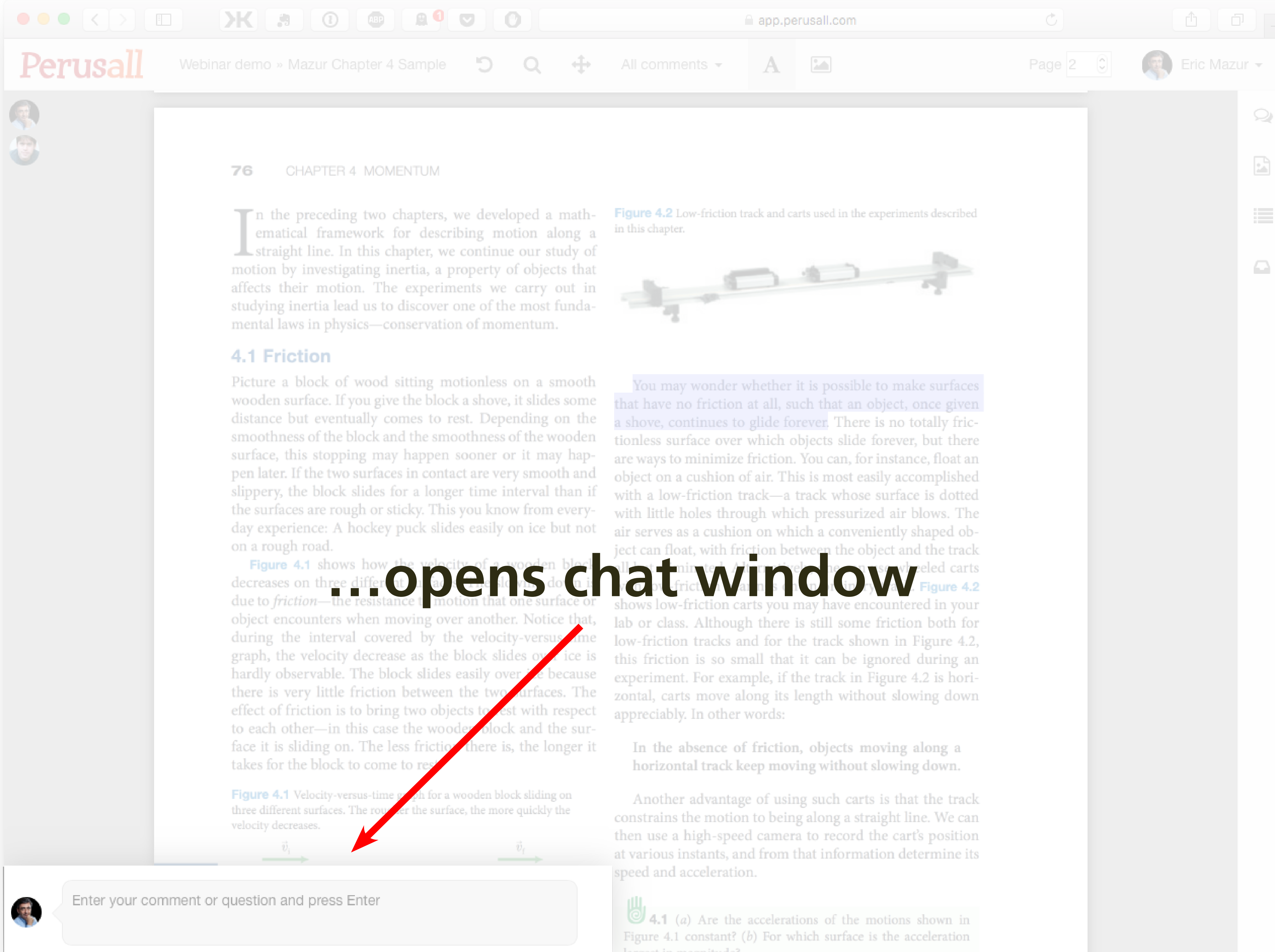
CEPTS



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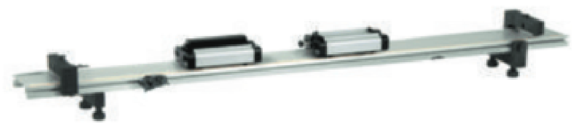

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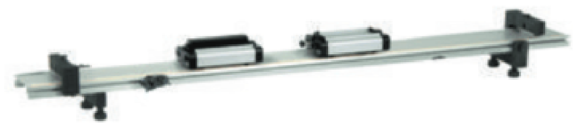
Figure 4.1 Velocity-versus-time graph for a wooden block sliding on three different surfaces. The rougher the surface, the more quickly the velocity decreases.

Figure 4.2 Low-friction track and carts used in the experiments described in this chapter.



You may wonder whether it is possible to make surfaces that have no friction at all, such that an object, once given a shove, continues to glide forever. There is no totally frictionless surface over which objects slide forever, but there are ways to minimize friction. You can, for instance, float an object on a cushion of air. This is most easily accomplished with a low-friction track—a track whose surface is dotted with little holes through which pressurized air blows. The air serves as a cushion on which a conveniently shaped object can float, with friction between the object and the track all but eliminated. Alternatively, one can use wheeled carts with low-friction bearings on an ordinary track. Figure 4.2 shows low-friction carts you may have encountered in your lab or class. Although there is still some friction both for low-friction tracks and for the track shown in Figure 4.2, this friction is so small that it can be ignored during an experiment. For example, if the track in Figure 4.2 is horizontal, carts move along its length without slowing down appreciably. In other words:

In the absence of friction, objects moving along a horizontal track keep moving without slowing down.

Another advantage of using such carts is that the track constrains the motion to being along a straight line. We can then use a high-speed camera to record the cart's position at various instants, and from that information determine its speed and acceleration.

4.1 (*a*) Are the accelerations of the motions shown in Figure 4.1 constant? (*b*) For which surface is the acceleration largest in magnitude?

No friction at all seems impossible. Isn't there always some friction in any real case.

In the preceding two chapters, we developed a mathematical framework for describing motion along a straight line. In this chapter, we continue our study of motion by investigating inertia, a property of objects that affects their motion. The experiments we carry out in studying inertia lead us to discover one of the most fundamental laws in physics—conservation of momentum.

4.1 Friction

Picture a block of wood sitting motionless on a smooth wooden surface. If you give the block a shove, it slides some distance but eventually comes to rest. Depending on the smoothness of the block and the smoothness of the wooden surface, this stopping may happen sooner or it may happen later. If the two surfaces in contact are very smooth and slippery, the block slides for a longer time interval than if the surfaces are rough or sticky. This you know from everyday experience: A hockey puck slides easily on ice but not on a rough road.

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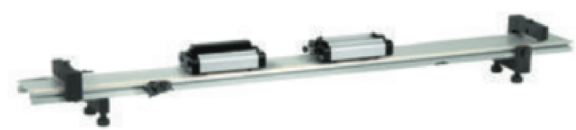
No friction at all seems impossible. Isn't there always some friction in any real case. Nov 1 4:41 pm

Enter your comment or question and press Enter

Figure 4.2 Low-friction track and carts used in the experiments described in this chapter.



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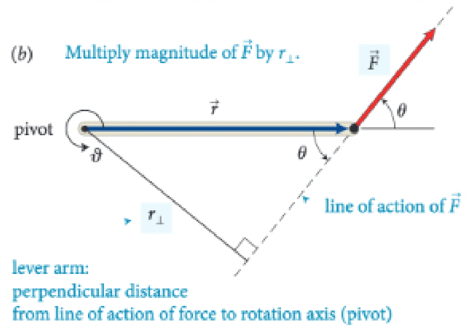


action of the force and the axis of rotation. So, the torque caused by a force exerted on an object is the product of the magnitude of the force and its lever arm distance. It can be written equivalently as $rF_\perp$ and as $r_\perp F$.

Like other rotational quantities, torque carries a sign that depends on the choice of direction for increasing ϑ. In Figure 12.4, for example, the torque caused by $\vec{F}_1$ about the pivot tends to rotate the rod in the direction of increasing ϑ and so is positive; the torque caused by $\vec{F}_2$ is negative. The sum of the two torques about the pivot is then $r_1F_1 + (-r_2F_2)$. As we've seen, the two torques are equal in magnitude when the rod is balanced, and so the sum of the torques is zero. When the sum of the torques is not zero, the rod's rotational acceleration is nonzero, and so its rotational velocity and angular momentum change.

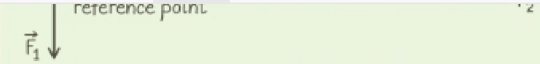
In the situations depicted in Figures 12.4 and 12.5 we used the pivot to calculate the lever arm distances. This is a natural choice because that is the point about which the object under consideration is free to rotate. However, torques also play a role for stationary objects that are suspended or supported at several different points and that are not free to rotate—for example, a plank or bridge supported at either end. To determine what reference point to use in such cases, complete the following exercise.

CONCEPTS

Exercise 12.1 Reference point

Consider again the rod in Figure 12.4. Calculate the sum of the torques about the left end of the rod.

SOLUTION I begin by making a sketch of the rod and the three forces exerted on it, showing their points of application on the rod (Figure 12.6).



The lever arm distances must now be determined relative to the left end of the rod. The lever arm distance of force $\vec{F}_1$ to this point is zero, and so the torque caused by that force about the left end of the rod is zero. If I choose counterclockwise as the positive direction of rotation, $\vec{F}_2$ causes a negative torque about the left end of the rod; the force $\vec{F}^c_{pr}$ exerted by the pivot causes a positive torque about the left end of the rod. The lever arm distance of $\vec{F}_2$ about the left end of the rod is $r_1 + r_2$; that of $\vec{F}^c_{pr}$ is r_1. Because the rod is at rest, the magnitude of the force exerted by the pivot is equal to the sum of the forces $\vec{F}_1$ and $\vec{F}_2$. Taking into account the signs of the torques, we find that the sum of the torques about the left end of the rod is $r_1(F_1 + F_2) - (r_1 + r_2)F_2 = r_1F_1 - r_2F_2$. This is the same result we obtained for the torques about the pivot, and so the sum of the torques about the left end is zero. ✔

Exercise 12.1 shows that the sum of the torques about the left end of the rod is zero, just like the sum of the torques about the pivot. You can repeat the calculation for the torques about the right end of the rod or any other point, and each time you will find that the sum of the torques is zero. The reason is that the rod is not rotating about any point, and so the sum of the torques must be zero about any point. In general we can say:

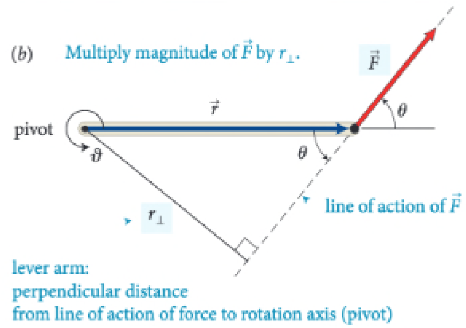
For a stationary object, the sum of the torques is zero.

For a stationary object we can choose any reference point we like to calculate torques. It pays to choose a reference point that simplifies the calculation. As you have seen, we do not need to consider any force that is exerted at the reference point. So, by putting the reference point at the point of application of a force, we can eliminate that force from the calculation.

12.2 In the situation depicted in Figure 12.2*a*, you must continue to exert a force on the seesaw to keep the child off the ground. The force you exert causes a torque on the seesaw, and yet the seesaw's rotational acceleration is zero. How can this be if torques cause objects to accelerate rotationally?

Example 12.2 Torques on lever

Three forces are exerted on the lever of Figure 12.7. Forces $\vec{F}_1$ and $\vec{F}_3$ are equal in magnitude, and the magnitude of $\vec{F}_2$ is half as great. Force $\vec{F}_1$ is horizontal, $\vec{F}_2$ and $\vec{F}_3$ are vertical, and the lever makes an angle of 45° with the horizontal. Do these forces cause the lever to rotate about the pivot? If so, in which direction?



action of the force and the axis of rotation. So, the torque caused by a force exerted on an object is the product of the magnitude of the force and its lever arm distance. It can be

I don't understand how this combination of factors tells you anything about direction? Aren't magnitude and lever arm distance both scalar quantities? It seems like we would need to know some sort of direction to calculate torque. Oct 20 12:09 am

SB I think you may be able to think about the direction separately. So, after multiplying this magnitude and distance, you can attach a sign to the torque based on the defined parameters of the system. In the following paragraph, they start to explain how to choose this direction. Oct 20 12:38 am

This is a great question. To further elaborate on this, we can think of this in terms of the Torque equation. The equation for torque is τ = r X F, with r being the level arm distance and F being force. We know that force is a vector vector from previous chapters, and in regards to "r" it can also be thought of as the radial vector. What this means is that this distance from the pivot points from the axis of rotation to the point where the force acts. In as previously mentioned, there is a general convention (the right-hand rule) that is used to determine the direction which happens to be perpendicular to both the radius from the axis and to the force. Oct 22 8:48 pm

Enter your comment or question and press Enter

reference point

$\vec{F}_1$

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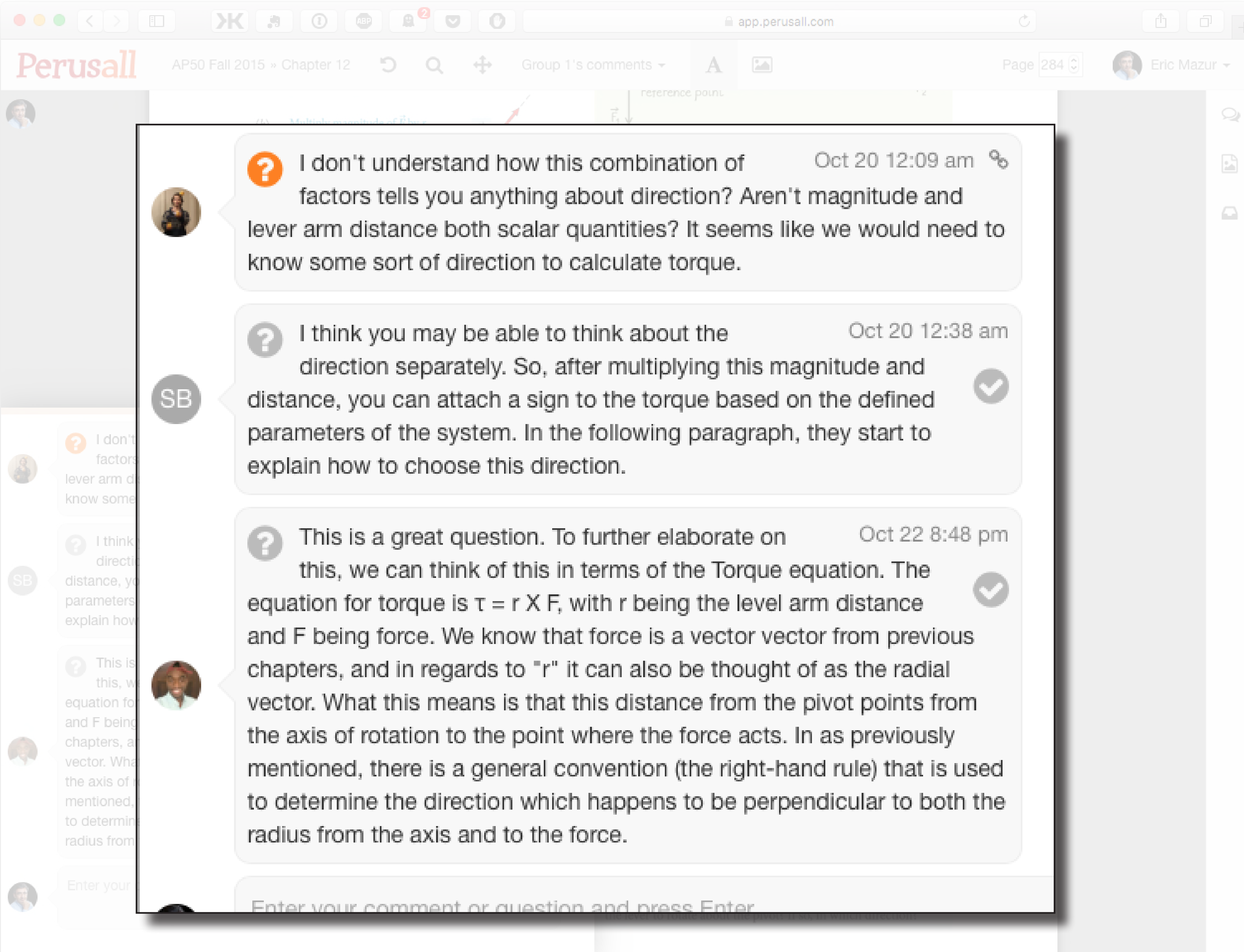
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Page 284
Eric Mazur
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Oct 22 8:48 pm
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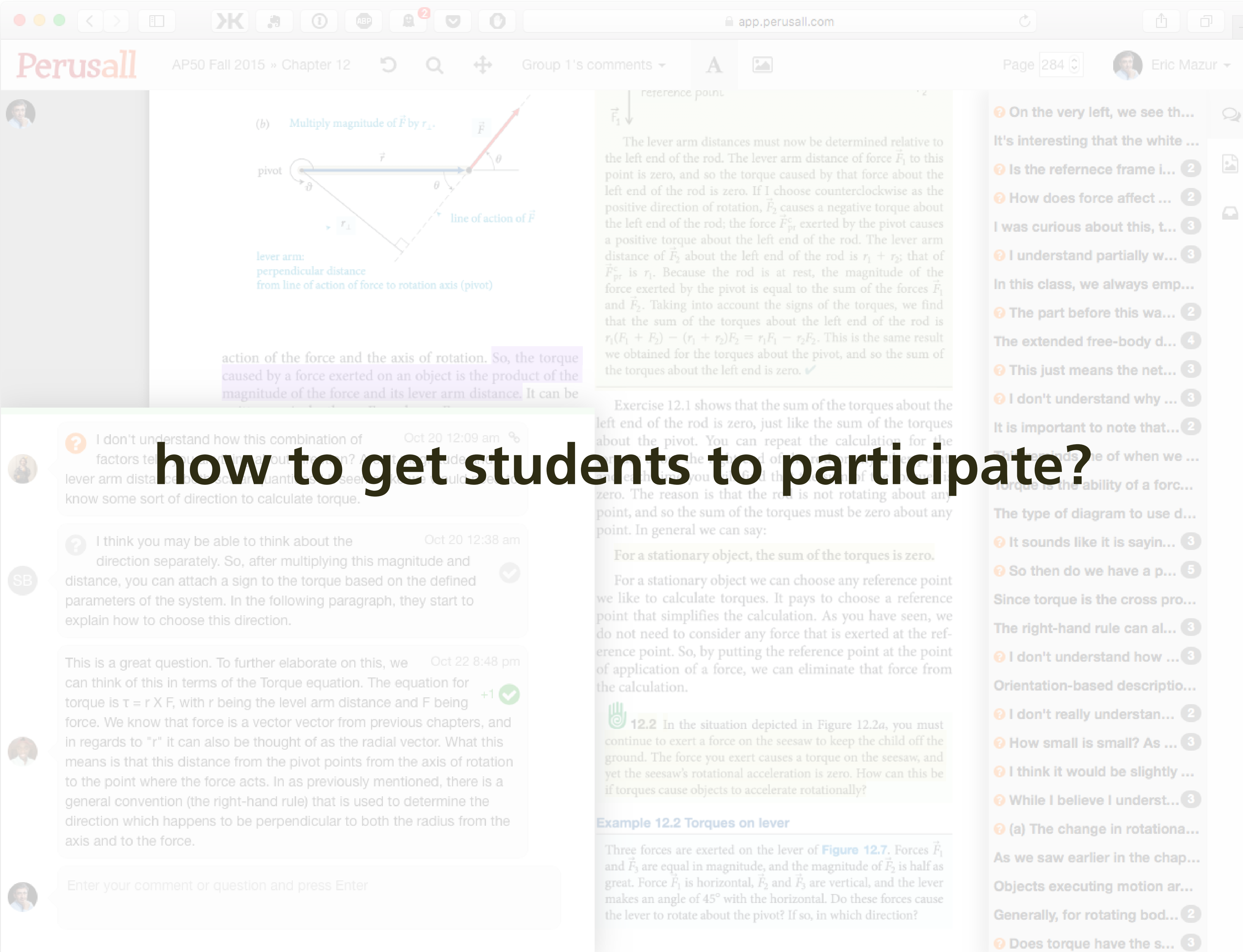
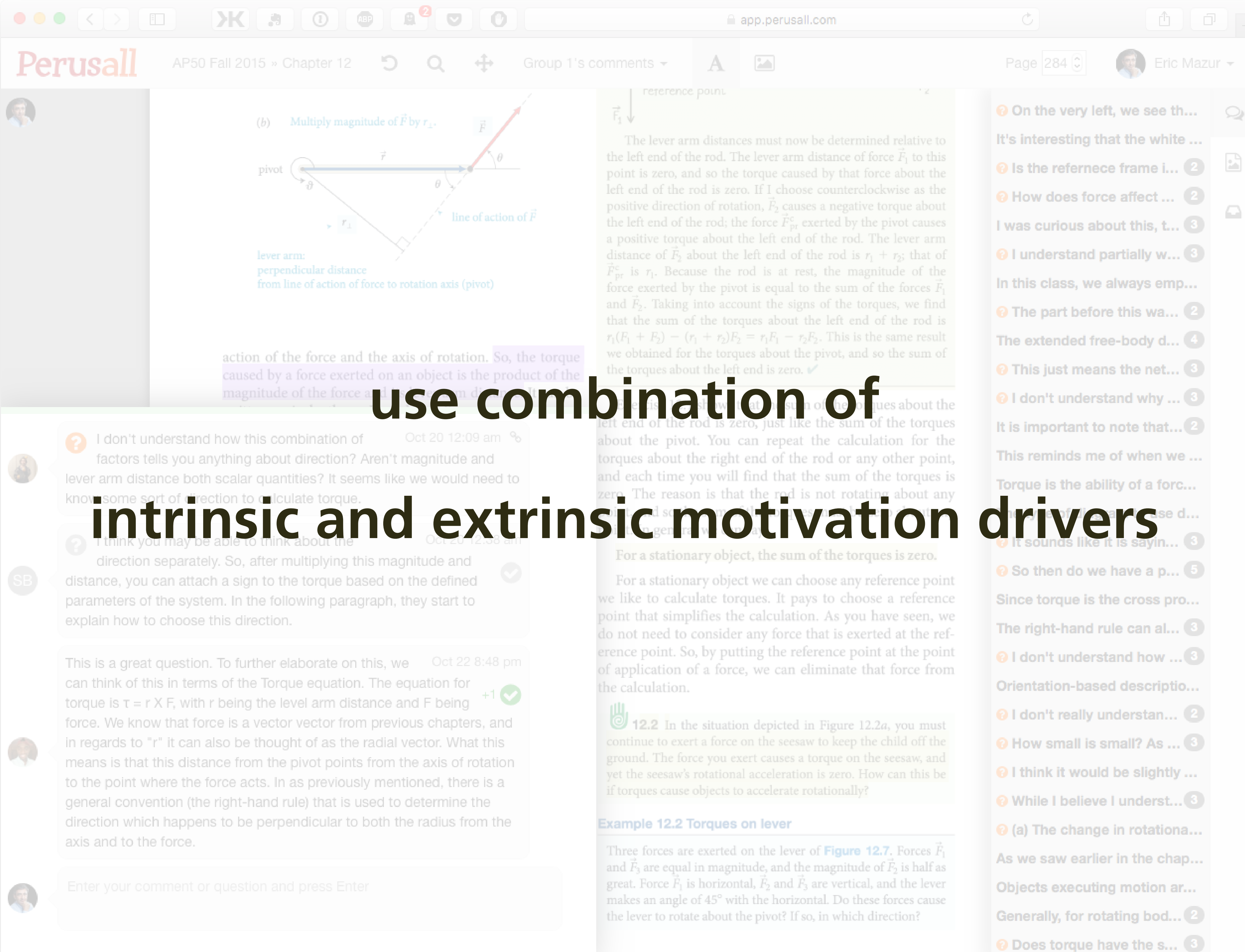
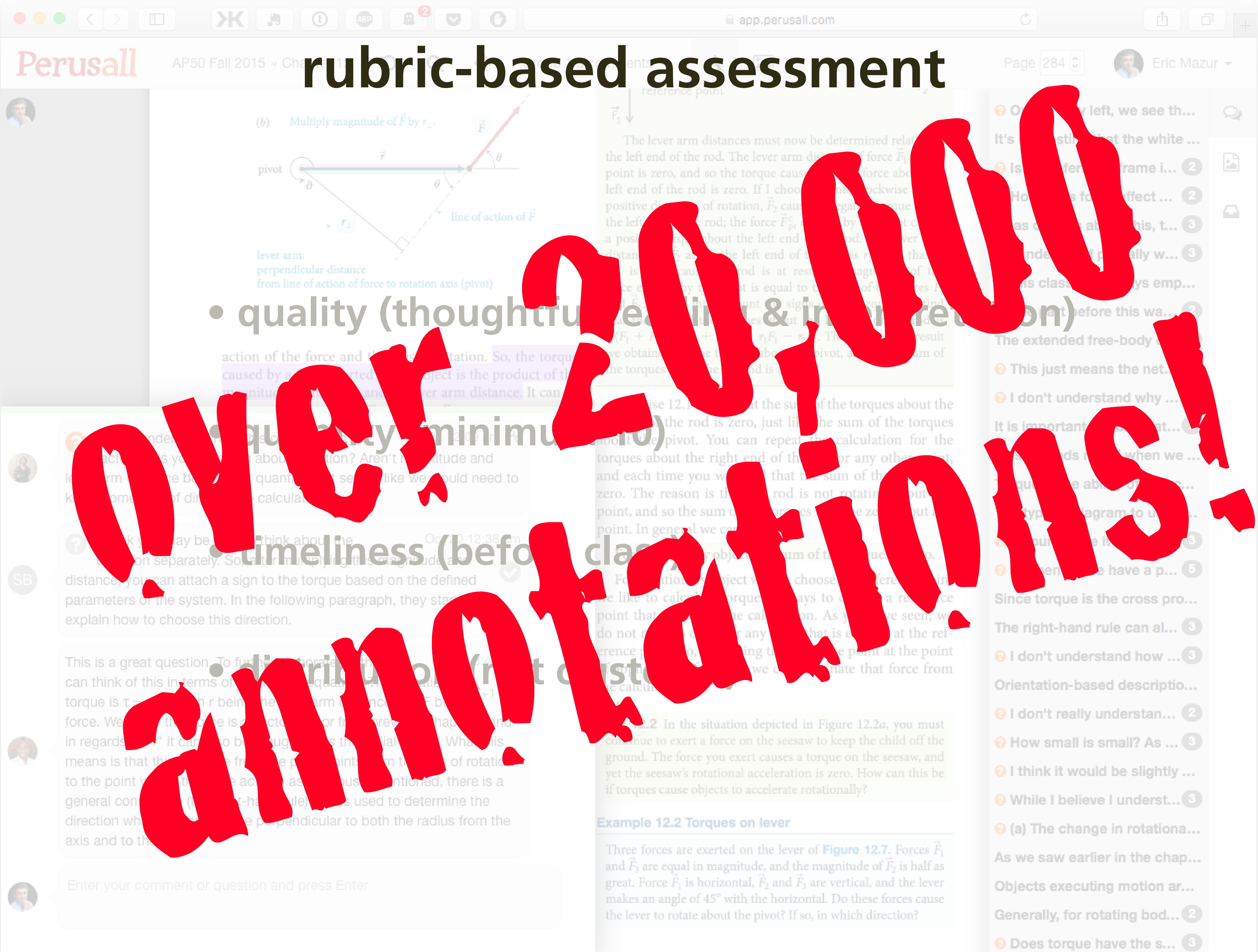
how to get students to participate?





use combination of intrinsic and extrinsic motivation drivers


rubric-based assessment
over 20,000 annotations!

rubric-based assessment

- quality (thoughtful reading & interpretation)
- quantity (minimum 10)
- timeliness (before class)
- distribution (not clustered)

how do you process all of that??

rubric-based assessment

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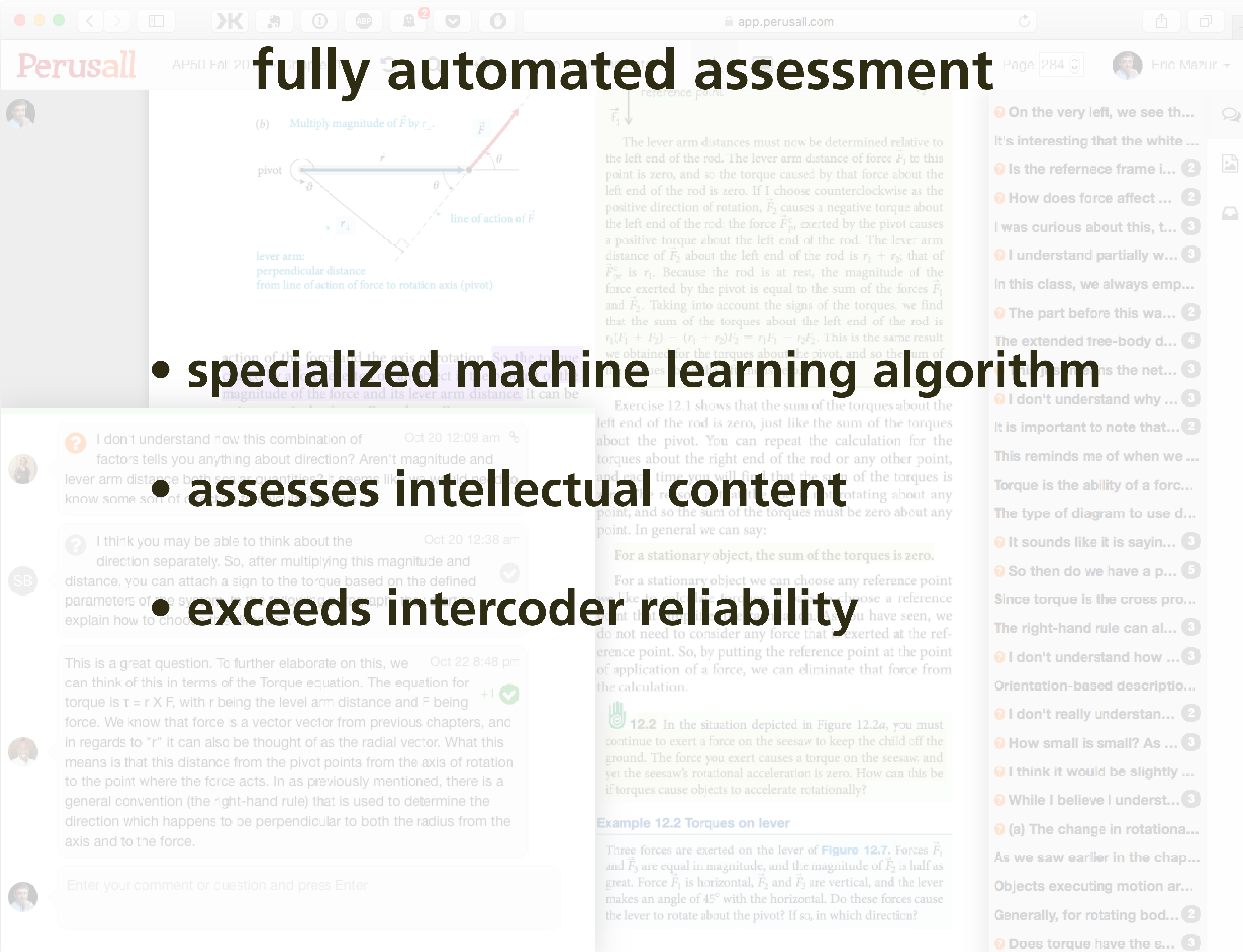
- quantity (minimum 10)
- timeliness (before class)
- distribution (not clustered)

how do you process all of that??

fully automated assessment

fully automated assessment



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- assesses intellectual content
- exceeds intercoder reliability

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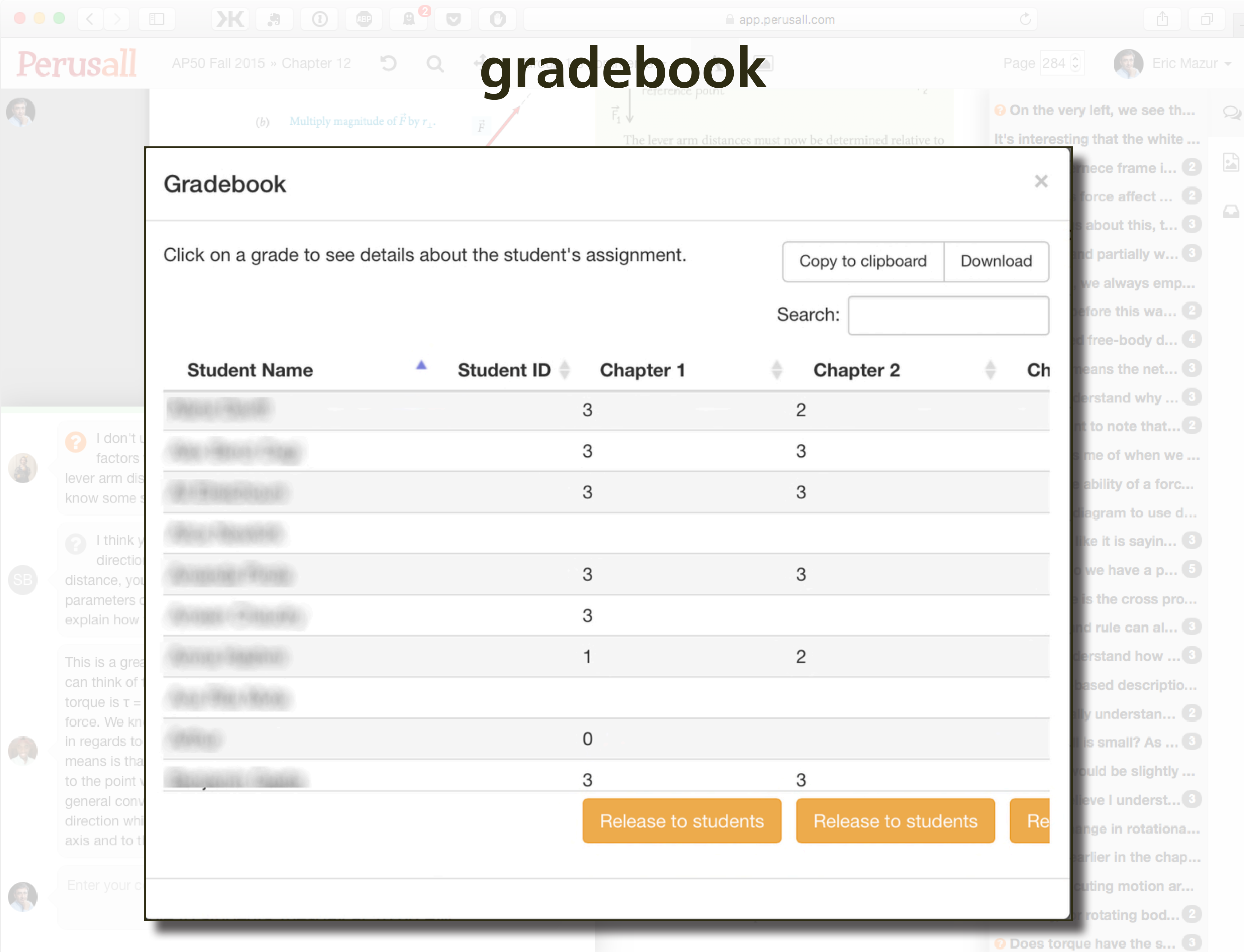
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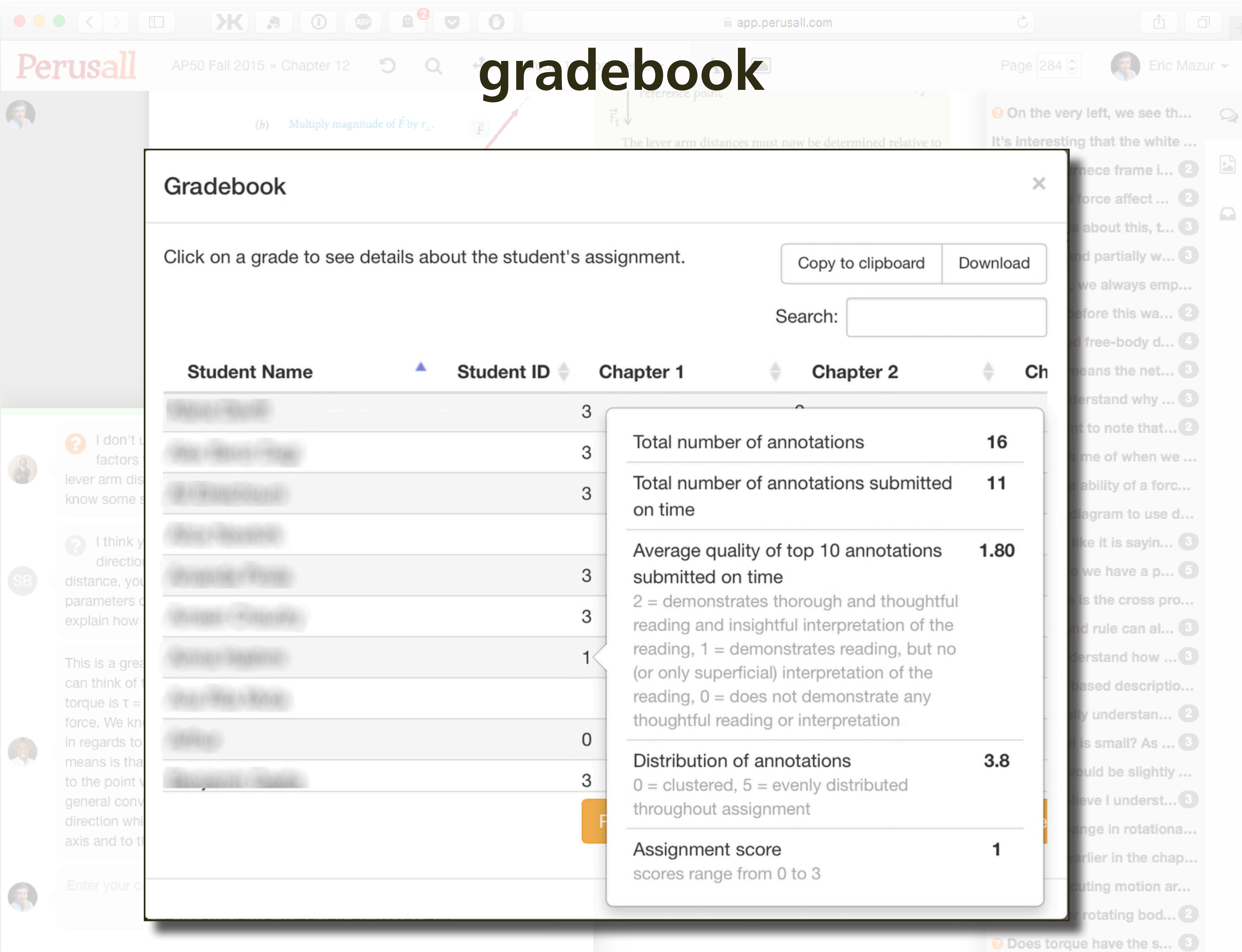
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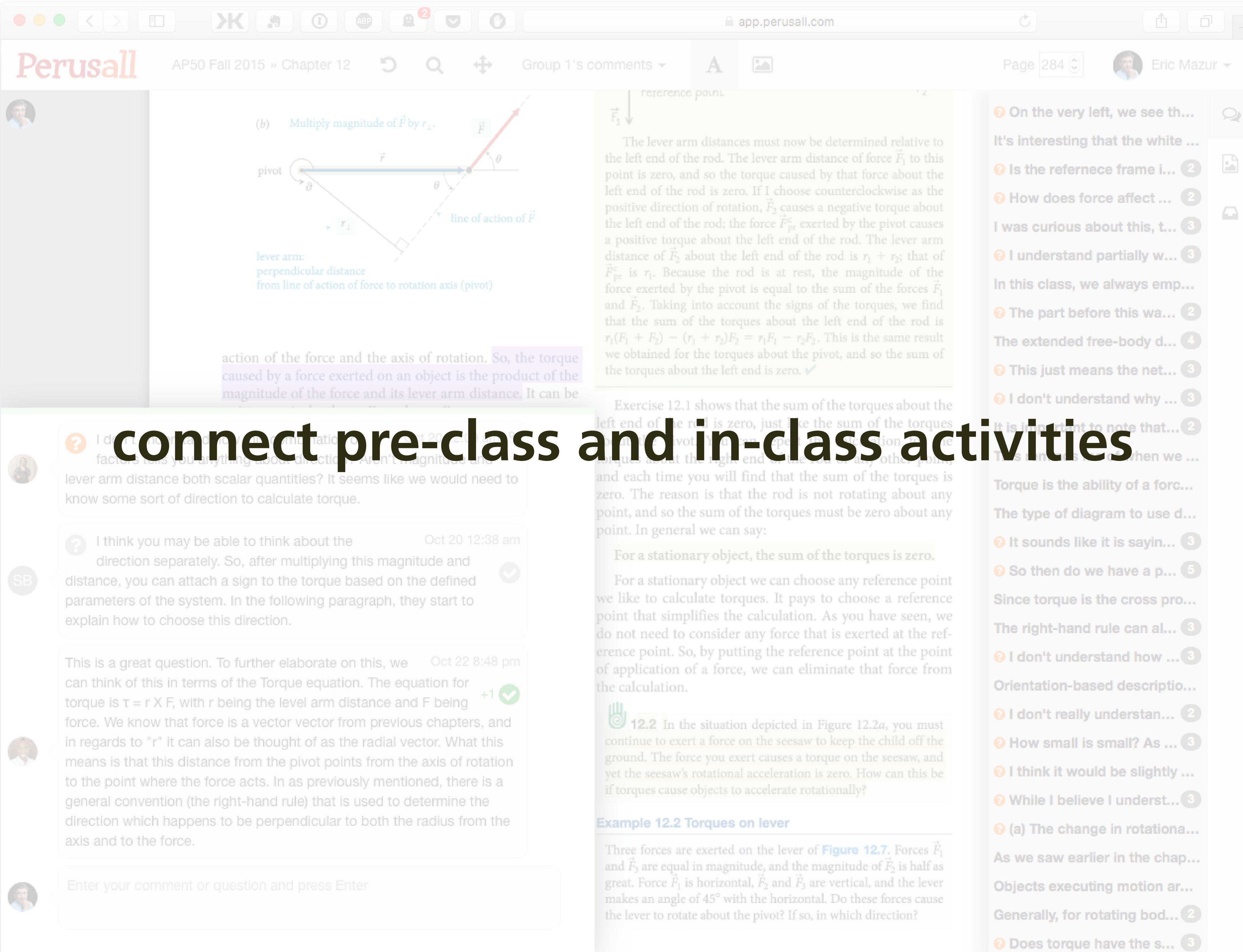
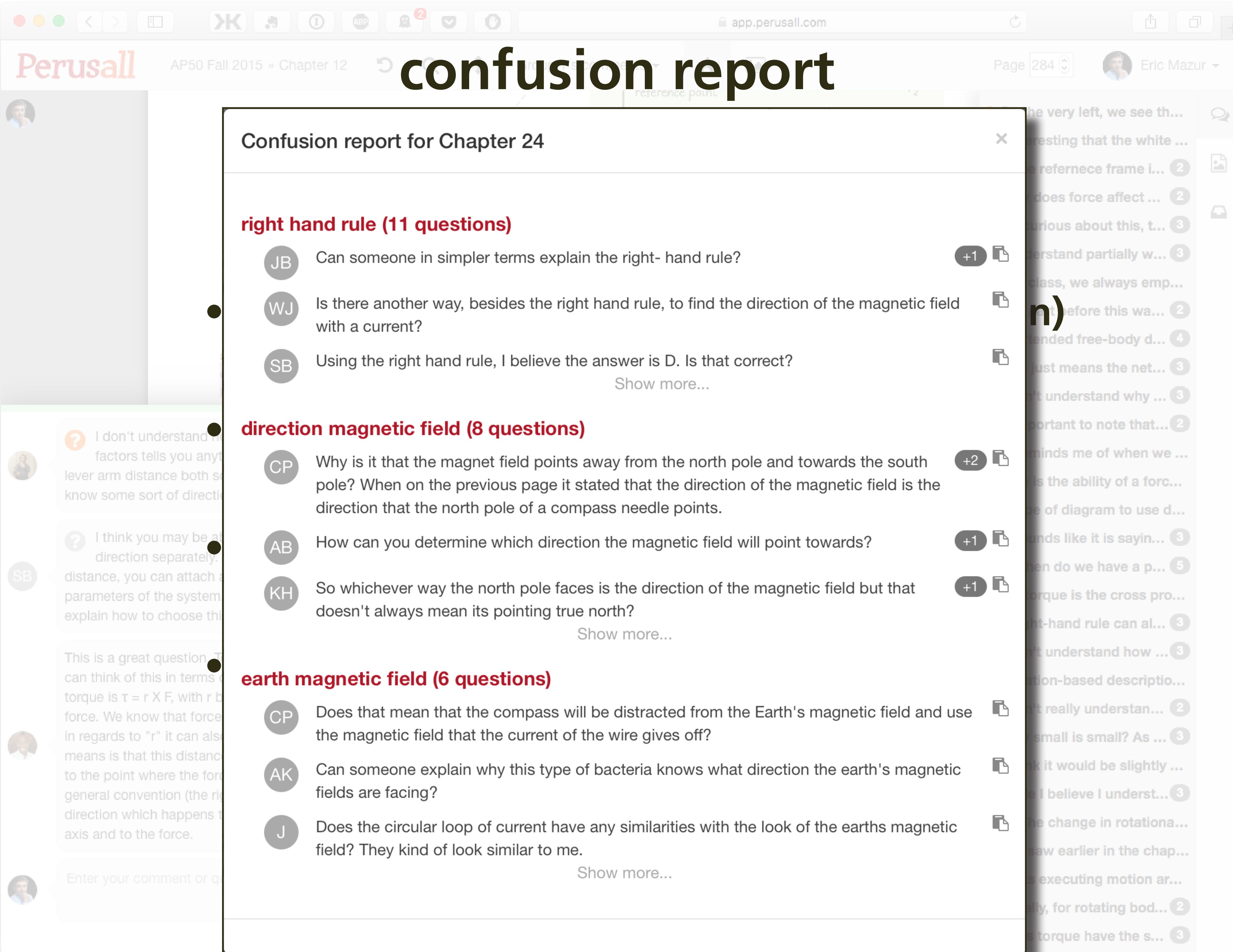
Total number of annotations submitted on time 11
Average quality of top 10 annotations submitted on time 1.80
2 = demonstrates thorough and thoughtful reading and insightful interpretation of the reading, 1 = demonstrates reading, but no (or only superficial) interpretation of the reading, 0 = does not demonstrate any thoughtful reading or interpretation
Distribution of annotations 3.8
0 = clustered, 5 = evenly distributed throughout assignment
Assignment score 1
scores range from 0 to 3



connect pre-class and in-class activities

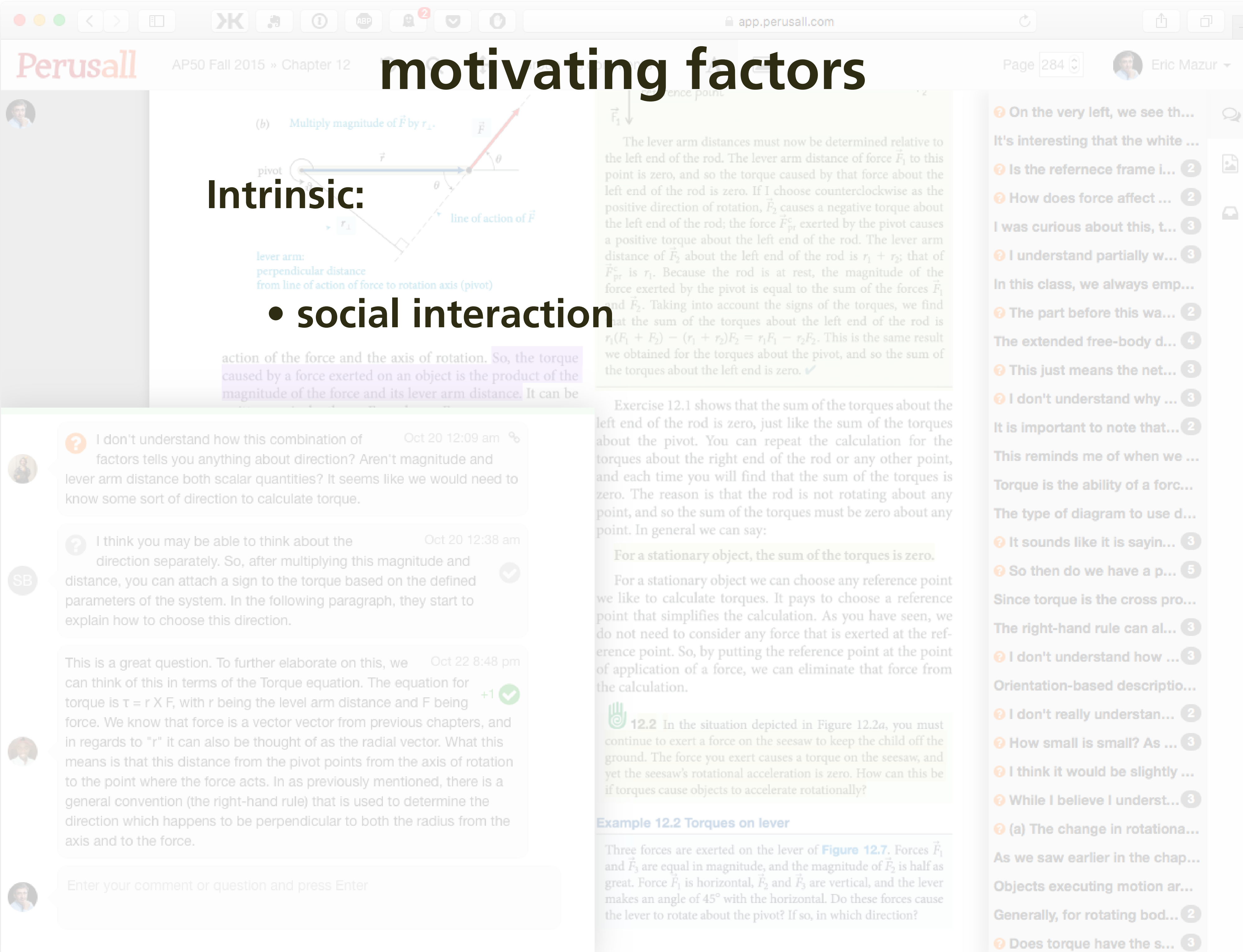
confusion report



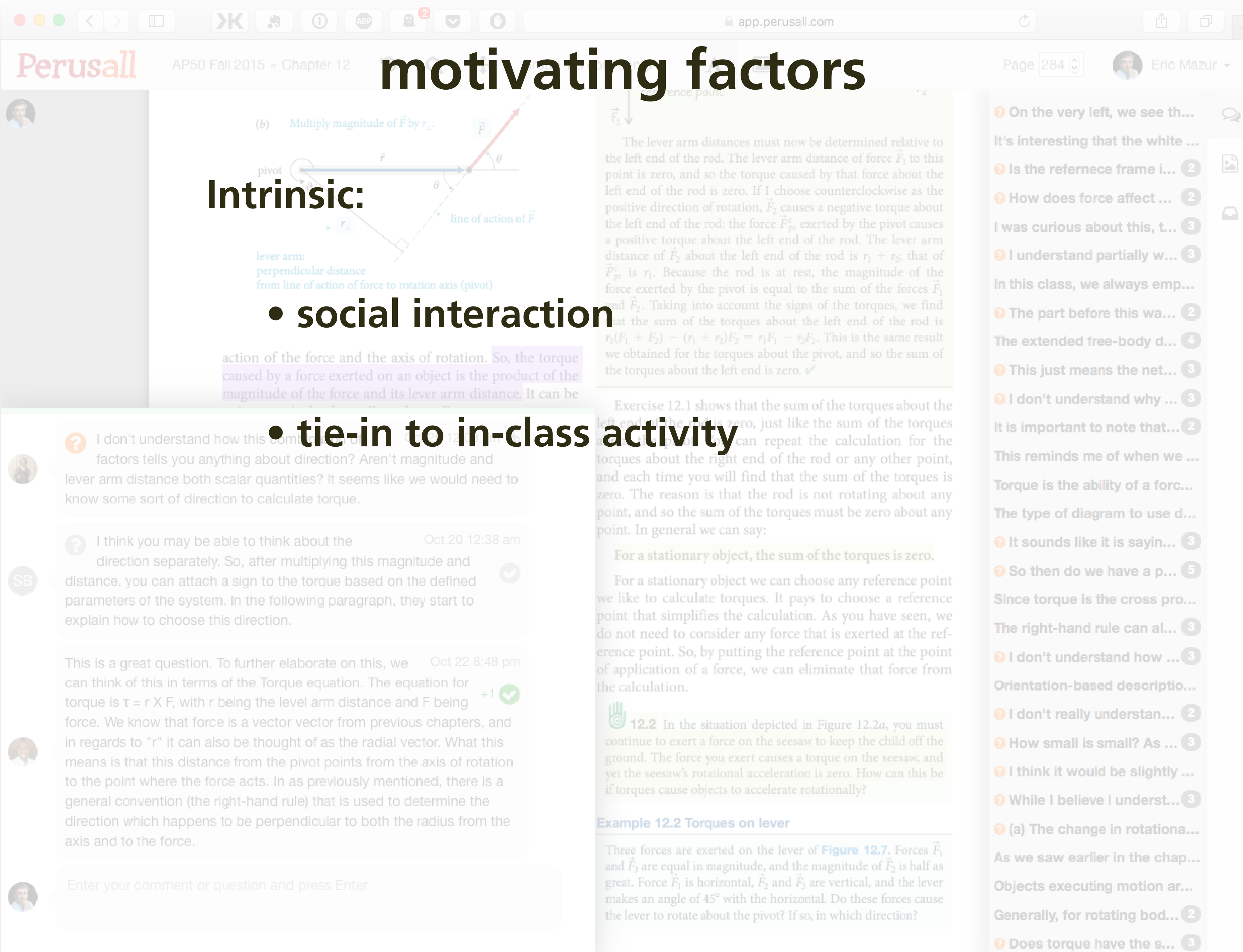
motivating factors

Intrinsic:

- social interaction



motivating factors



Intrinsic:

- social interaction
- tie-in to in-class activity

motivating factors

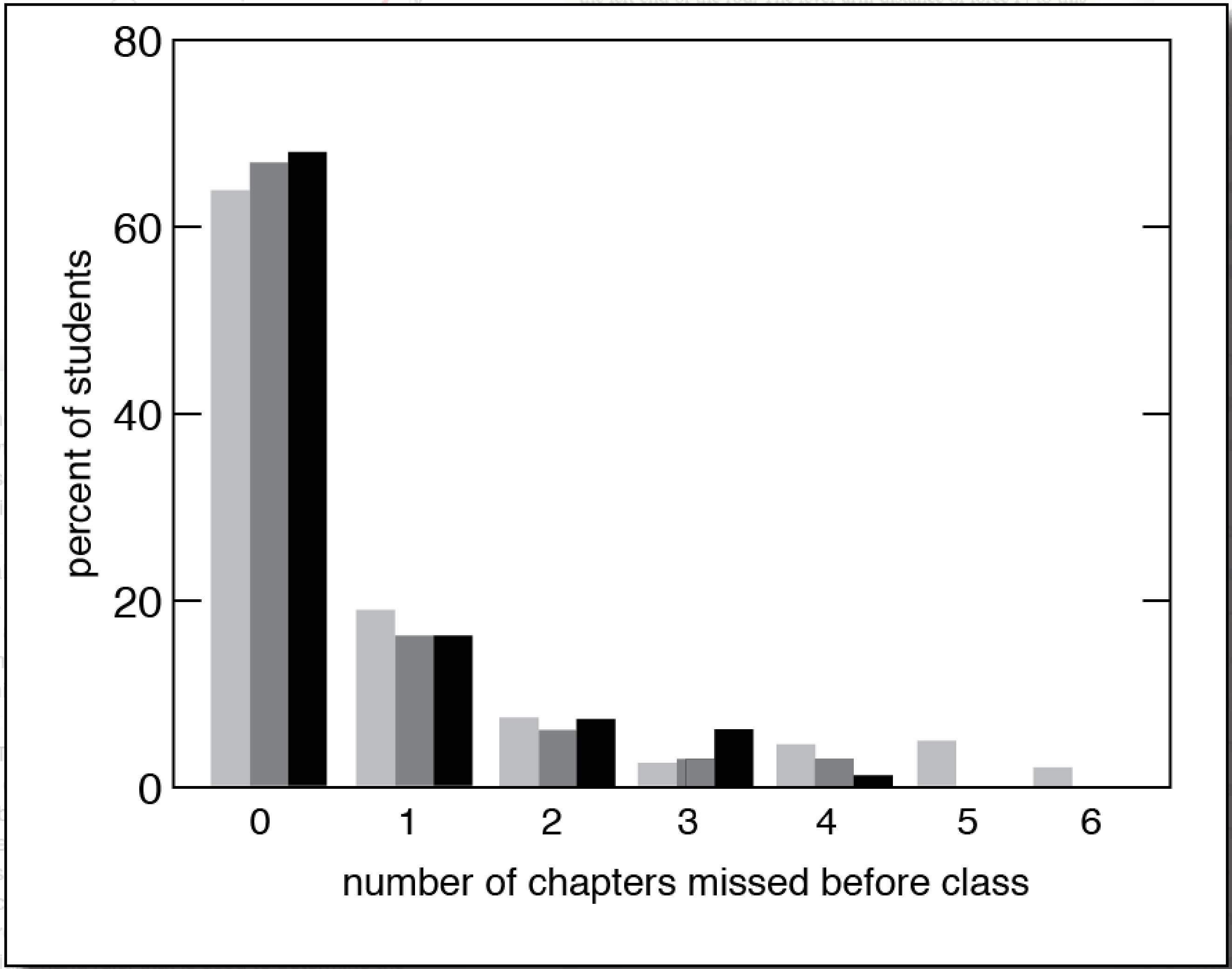
Intrinsic:

- social interaction
- tie-in to in-class activity

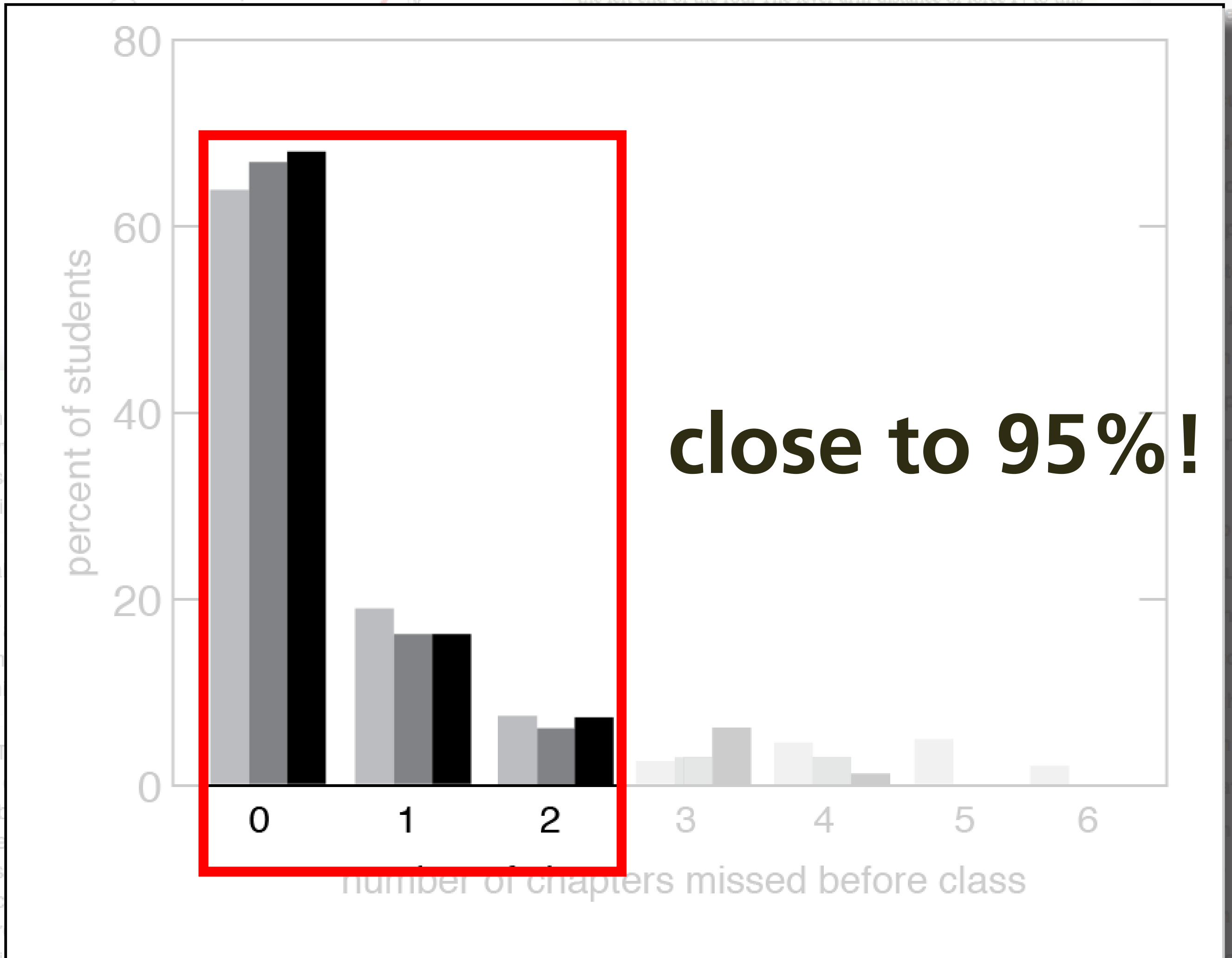
Extrinsic:

- assessment (fully automated)

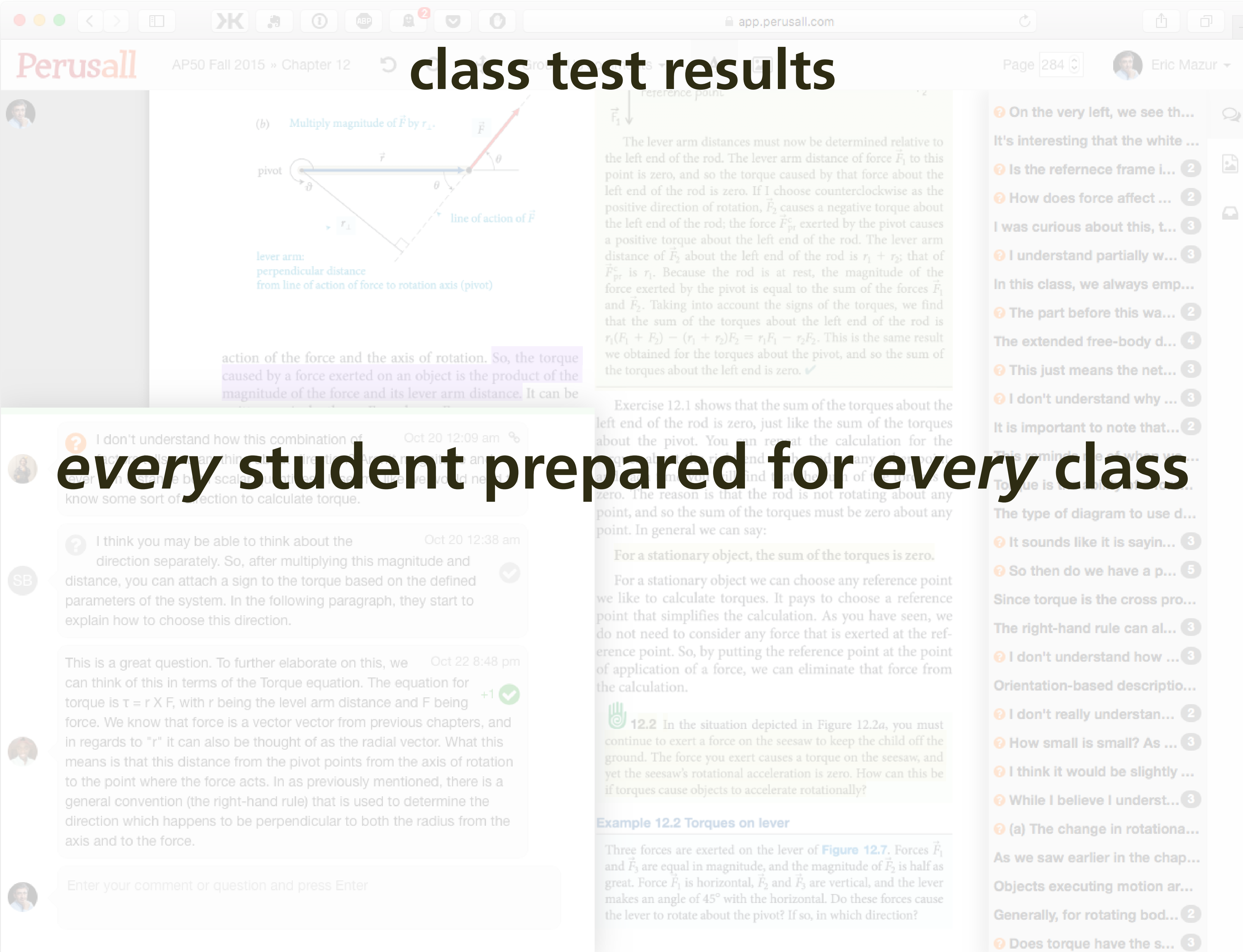
class test results



class test results



class test results



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information transfer

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in class

sense-making

Peer Instruction

Works online!

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information transfer

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sense-making

Peer Instruction

Education is not just about:

- transferring information
- getting students to do what we do

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- getting students to do what we do

active engagement/social interaction a must!

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