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# Active Learning in Mathematics Intellectual, Social, and Physical

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# Intellectually Active Learning

Conceptual Understanding, not just memorizing procedures

Focus on Problem-Solving

Focus on Critical Thinking

Mathematical Practices

Make sense of problems and persevere in solving them

Reason abstractly and quantitatively

Construct viable arguments and critique the reasoning of others

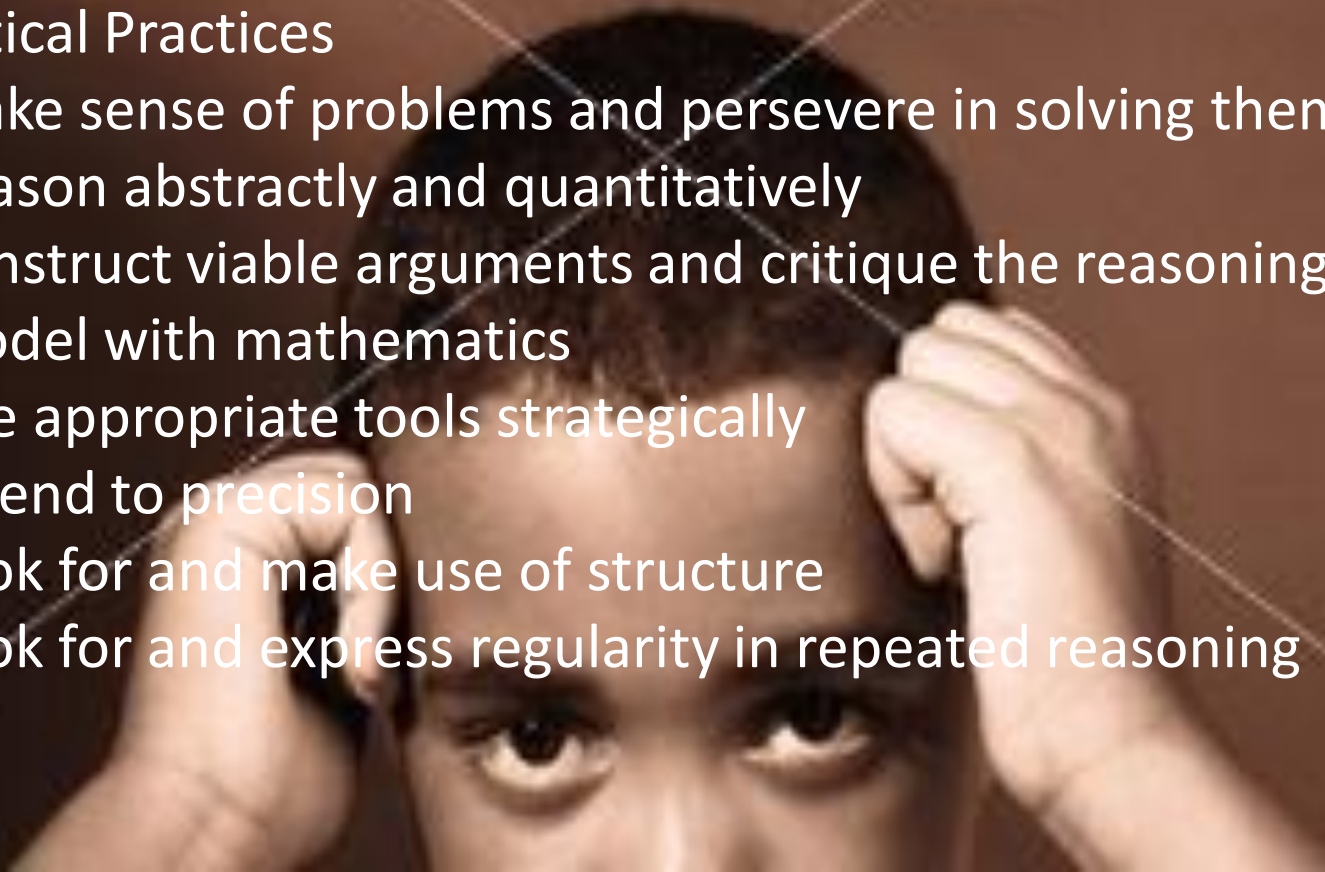
Model with mathematics

Use appropriate tools strategically

Attend to precision

Look for and make use of structure

Look for and express regularity in repeated reasoning



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# Socially Active Learning

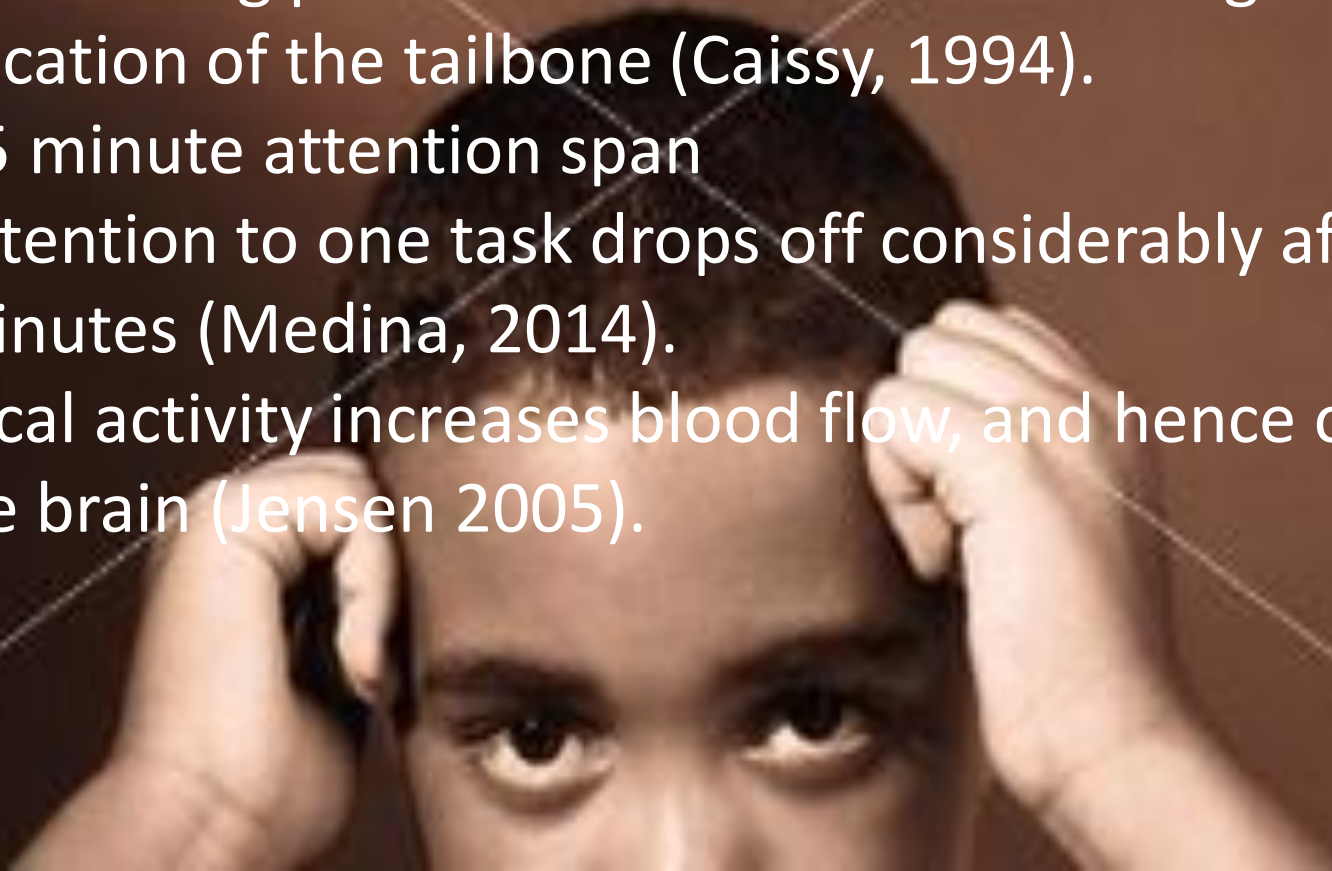
Mathematical discourse is a critical part of learning.

Early adolescents are very peer-oriented, use this to your advantage



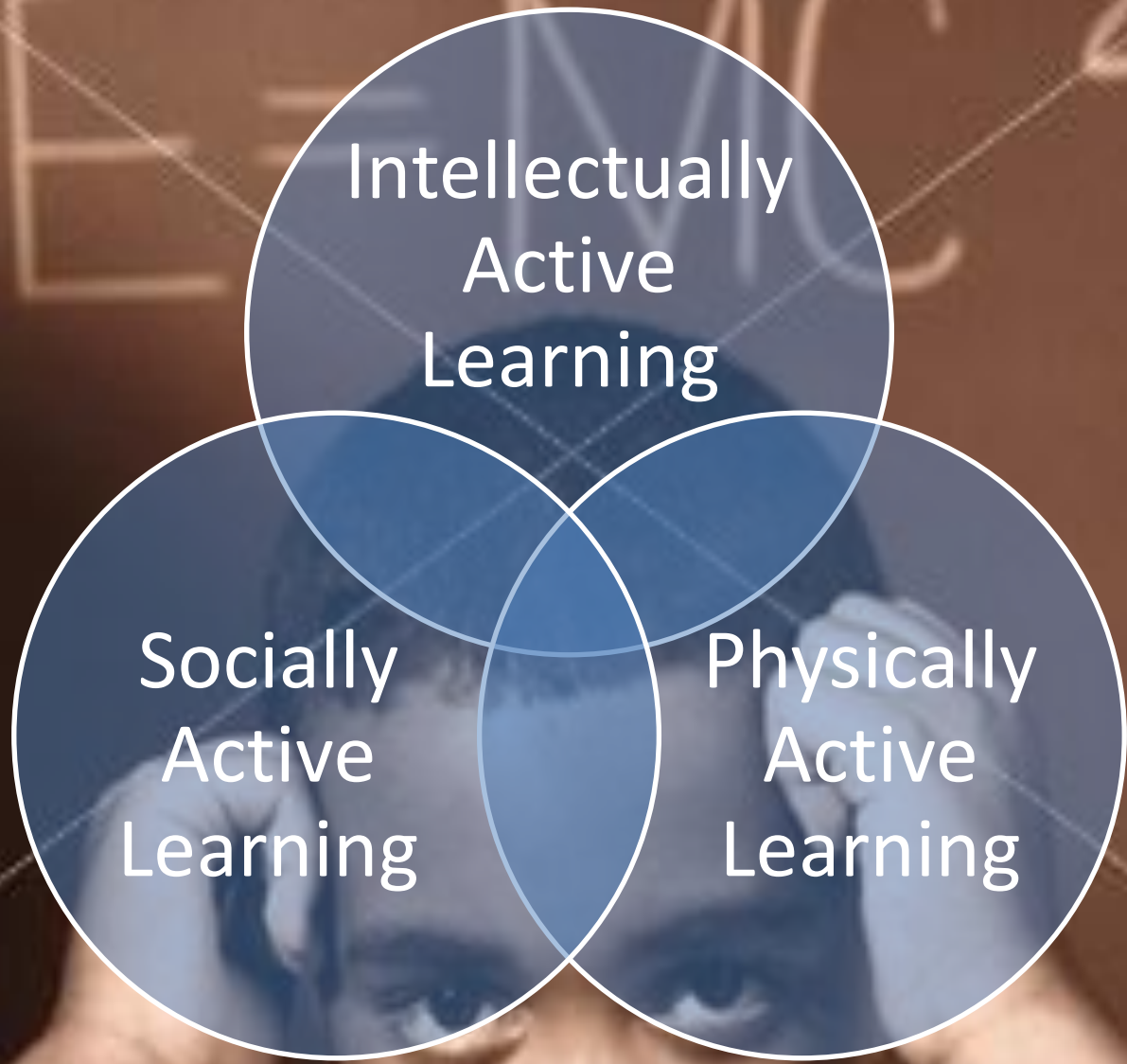
# Physically Active Learning

- Endocrine system is still stabilizing (Brighton, 2007).
  - Bursts of adrenaline
  - Alternating periods of restlessness and fatigue
- Ossification of the tailbone (Caissy, 1994).
- 10-15 minute attention span
  - Attention to one task drops off considerably after 10 minutes (Medina, 2014).
- Physical activity increases blood flow, and hence oxygen, to the brain (Jensen 2005).



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# Active Learning Framework



Intellectually  
Active  
Learning

Socially  
Active  
Learning

Physically  
Active  
Learning

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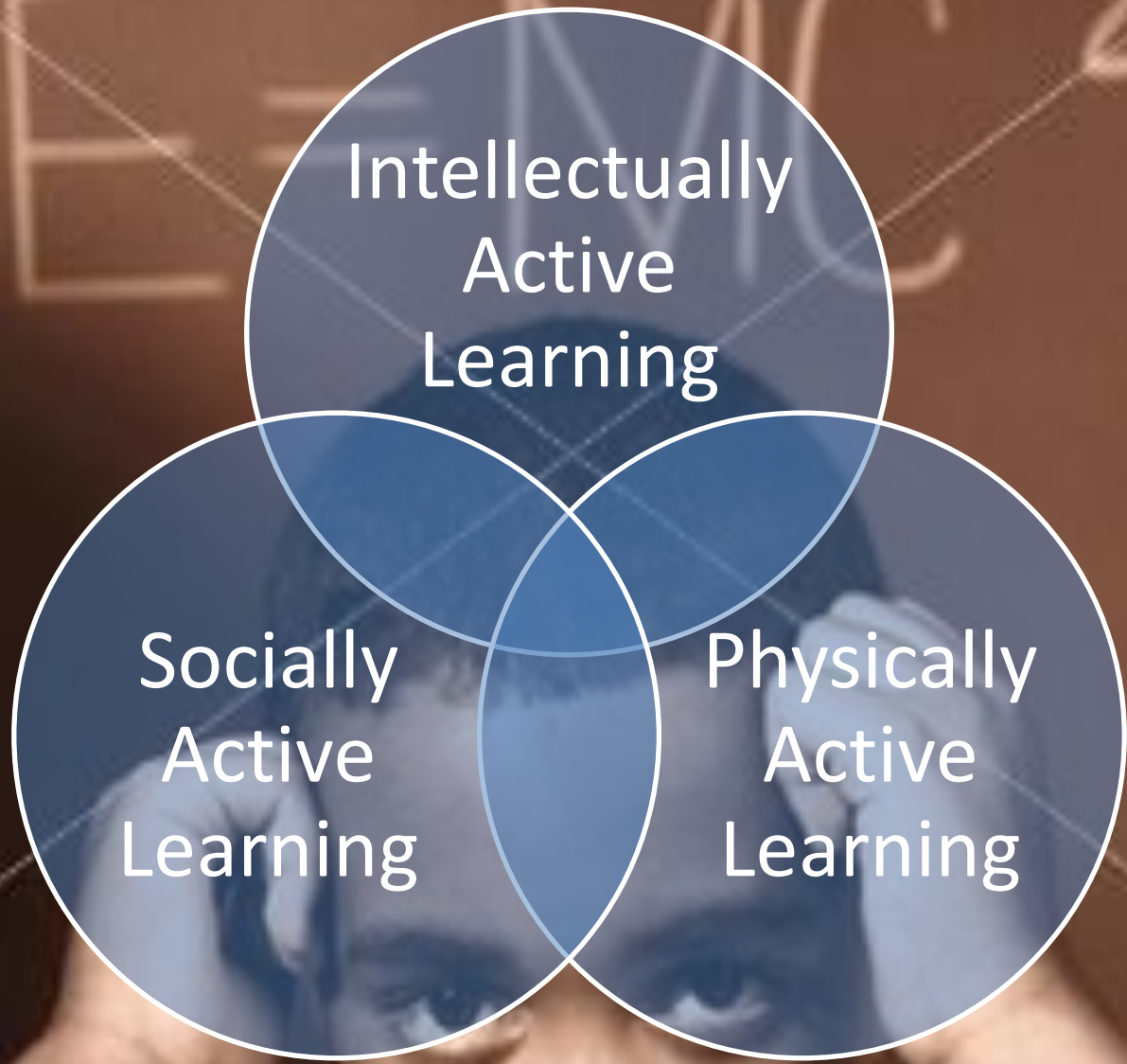
# Scientific Notation Discovering the Rule

$$E=MC^2$$



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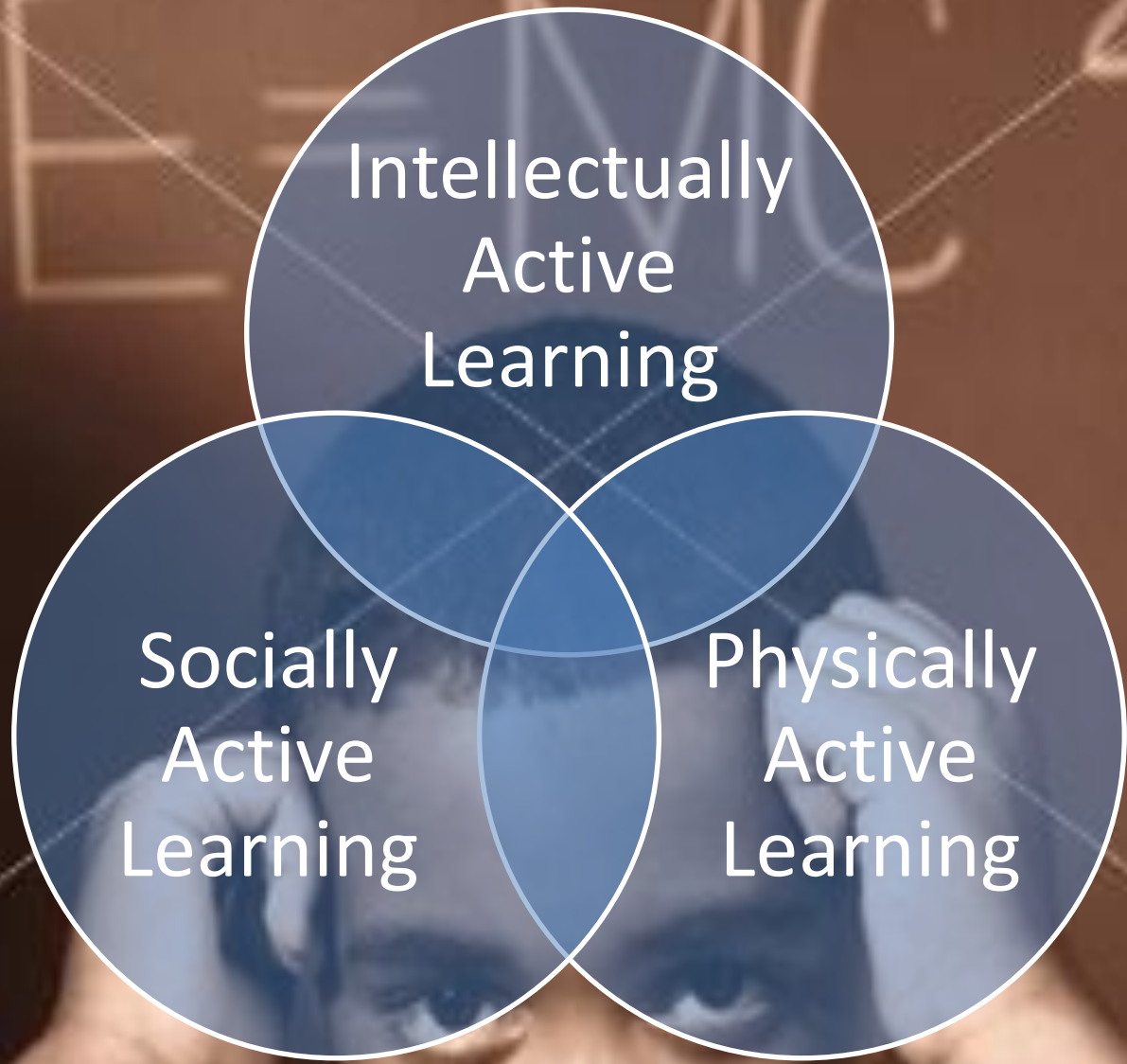
# Soda Can Lab

$$E=MC^2$$



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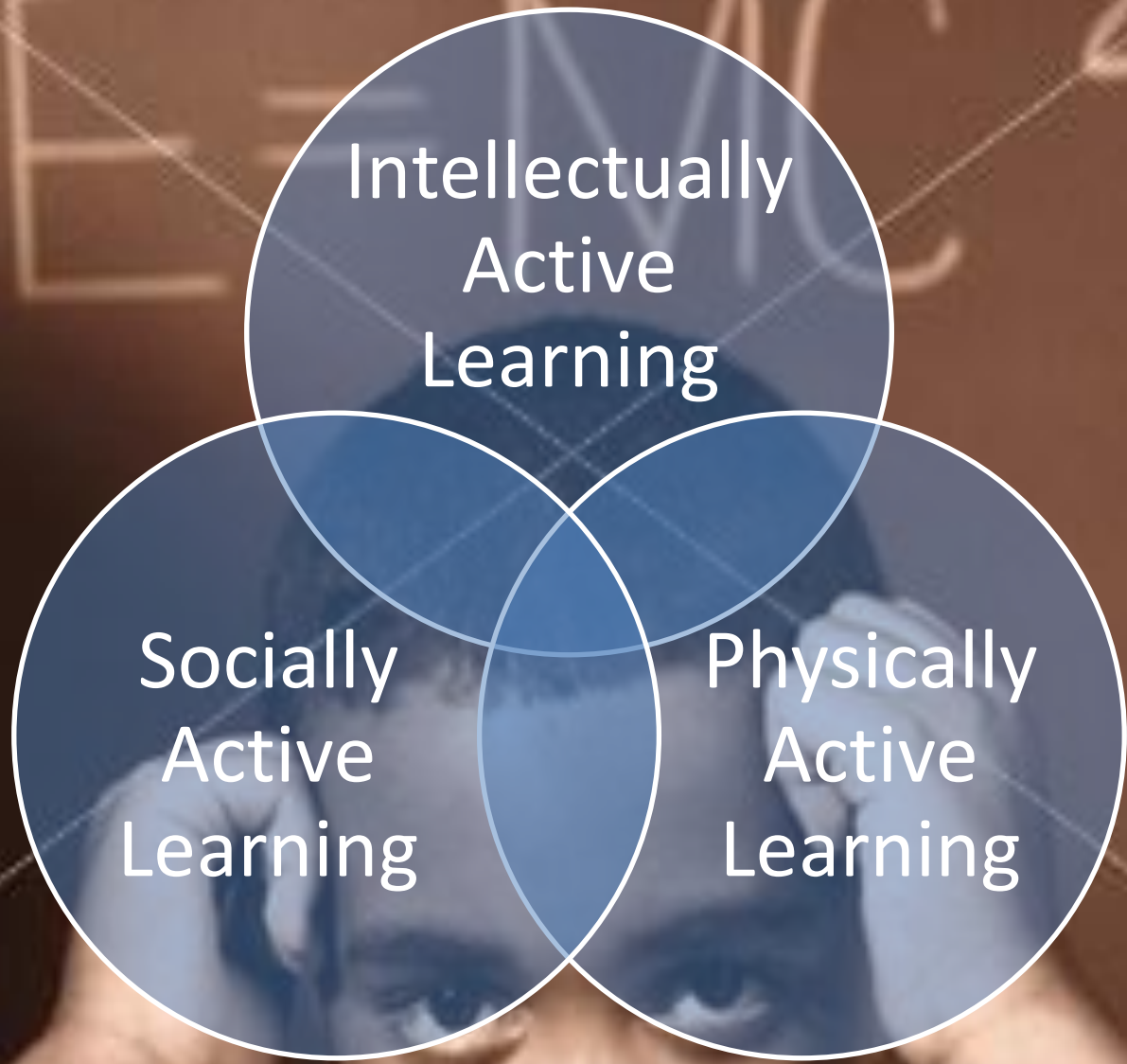
# Car Ramp Problem

$$E = MC^2$$



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# Active Learning Framework



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# Active Learning Logistics

Ease into it

MATHEMATICS on the board

Use active learning as leverage

Toonoisyapp.com

Head it off at the pass

More structure rather than less

Gotchas

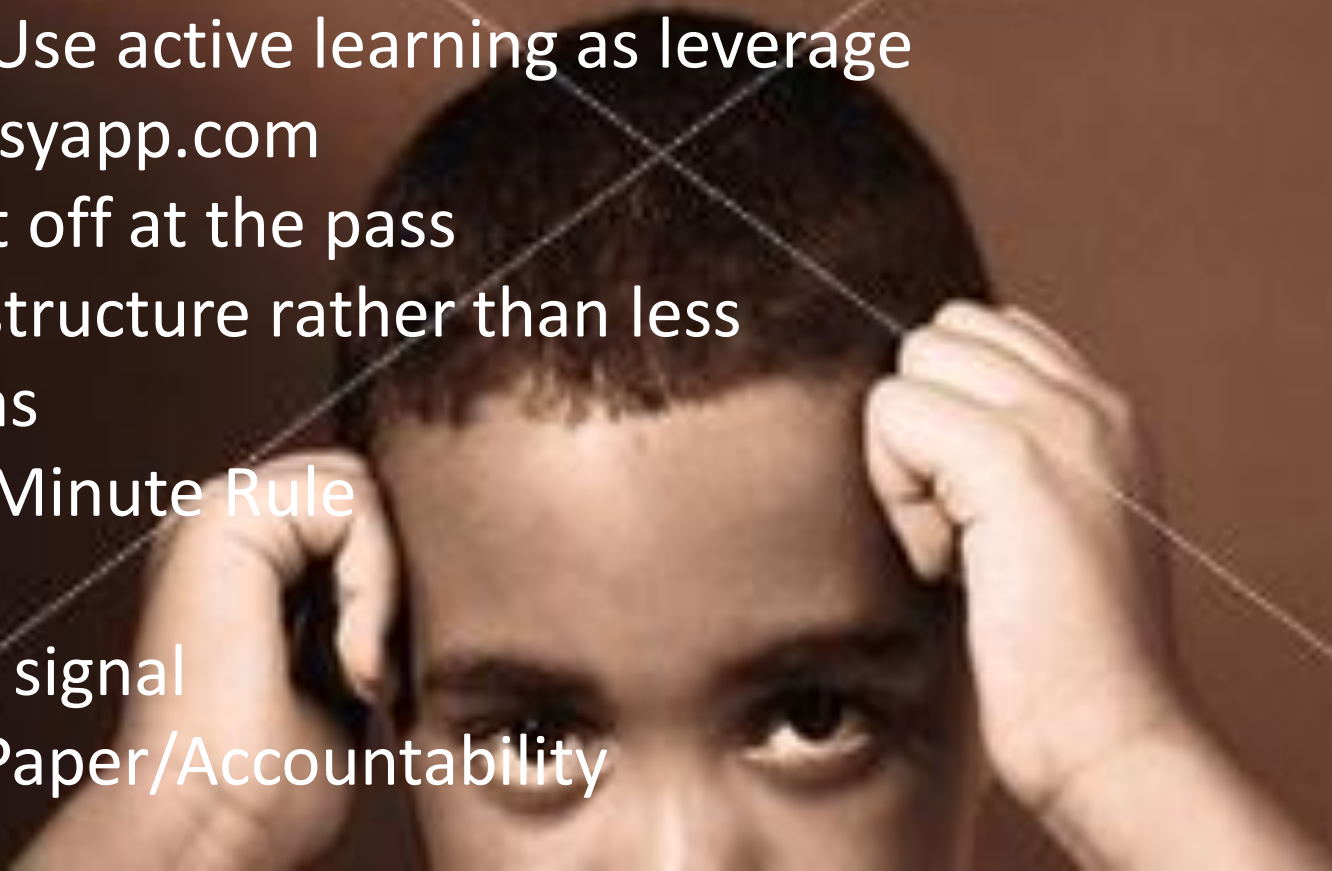
10-15 Minute Rule

Timer

Have a signal

Chart Paper/Accountability

$$E = MC^2$$



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Questions?

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## References

- Brighton, K. (2007). *Coming of age: The education and development of young adolescents*. Westerville, OH: National Middle School Association.
- Caissy, G. (1994). *Early adolescence: Understanding the 10 to 15 year old*. Cambridge, MA: Perseus Publishing.
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