STEVENSON UNIVERSITY

LEARNING GAINS USING KAHOOT!

WITH STUDENT GENERATED QUESTIONS

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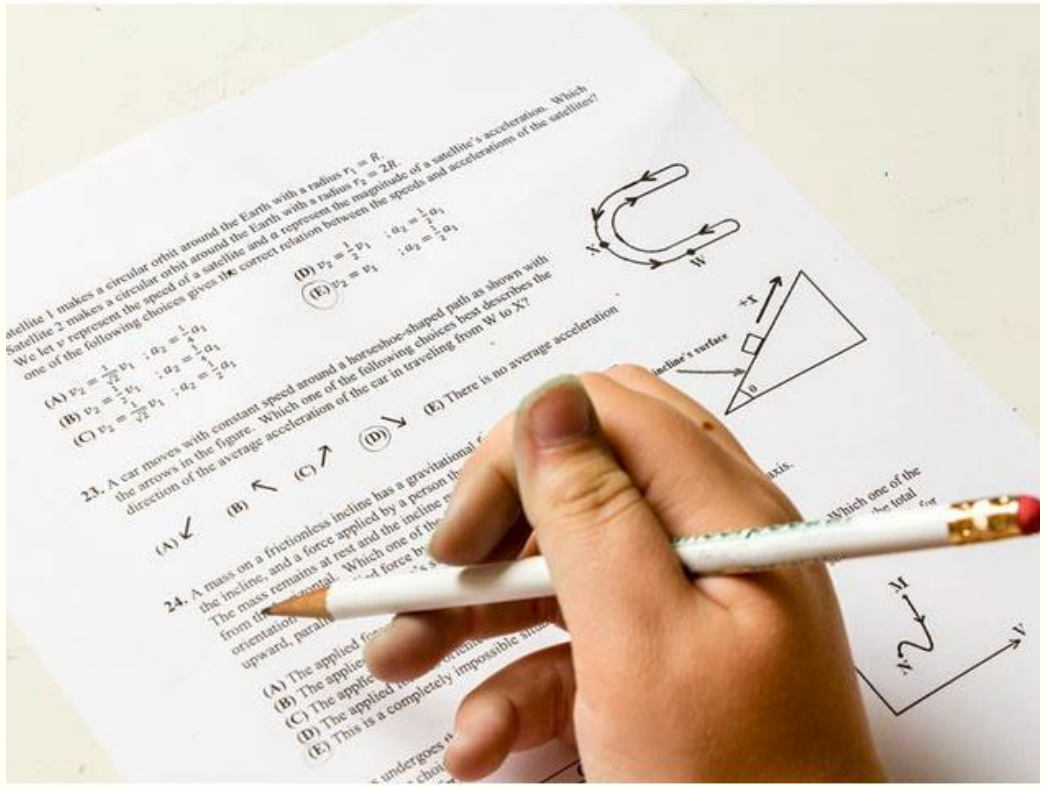
Purpose

Investigate the effect of using Kahoot! in introductory physics courses w/student generated questions.

Agenda

- What led to my work?
- About Kahoot!
- Assessments and Outcomes
- Conclusions
- What's Next?
- References

What led to this work?



Poor performance in conceptual questions on exams!!

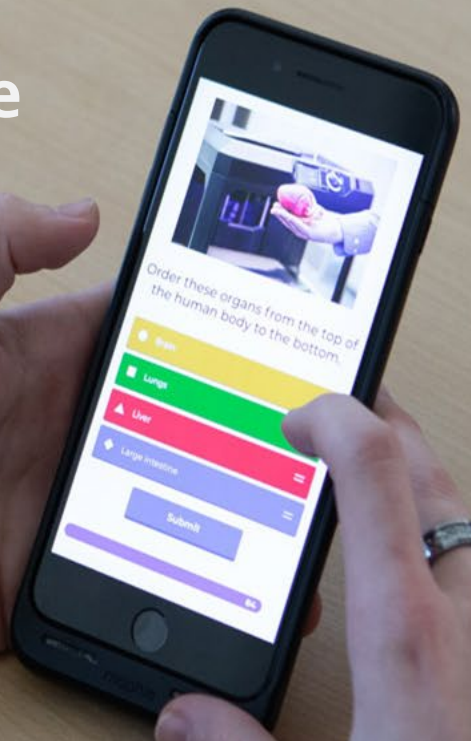
- **3 Unit exams on one final exam.**
- **40% of the grade on exams comes from conceptual questions!**

Class Sizes

- **Small class sizes ~ 20 students/class**
- **No physics program.**
- **Serves the other programs like Bio Medical Engineering and Chemistry.**

Kahoot! - What is it?

- A game-based student response system.
- Students don't need registration.
- Free version is available with limited functionality.
- Students access using their mobile devices.



Kahoot!, an Interactive Engagement? DEMO

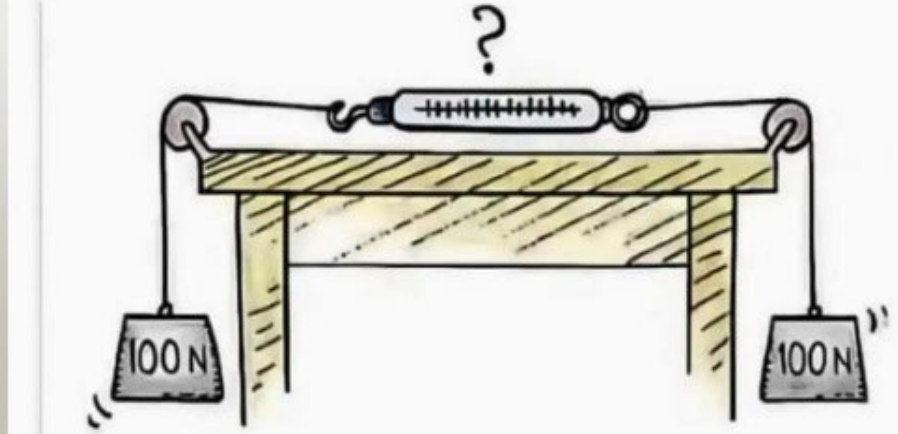
Classroom with IE

- Increased interaction.
- Immediate feedback.
- Competitive.

Classroom with Traditional Lectures

- Rely on lectures.
- Passive students.
- No interaction.


The forces acting on a ball that has been kicked and airborne are:
Only the force of the kick.
Only the force of gravity.
The force of the kick and the force of gravity.
None of the above.



What does the scale read?

▲ 0 N

◆ 100 N

● 150 N

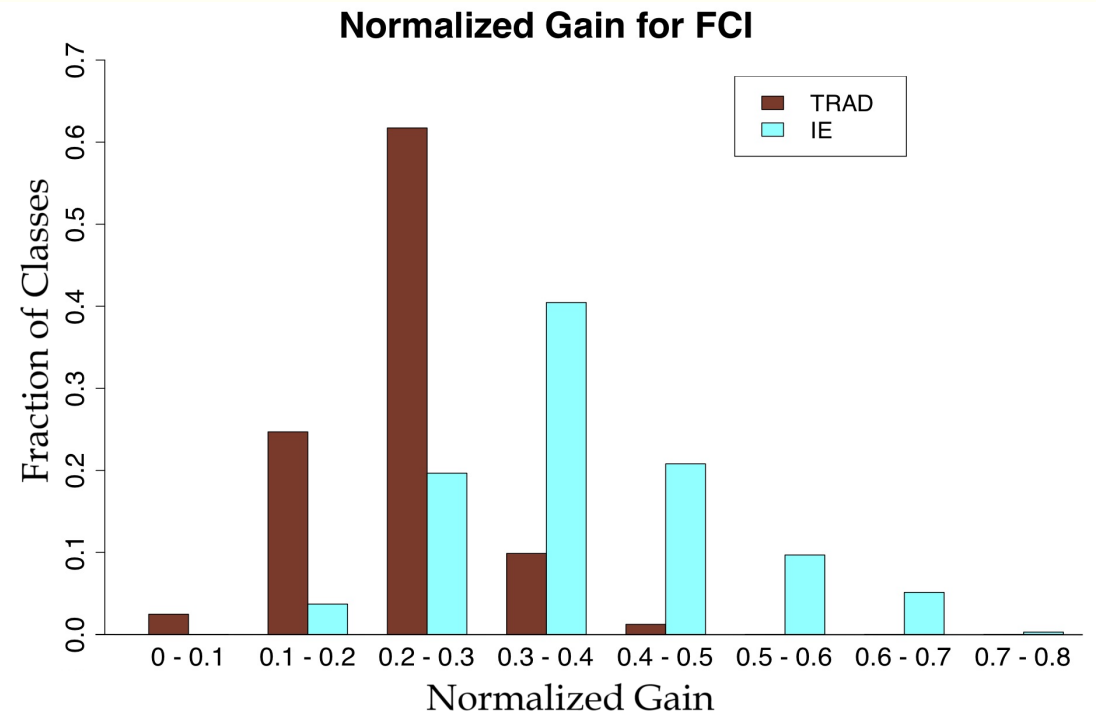
■ 200 N

Implementation and Assessment

- FCI test was administered on week 2 of the semester.
- Two Kahoot Games were incorporated.
- Student-generated questions were included.
- FCI test was administered on week 13 of the semester.
- Analyzed the differences between pre- and post-test results.

Force Concept Inventory = FCI

Traditional Lecture vs. Interactive Engagement



The courses that used interactive techniques shows increased gains in the FCI scores.

$$Normalized\ Gain < g > = \frac{Post - Pre}{100 - Pre}$$

The Normalized Gains from 31,000 students in 450 physics classes, published in 63 papers. (Korff, et al.)

References

FCI Test Ref. 4

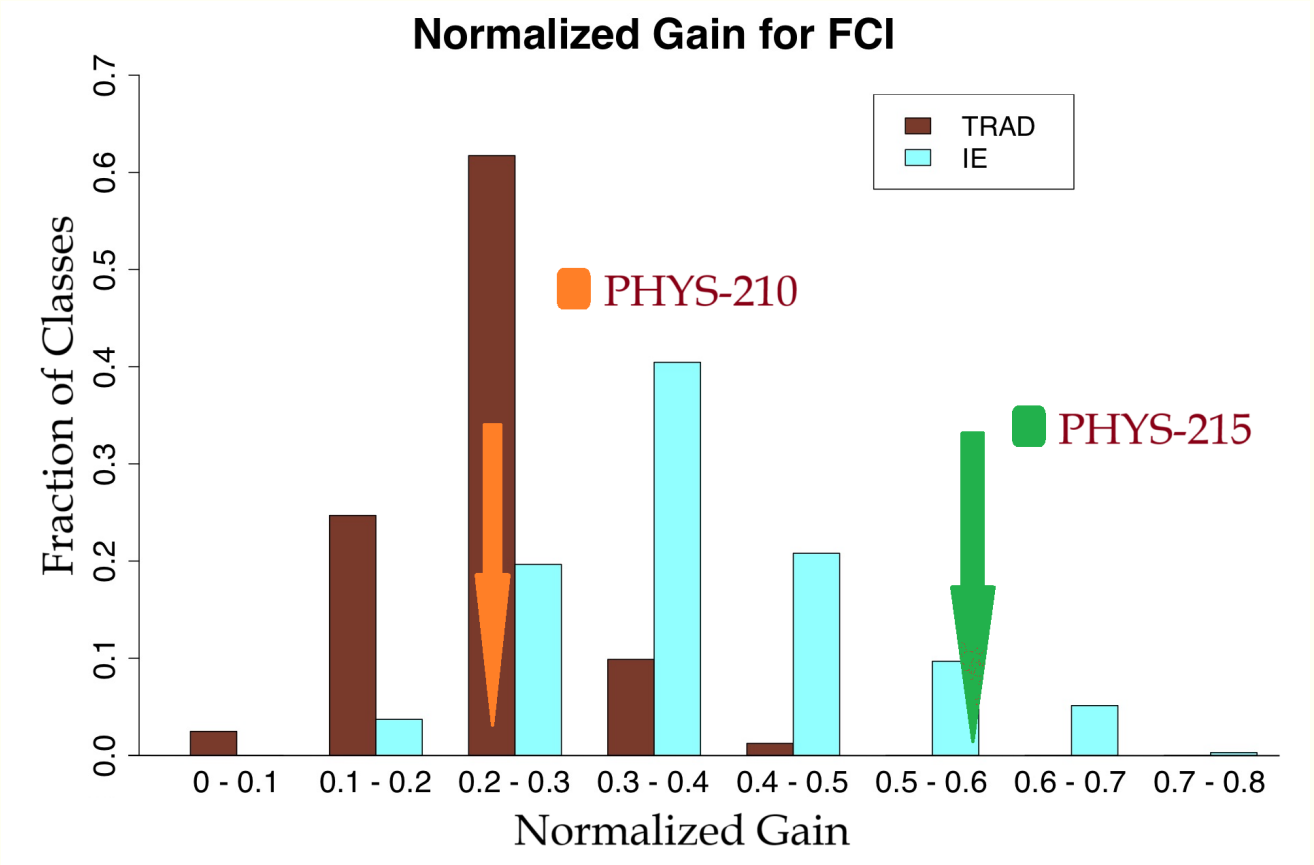
This graph Ref. 3

Results and Discussion

Drastically different results for the two classes!

Possible Influencing Factors:

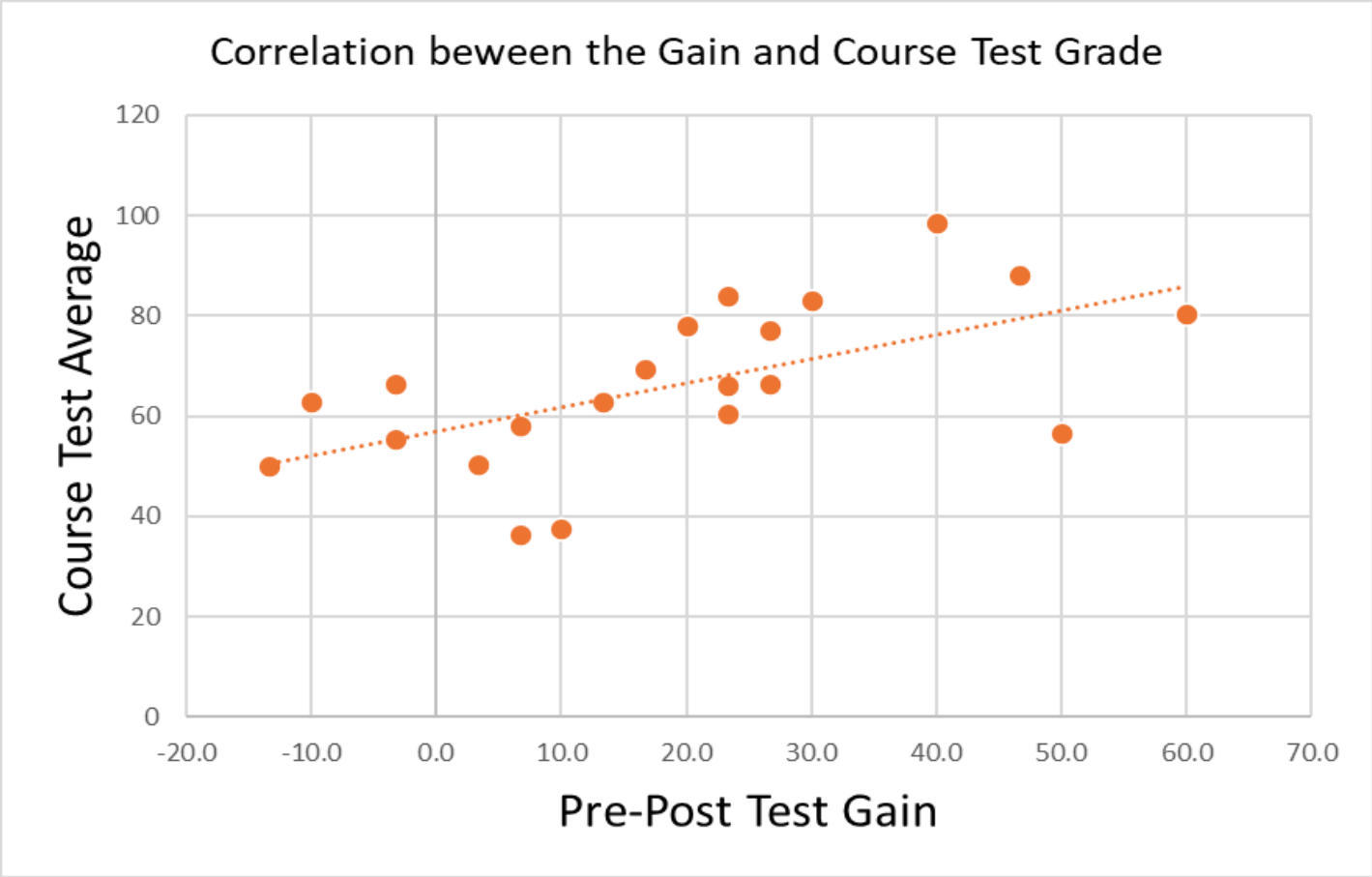
- **Math skills levels.**
- **Prior physics experiences.**



PHYS-210: Algebra-based Physics

PHYS-215: Calculus-based Physics

Other Observations



- Pre-post test gains are correlated with the course exam grades!
- FCI Gains can predict student success in the course!

Correlation Co-efficient = 0.59

Conclusions and Future Work

- **Kahoot Game's impact on gains is inconclusive.**
- **FCI test gains are indicative of course success.**
- **Recent work suggested additional concept practice can help with increased gains. (Paul et al.)**
- **Future work will focus on enhancing Kahoot integration.**

Thank You

References

[1] Hake, R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. American Journal of Physics, 66, 64-74. doi: 10.1119/1.18809

[2] Hestenes, D., Well, M., & Swackhamer, G. (1992). Force concept inventory (FCI). The Physics Teacher, 30, 141-158.

[3] Korff V. K., Archibeque B., Gomez K. A., Heckendorf T., McKagan S. B., Sayre E. C., . . . Sorell, L. (2016). Secondary analysis of teaching methods in introductory physics: A 50 k-student study. American Journal of Physics 84, 969. doi.org/10.1119/1.4964354

[4] Physport: Supporting physics teaching with research-based resources. (n.d.). Retrieved July 18, 2016, from https://www.physport.org

[5] Paul Justice *et al* 2019 *Eur. J. Phys.* **40** 055702. doi: 10.1088/1361-6404/ab2135