Does lecture attendance matter: Using clicker data to assess the role of lecture attendance on student performance

Michael S. Berger
Washington State University Vancouver
msberger@wsu.edu

WASHINGTON STATE UNIVERSITY
VANCOUVER

Background

- Undergraduate lecture attendance rates are variable and often below 75 percent (Kelly 2012)

- Many universities are engaged in mechanisms to increase student success and subsequent retention (AAAS 2011)

- Clickers are one successful mechanism to increase student performance and participation (Caldwell 2007)

- Low value participation points that are associated with clicker use can increase rates of attendance and student engagement

- Students are frequently informed that lecture attendance results in increased performance, but not provided with quantifiable data

Questions addressed

- Does lecture attendance have a measurable effect on student performance?

- Is the effect of lecture attendance on performance the same for all courses?

Methods

- Percent attendance was calculated from clicker data in three courses:
  - Introductory biology for majors (years 2012 – 2015 and 2017; n=5)
  - General biology for non-majors (years 2012 – 2014; n=3)
  - Introductory environmental science (2013, 2015, and 2017; n=3)

- Students were awarded 1 participant point per lecture attended

- Attendance was grouped into categories of 100 percent, 99 – 90 percent, 89 – 80 percent, 79 – 70 percent, and less than 60 percent

- Median final course grade was used as a metric of performance

- A one-way ANOVA with a Tukey post-hoc test was used to analyze data from each course independently

Results

- Mean percent attendance was greater than 83 percent in all three courses (Table 1)

- Missing 20 percent of lecture in introductory biology for majors significantly reduced median grade by 8 percent

- A significant decrease of 13 percent in median grade was observed in introductory biology for majors, when attendance decreased to 70 percent (Fig. 1A)

- Missing 30 percent of lectures in general biology for non-majors resulted in a significant decrease of 8 percent in median grade (Fig. 1B)

- A significant reduction in performance for introductory environmental science students was observed when attendance was 60 percent or less (Fig. 1C)

- Freshman enrolled in introductory biology for majors had an 8 percent higher rate of attendance compared to Seniors (Fig. 2)

- A trend for increased rate of attendance for Freshmen was observed in biology courses, but not in introductory environmental science

Figure 1. Effect of percent attendance on student performance in three independent introductory level courses. Lines above bars represent non-significant differences ($P > 0.05$) between groups.
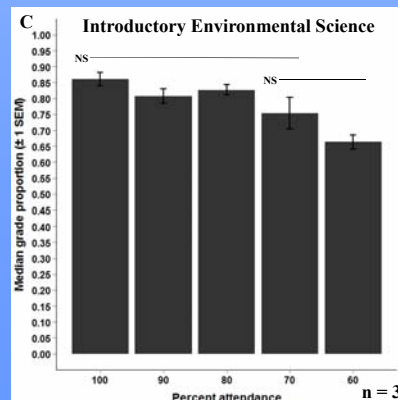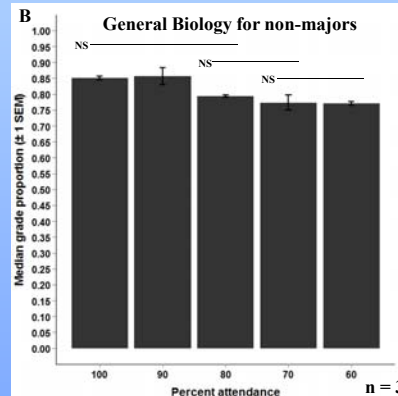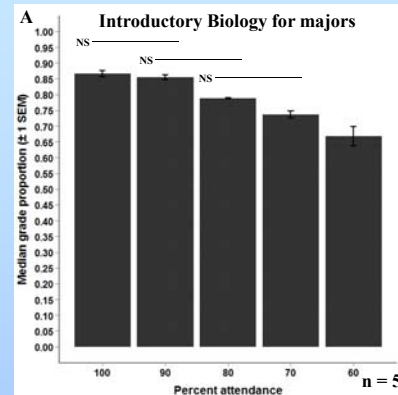

Table 1. Mean percent attendance in introductory courses.

Course	Mean percent attendance (±1 SEM)
Introductory biology for majors	87 (0.01) percent
General biology for non-majors	83 (0.02) percent
Introductory environmental science	83 (0.02) percent

Figure 2. Mean attendance by academic rank in introductory biology for majors. 1 = Freshman, 2 = Sophomore, 3 = Junior, and 4 = Senior. Lines above bars represent non-significant differences ($P > 0.05$) between groups.
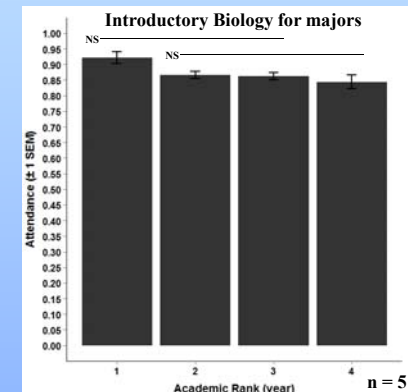
Conclusions

- Performance is not impacted when a limited number of lectures (i.e., less than 20 percent) are missed

- The effect of lecture attendance on performance is course specific, with biology courses displaying the strongest effect

- Missing 20 – 30 % of lectures will reduce student performance by ~ 8 percent in biology courses

- The effect of attendance on performance can be shown to students, to re-enforce the importance of lecture attendance

Literature cited

- AAAS. 2011. Vision and Change in Undergraduate Biology Education: A Call to Action. Washington, DC: AAAS

- Caldwell, J.E. 2007. Clickers in the Large Classroom: Current Research and Best-practice Tips. CBE-Life Sciences Education. 6: 9-20

- Kelly, G.E. 2012. Lecture Attendance Rates at University and Related Factors. Journal of Further and Higher Education. 36: 17 – 40