

The Lasting Impact of IPLS on Student Interdisciplinary Attitudes

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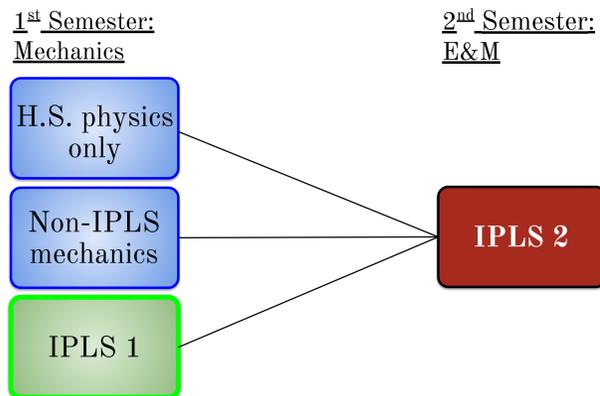
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Research Question

A year or more after instruction, do IPLS students **continue to view** physics as more *relevant to* and *connected with* their life science coursework?

Populations

We surveyed students with various physics backgrounds before and after IPLS 2 (E&M).



IPLS (Introductory Physics for Life Sciences)

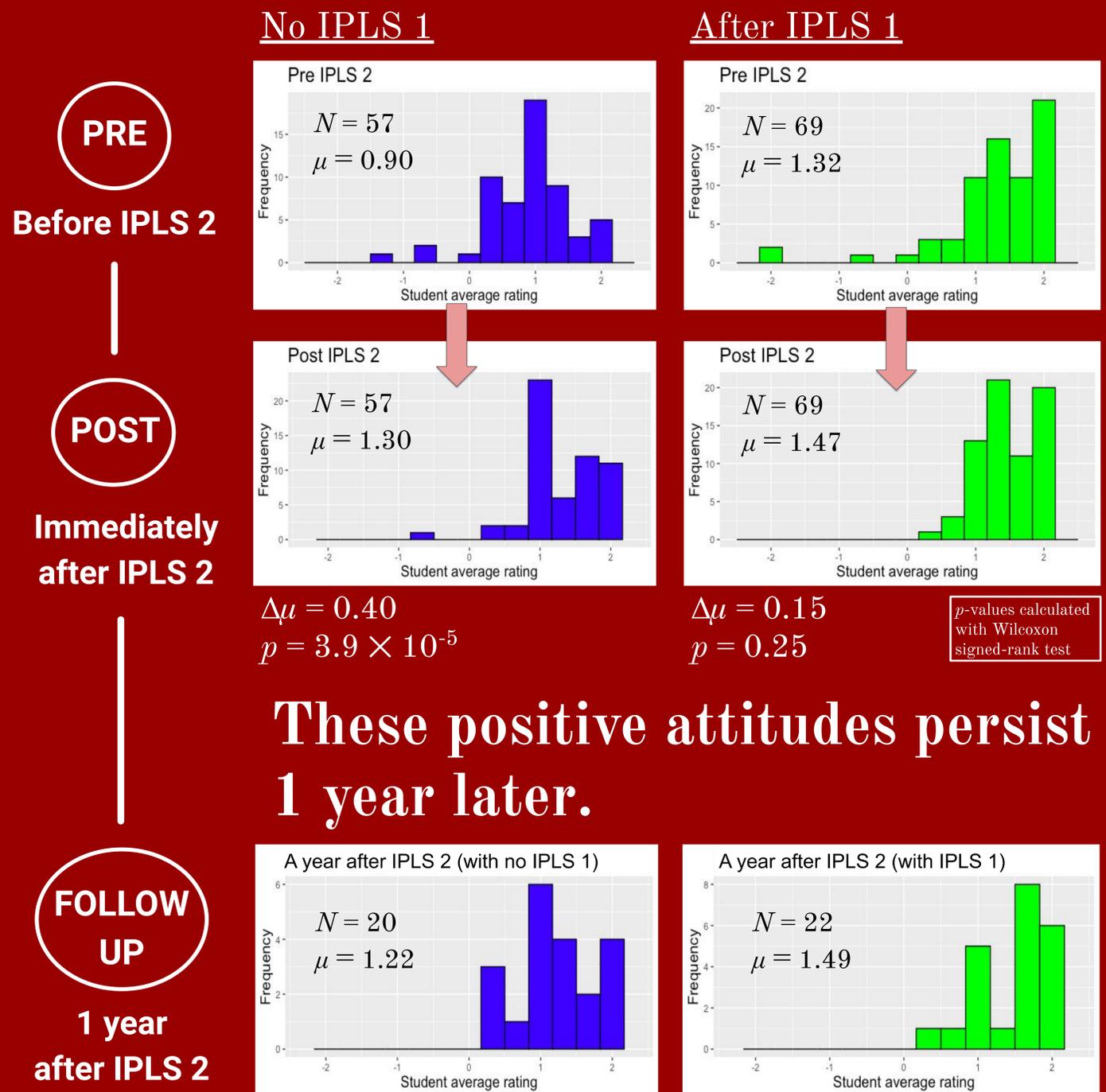
IPLS courses: intro. mechanics and E&M courses designed to enable and *motivate* future physics use in the life sciences and medicine.¹

- Previous research shows² IPLS improves general attitudes about physics.
- We assess interdisciplinary attitudes, and introduce a follow-up 1 year later

Data Source: Interdisciplinary Attitudes Survey

1. Students asked to agree/disagree with 3 statements³ about the **relevance of physics to biology** (5 pt. scale):
 - *It will be beneficial to me, for my chosen field of study or career, to be proficient in physics*
 - *Physics helps me make sense of biological phenomena*
 - *Physics is largely irrelevant for understanding biological processes*
2. Responses converted to values of -2 (strongly unfavorable) to 2 (strongly favorable) and averaged for each student

Student attitudes about the relevance of physics to the life sciences improve after IPLS instruction.



These positive attitudes persist 1 year later.

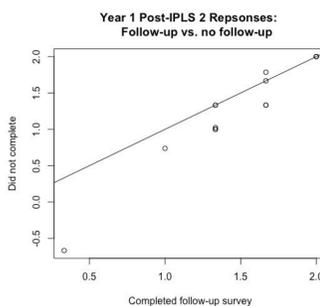
See my accompanying AAPT talk here for more info:
<https://materials.physics.swarthmore.edu/sm2020>

Is Follow-up Representative of Whole?

Since response rates for the follow-up survey were only 37.5%, we explicitly checked how representative this data is of the whole group:

1. Comparing attitudes (post-IPLS 2 responses) of those who completed the follow-up to those who did not

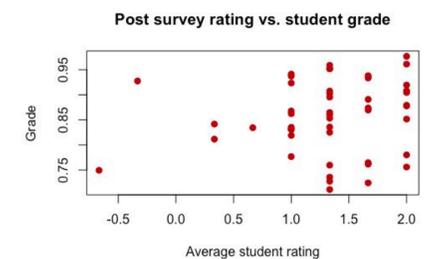
Only Year 1 of the follow-up data (taken over 2 years) had reliable post responses. Year 1 post responses were similar for both groups ($p = 0.29$), as seen in this Q-Q plot[†].



Additionally, Year 2 follow-ups were similar to those from Year 1 ($p = 0.50$, two-way ANOVA[‡]), suggesting representativeness of all follow-up data.

2. Comparing performance (IPLS 2 grades)

Follow-up students' performance reflects that of all students. Furthermore, performance and interdisciplinary attitudes are uncorrelated:



References and Footnotes

¹ C. H. Crouch & K. Heller (2014); E.F. Redish & D.C. Meredith (2013); E.F. Redish et al. (2014).

² C.H. Crouch et al. (2018); B.D. Geller et al. (2018).

³ K.L. Hall, Ph.D thesis, University of Maryland (2013).

[†] Q-Q plots compare distributions of data by plotting 2 sets of quantiles against each other, with the line $y=x$ for reference.

[‡] The number of semester of IPLS taken is also likely to have a modest effect on follow-up attitudes ($p = 0.05$).

Acknowledgements

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