Assessing the lasting impact of IPLS in an Animal Physiology course

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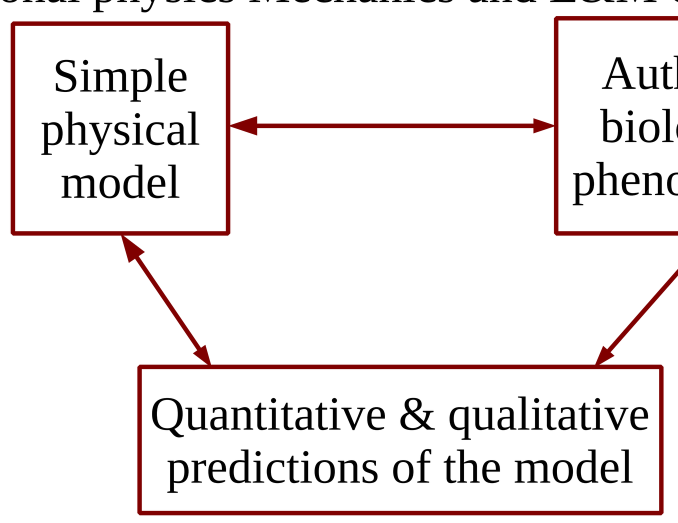
Research Questions

In their later life science coursework, do IPLS students, compared to their peers with traditional introductory physics or no physics background:

1. Demonstrate a greater ability to leverage physics competencies?
2. View physics as more relevant and connected to their life science coursework?

IPLS (Introductory Physics for Life Sciences)

At Swarthmore College, students take up to 2 semesters of IPLS, containing similar content to traditional physics Mechanics and E&M courses.



The goal of IPLS is to facilitate transfer of physics content in biological contexts and to promote expansive framing. The short-term benefits of IPLS curricula are well-documented;[1] our study investigates the long-term benefits of more positive attitudes and greater competencies.

Transfer has typically been studied in tightly controlled settings.[2] In our study, the biology courses are not designed to necessitate or cue the skills that students may transfer out of a physics context.

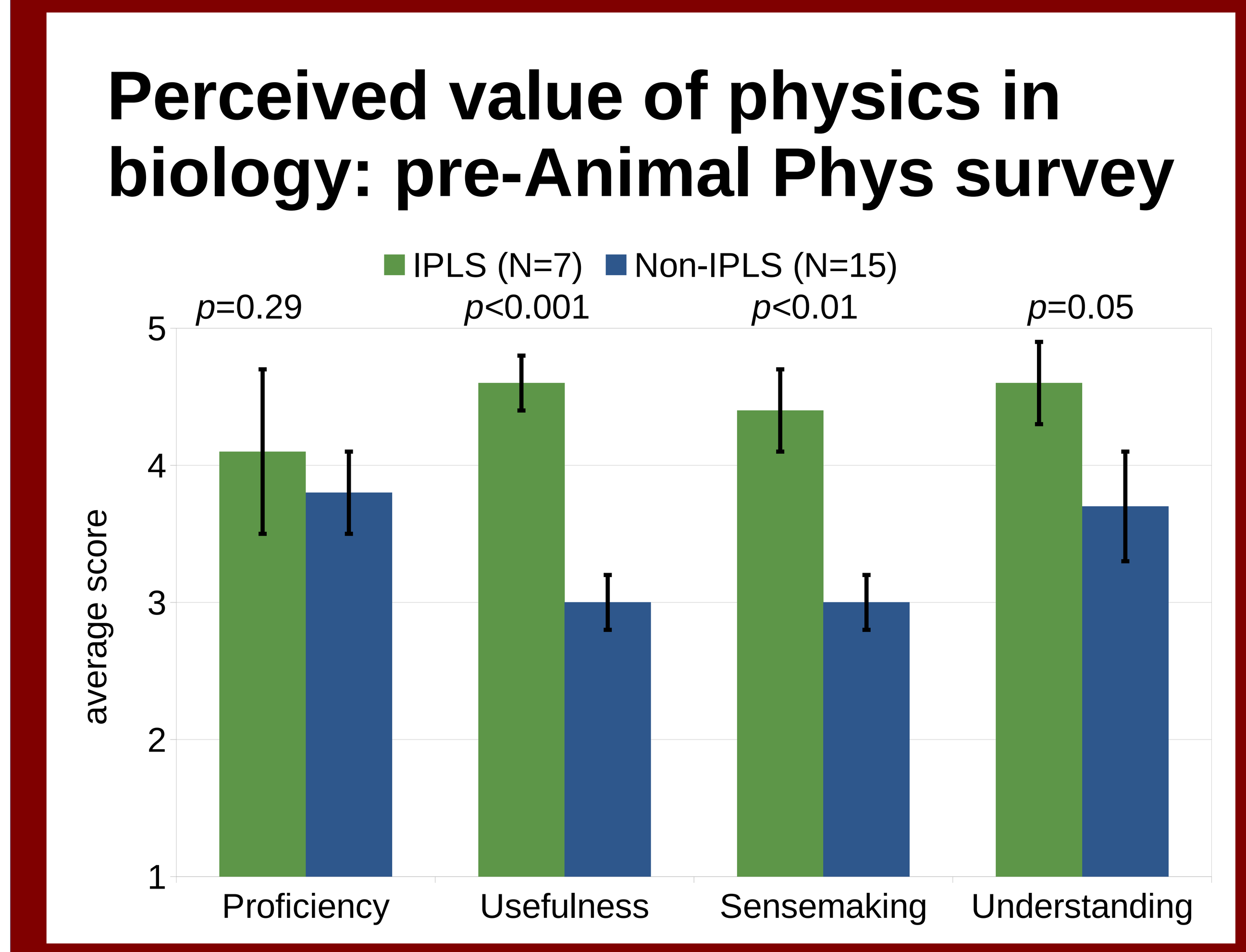
Methodology

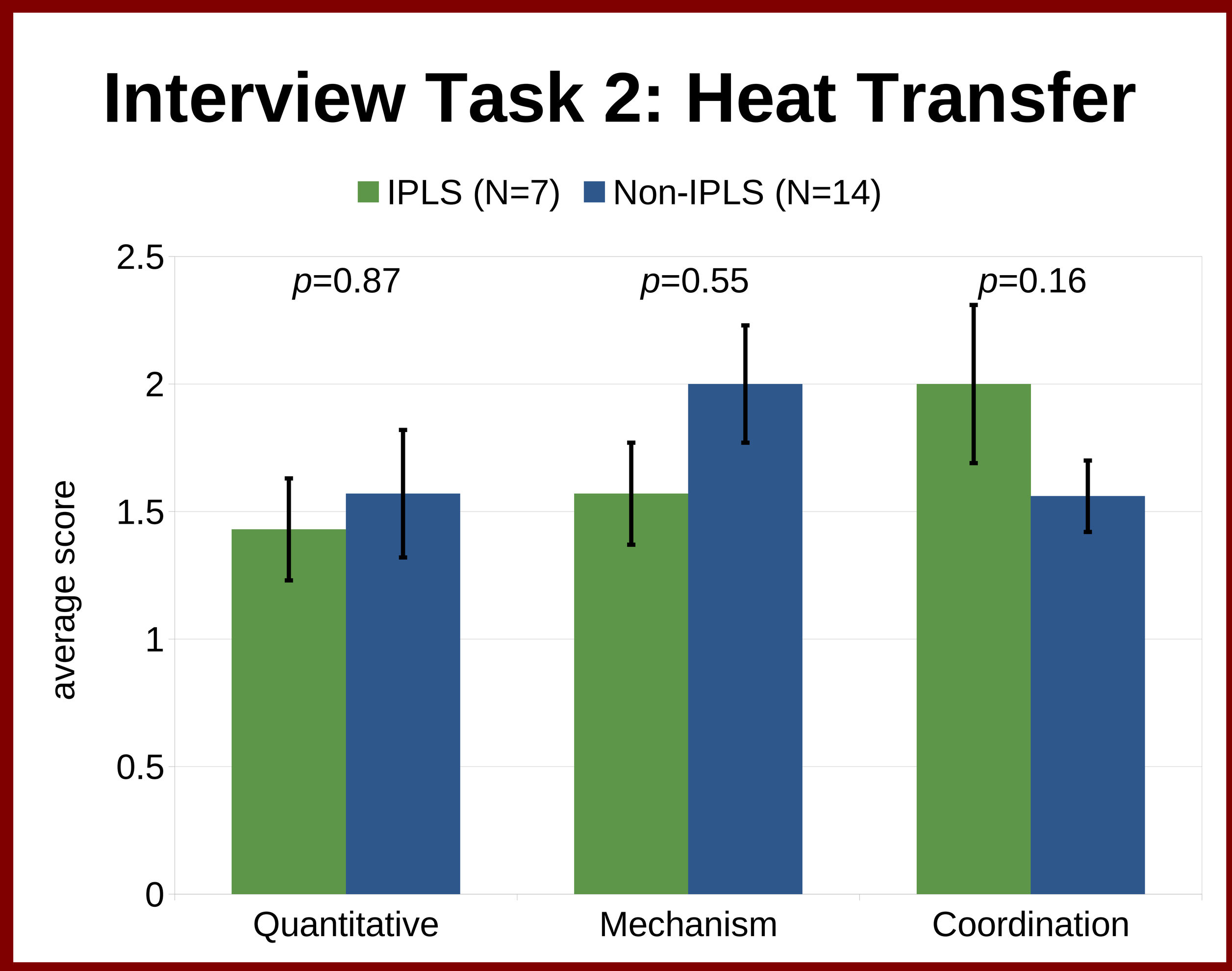
We present findings of students in an intermediate-level Animal Physiology course at Swarthmore College (N=22 students; 7 had IPLS backgrounds).

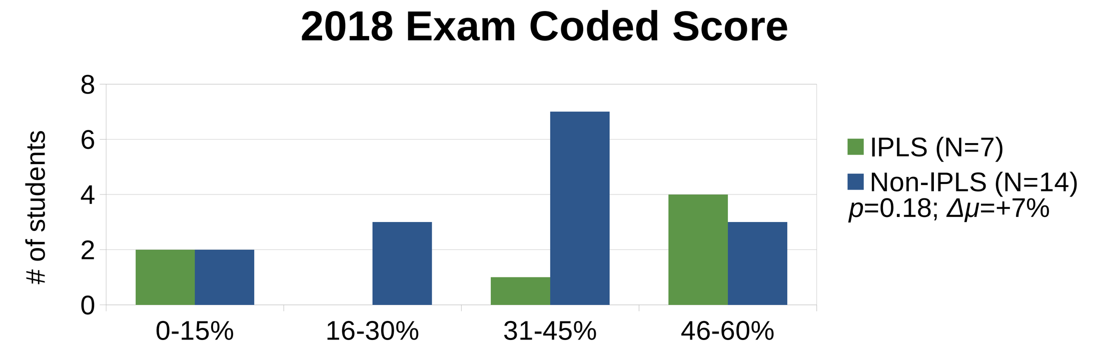
- **Think-aloud interviews**, 30 minutes in length, designed to display various physics competencies in a biological context. The responses to each of the two tasks were coded holistically on a 0-3 scale in three categories: quantitative reasoning[3], mechanistic reasoning[4], and coordination between representations. Additionally, interviews were coded on a binary scale for some additional markers of physics competency.
- **Attitudinal surveys** in which students were asked to state their level of agreement with statements describing the value of physics in biological contexts (Interdisciplinary Cluster from MBEX II).[5]
- **Midterm and final exams** from both 2017 & 2018, which included heat transfer and biomechanics; student responses were coded on a binary scale for various markers of physics competency.

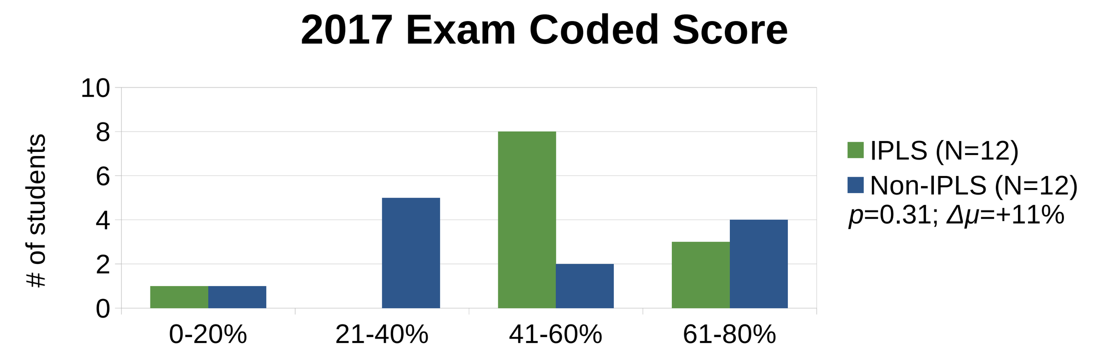
In an Animal Physiology course, IPLS students have more positive <u>attitudes</u> about physics.

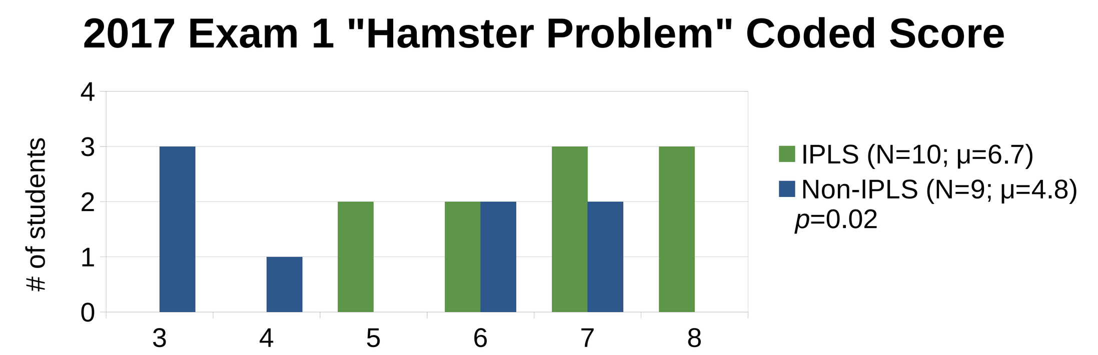
It is difficult to assess whether they also have greater <u>competency</u> in physics.

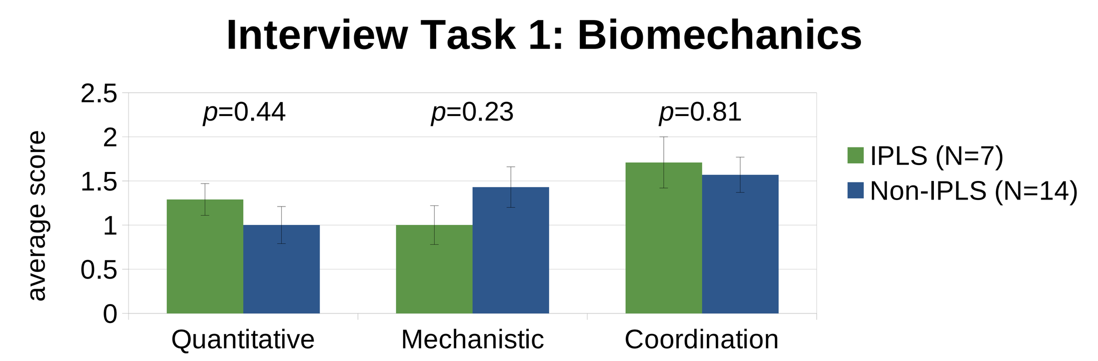


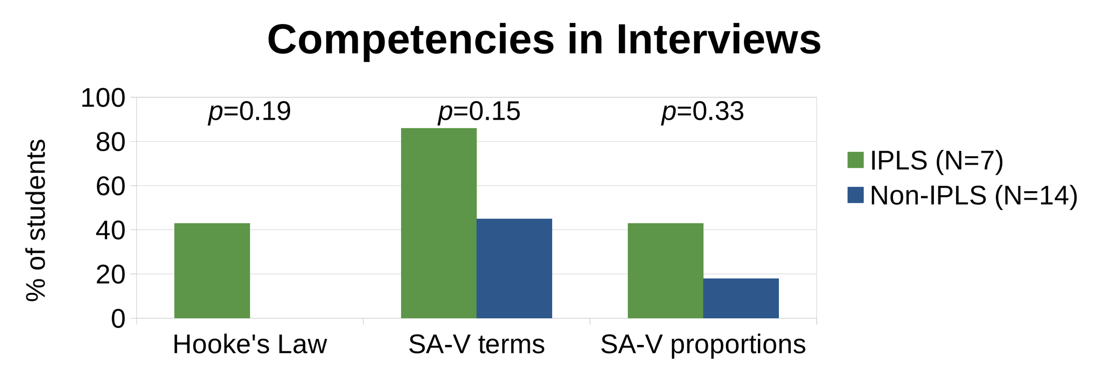


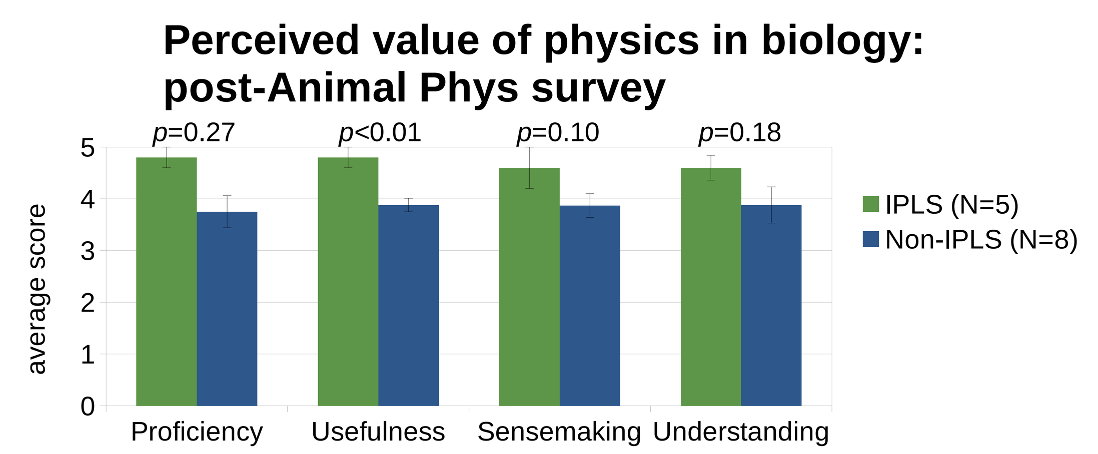












"Dakota"	Adjustment	Equation	Air	Babies
Visualization	√			
Recall		√		
Causality	√	√		√
Sensemaking				
Coordination		√	√	√

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Acknowledgments

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