

Understanding the Learning Assistant experience with Physics Identity

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Physics Identity

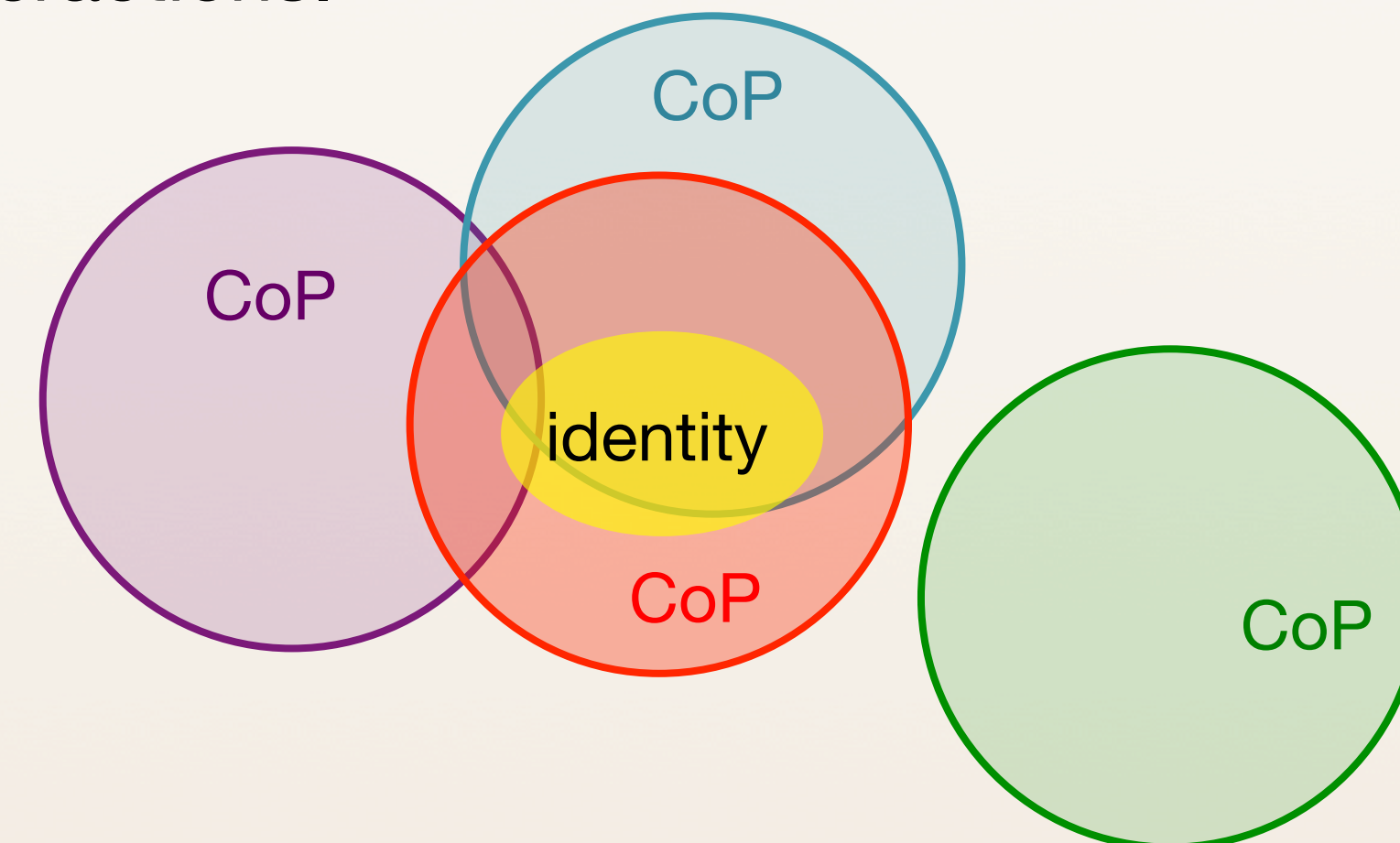
Elements:

- **Personal interest** → correlates strongly with **choice of physics major** (Ref. 2)
a student's reported interest in physics topics or activities
- **Student performance**
a student's self-assessment of her ability to perform required physics tasks
- **Competence**
a student's self-reported belief in his ability to understand physics concepts
- **Recognition by others**
a student's perceptions of whether others see her as a talented physics student and/or a "physics person"

Physics identity correlates strongly with **choice of career in physical science** (Ref. 1)

Community of Practice & Identity

Communities of practice structure a person's identity by shaping perceptions, values, and interactions.



We are members of multiple communities – peripheral members of some, full members of others; identity is constructed through all CoPs.

"In practice, we know who we are by what is familiar, understandable, usable, negotiable; we know who we are not by what is foreign, opaque, unwieldy, unproductive." (Ref. 3)

Community of Practice

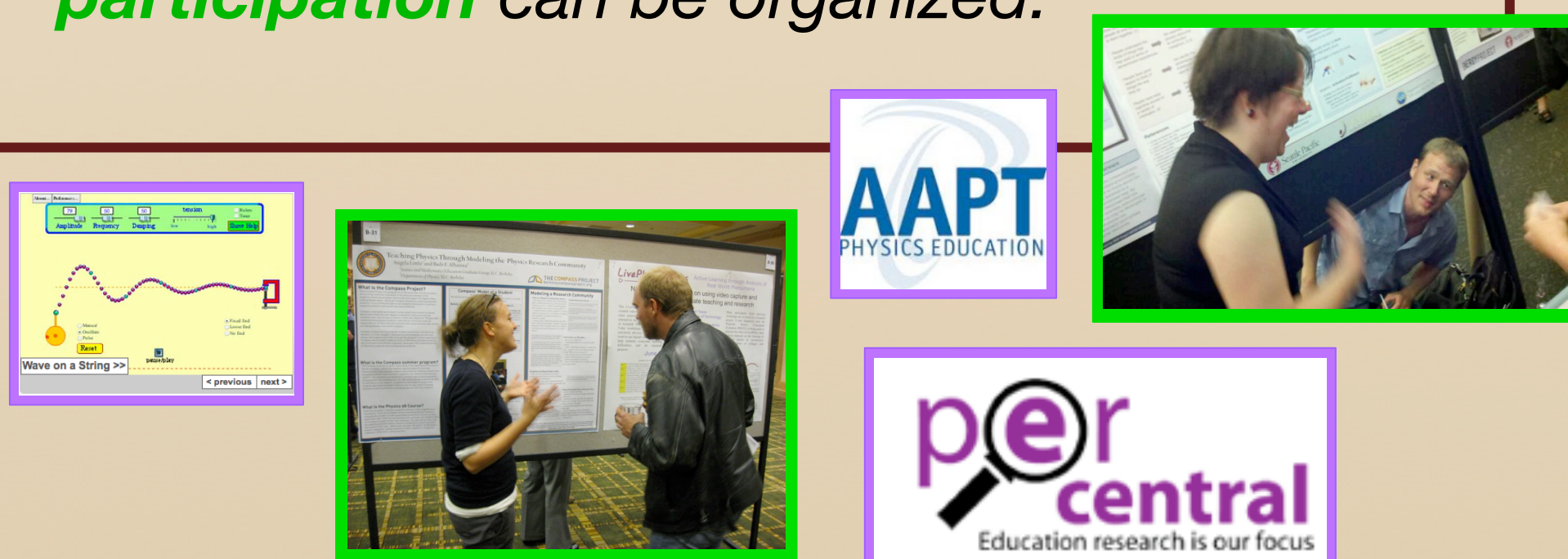
Members share:

- A **joint enterprise**;
- **Mutual engagement**, through which joint enterprise is negotiated and defined, and in forms of interaction expected / recognized within the community;
- A **shared repertoire** of resources for negotiating meaning, including language, stories, concepts, styles of interacting, and ways of accomplishing tasks.

Community balances:

Participation: the active process of engaging in social communities and enterprises
Reification: the process of attributing concrete status ("thingness") to an abstraction

Reification creates artifacts around which **participation** can be organized.

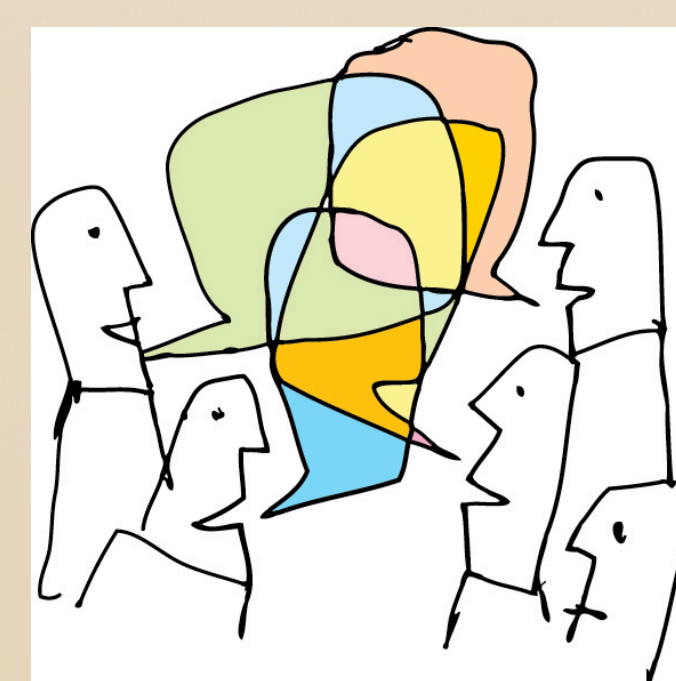


Community of Practice & Learning

Communities of practice that successfully reproduce themselves are characterized by "newcomers furnished with comprehensive goals, an initial view of the whole, improvising within the multiply structured field of mature practice with near peers and exemplars of mature practice." (Ref. 4)

Legitimate Peripheral Participation:

engaging in tasks that are important to the community of practice and that give novices access to situations in which they can observe and interact with more central participants



LA assisting during class session: **legitimate peripheral participation**



TA grading papers in office: **legitimate participation, but not peripheral**

"Learning [is]... an emerging property of whole persons' legitimate peripheral participation in communities of practice." (Ref. 4)

To what extent do classrooms look like this?

Identity, Learning, & Schooling

"Developing an identity as a member of a community and becoming knowledgeable skillful are part of the same process, with the former motivating, shaping, and giving meaning to the latter, which it subsumes." (Ref. 4, emphasis added)

Curriculum construction is the reification of content knowledge: "decomposition of activity to the point of meaninglessness" (Ref. 4)

- Students then must learn the reification, instead of the participating in the practice
- New practice is developed to learn the reification

When stated goals and permitted forms of participation are misaligned, identity construction is alienated from officially sanctioned classroom activity.

Implications & questions

If identity motivates, shapes, gives meaning to, and subsumes learning, could LA implementation include more explicit support for STEM major community of practice?

- Would this strengthen physics identity of students? improve learning?

Is identity transformation different for LAs who teach alongside faculty vs. for those who teach separate sections?

Does negotiation of meaning among intro students look different in an LA-served course? Is the joint enterprise recognizably different?

Learning Assistant Model

Students serving as LAs participate in three program components:

Content

Preparing to teach, with the course instructor (e.g., working through a *Tutorial in Introductory Physics*)

Practice

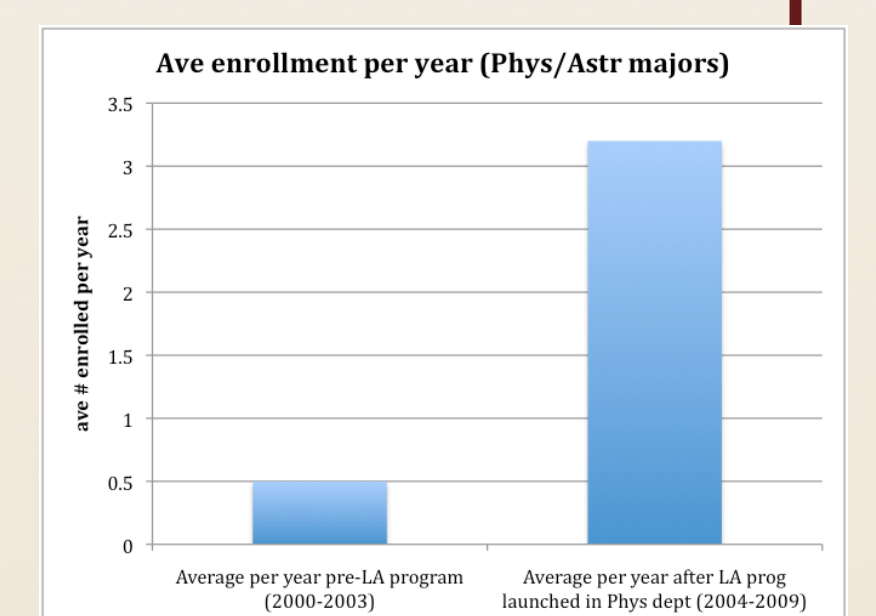
Facilitating small-group interactions among students working through research-based curriculum

Pedagogy

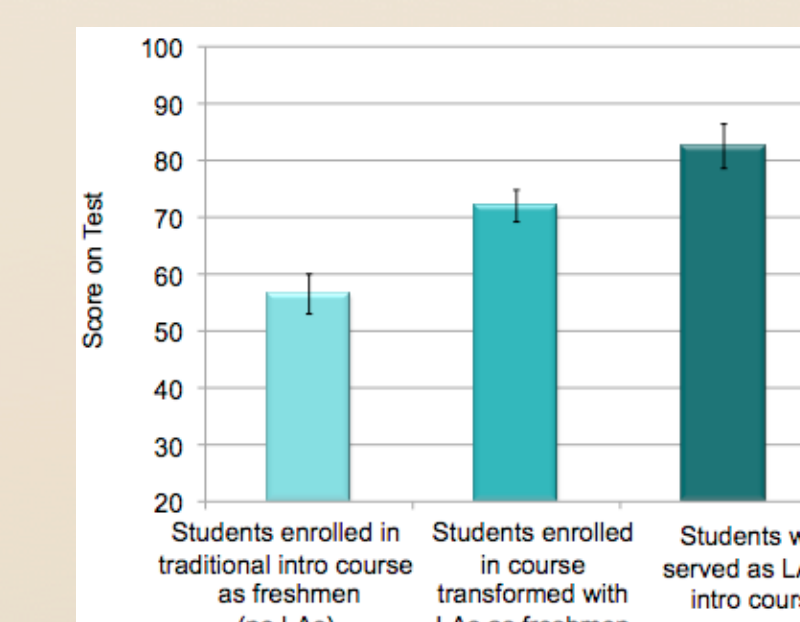
Participating in weekly STEM Education seminar; reflecting on LA experience; discussing STEM-specific pedagogy

Successes

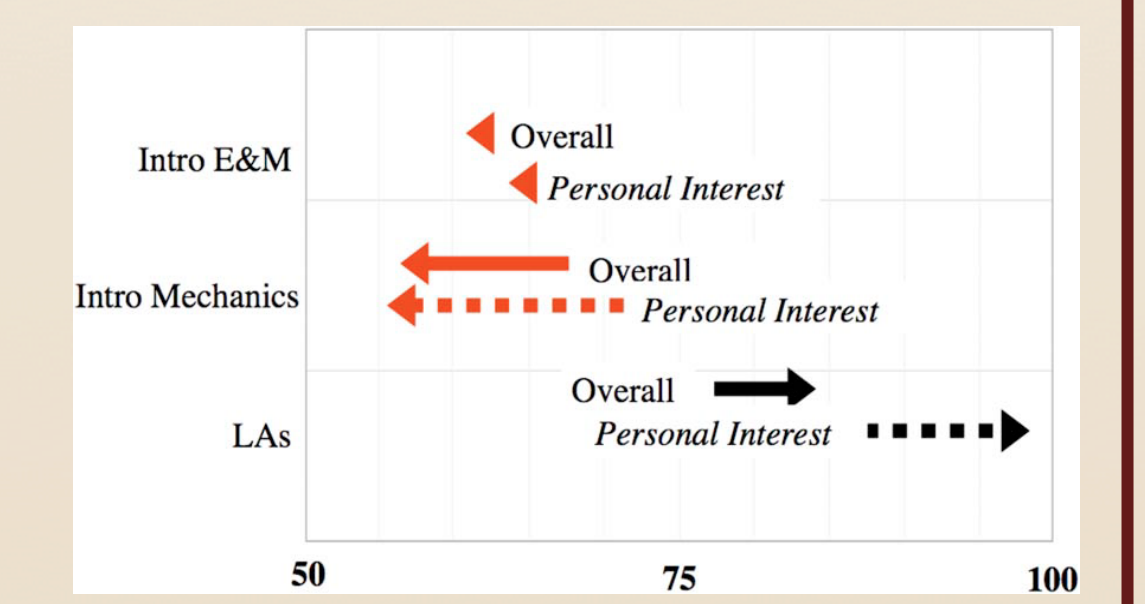
STEM students (some of whom are future K-12 science teachers) "exit the LA experience with more favorable beliefs about science, greater interest in science, and greater mastery of the content than their peers." (Ref. 6)



Enrollment of physics/astronomy majors in undergraduate teacher certification program, before and after LA program (Ref. 5)

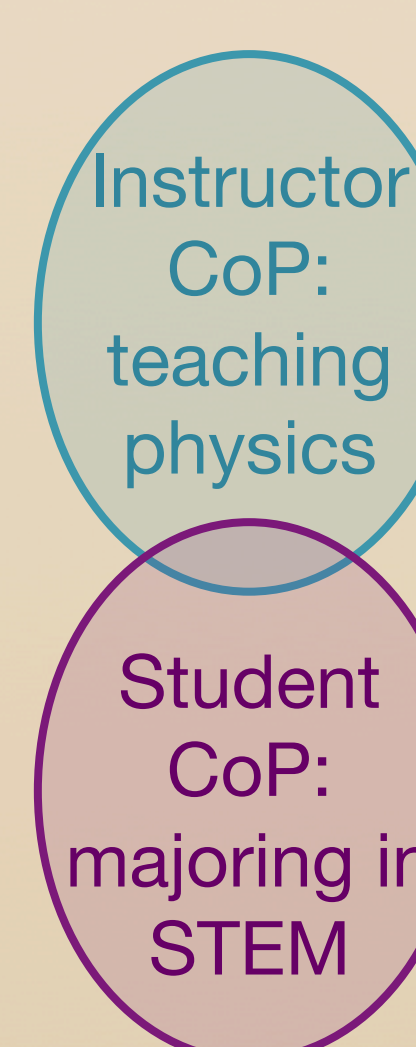


BEMA scores for students who have just completed an upper division electricity and magnetism course (Ref. 5)



Shifts on the CLASS for students in a transformed Intro E&M course, students in transformed Intro Mechanics course, and the LAs who served in both courses (Ref. 6)

Classroom as community of practice?

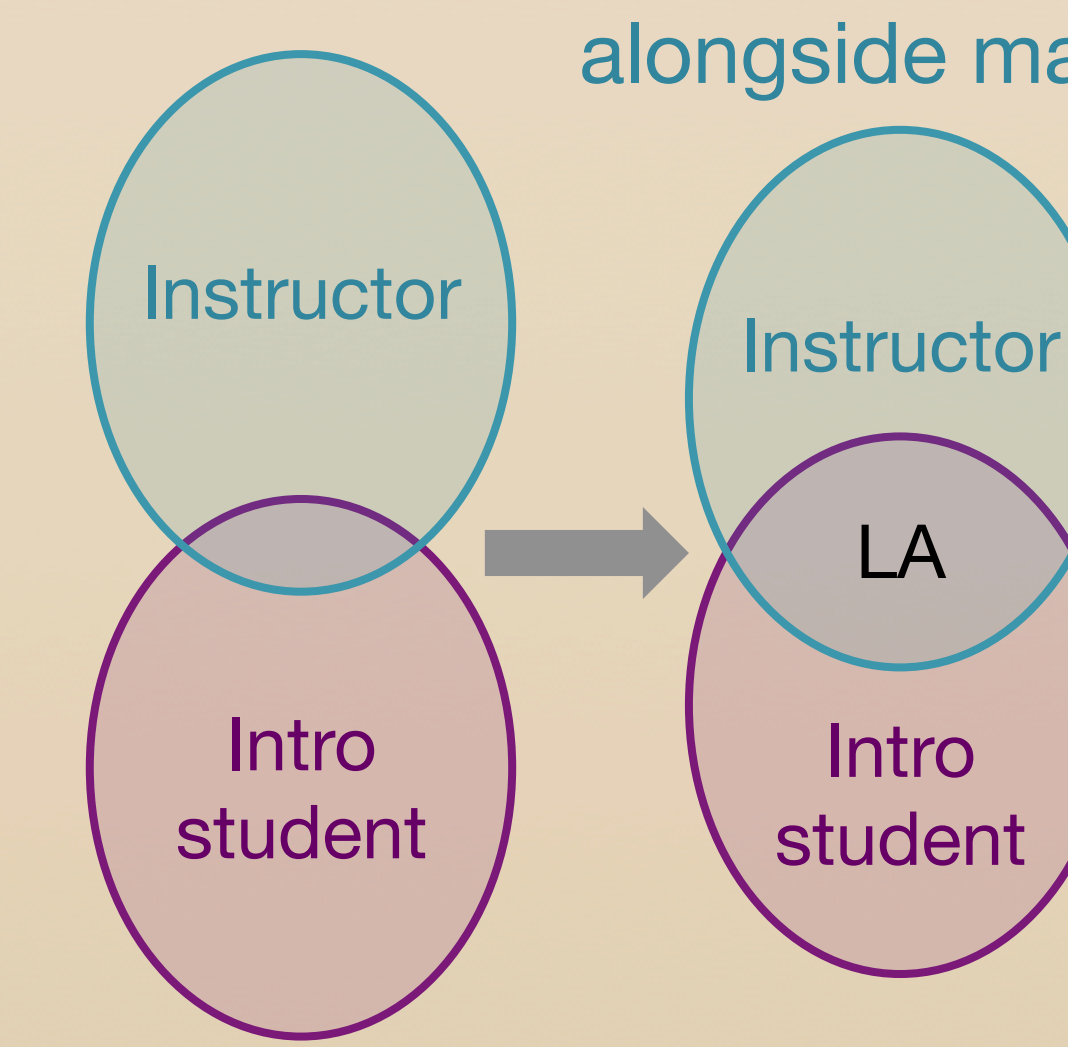


Sanctioned goal: help students learn to do physics
Functional goal: get students to acquire specific reified content knowledge; keep job
Forms of participation (ways of surviving): Lecturing, questioning, multiple-choice, ...

~~Joint enterprise?~~ Mutual engagement?

Sanctioned goal: learn physics
Functional goal: pass class; obtain degree
Forms of participation (ways of surviving): Cramster, test-taking strategies, memorization; ...

LAs bridge the gap, improve both communities



Instructor CoP: LAs are legitimate peripheral participants, practice alongside mature exemplars

LA multi-membership creates continuity, shapes practice

STEM major CoP: LAs are mature exemplars, provide accountability

LA program implementation changes practice and therefore impacts identity formation

Consistent with physics identity research: Self-reports of **engaging in expert-like behavior** are strong predictors of physics identity (Ref. 1)



References

- Ref. 1: Hazari, Sonnert, Sadler, & Shanahan (2010). *J. Res. Sci. Teaching*, 47 (8), 978-1003.
Ref. 2: Adams, Perkins, Podolefsky, Dubson, Finkelstein, & Wieman, (2006, January 10), *PRST-PER*, 2, 010101.
Ref. 3: Wenger, (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.
Ref. 4: Lave (1991). Situating learning in communities of practice. In Resnick, Levine, & Teasley (Eds.), *Perspectives on Socially Shared Cognition* (pp. 63-82). D. C.: APA.
Ref. 5: LA Manual (2010). <https://laprogram.colorado.edu/content/la-manual>
Ref. 6: Otero, Pollock, & Finkelstein (2010). *AJP*, 78 (11), 1218-1224.