Transforming Student Relationships to Physics with iPads

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iPad Enhanced Active Learning (iPEAL)

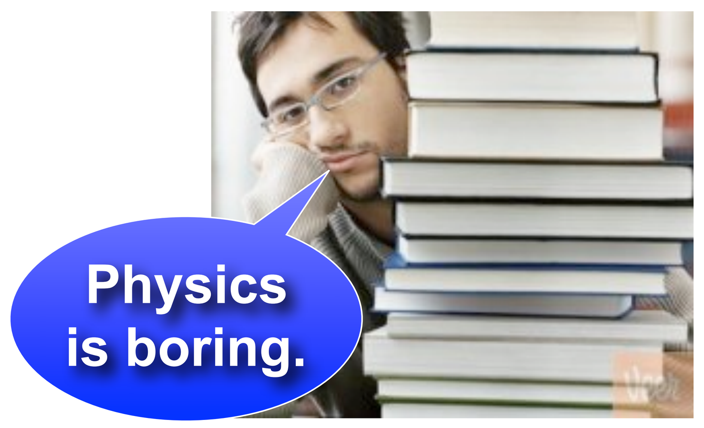
Through the introduction of a classroom set of iPads in high school physics classes, we have examined how students have taken up digital tools and how they have transformed student relationships to physics.

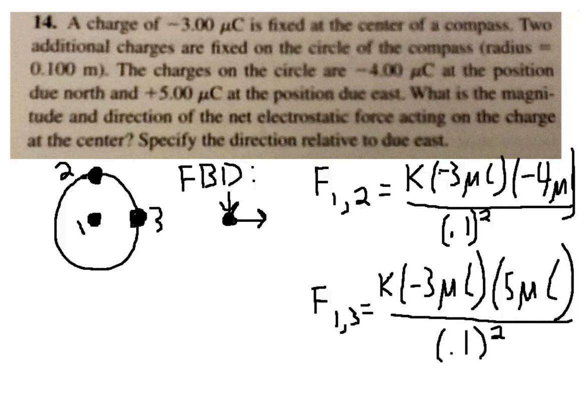
Research Questions

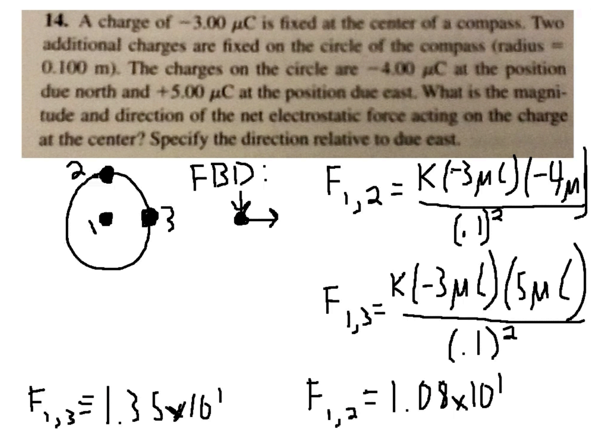
1) In what ways do iPads transform student interactions with physics?
2) In what ways do iPads mediate student relationships to physics?

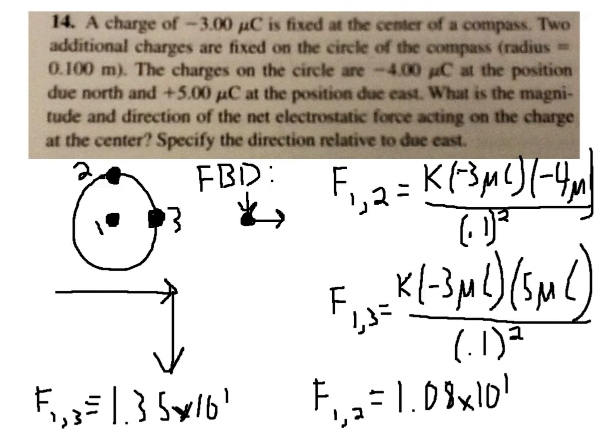
Theoretical Framework

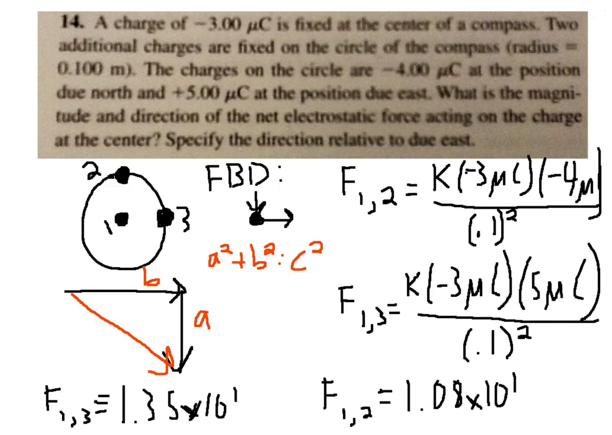
Tools act as mediating artifacts that have the potential to transform the task of doing physics [1, 2]. Within a sociocognitive environment, learning is evidenced by the shifting role of the tool over time [3].

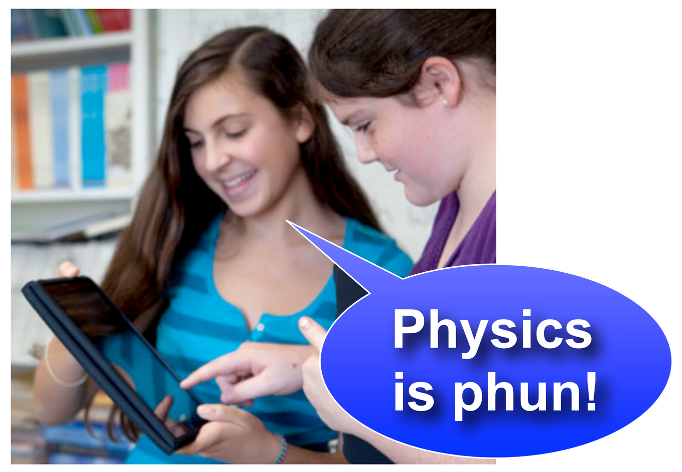


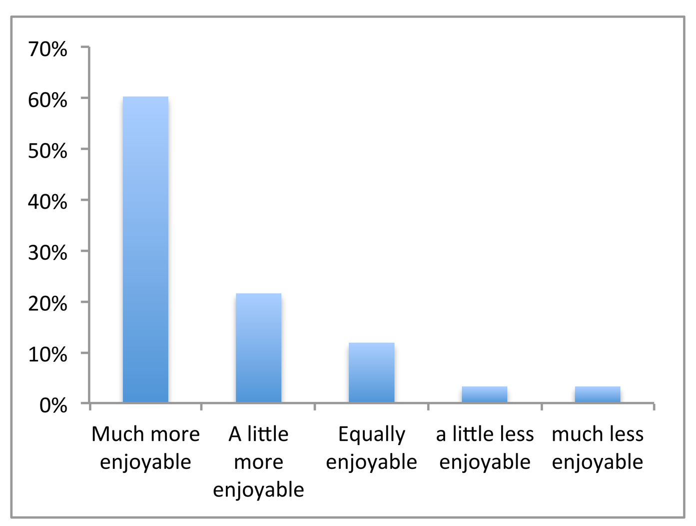
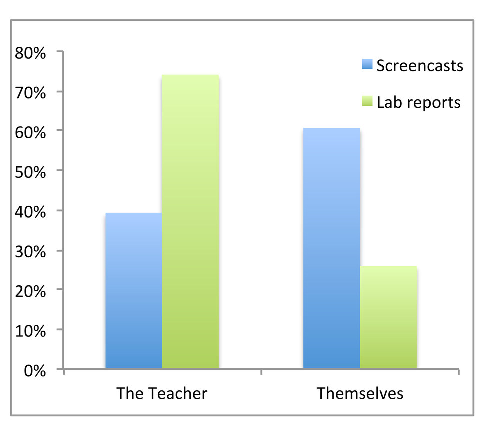






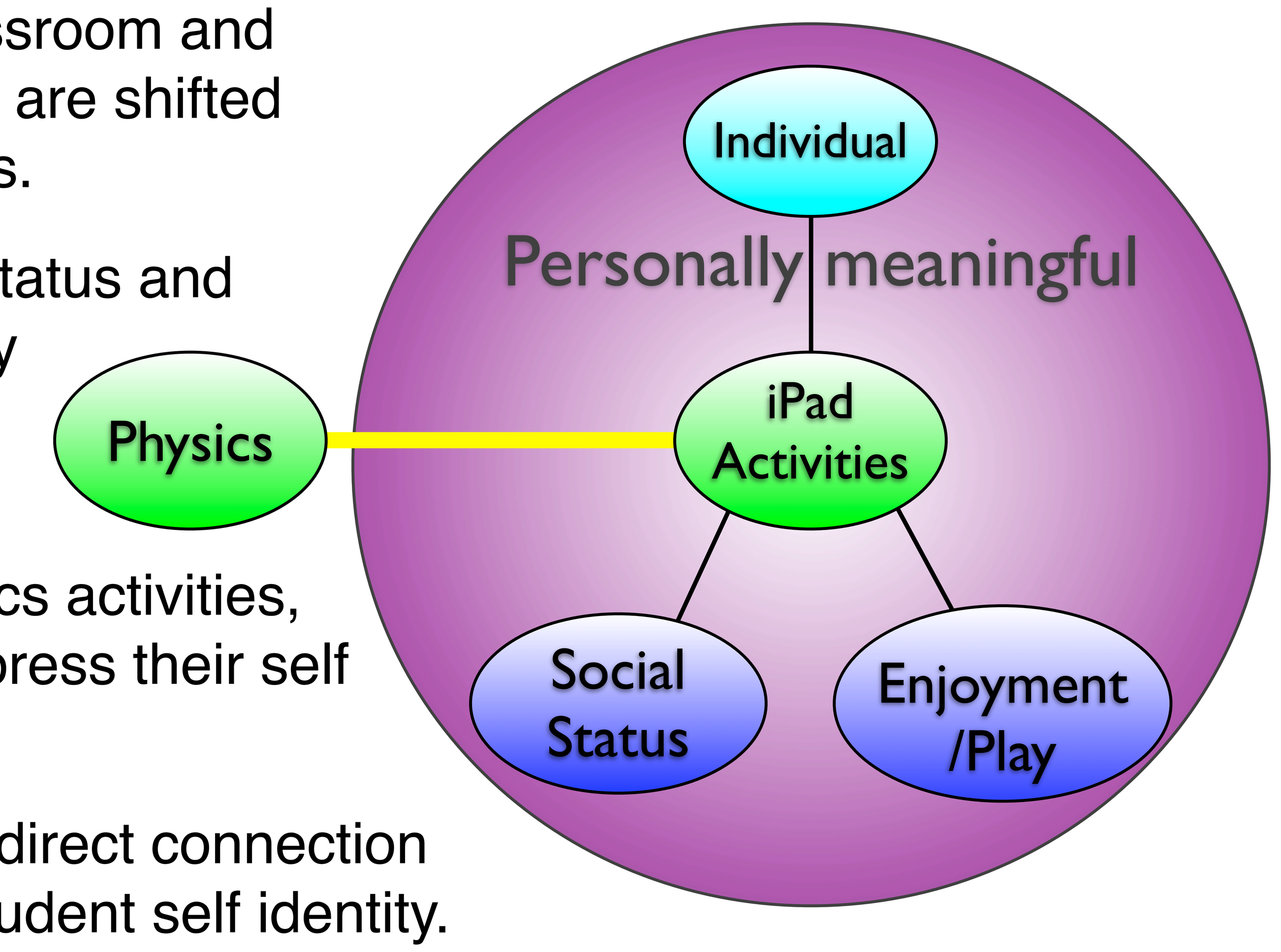




Claims	Findings
#1: iPads helped students use evidence in physics.	✳ Lab activities were transformed by allowing students to engage in data collection, analysis, and collaboration in ways that were previously either prohibitively difficult or impossible. ✳ For example, students brought in digital evidence from their daily lives to inform their physics investigations.
#2: iPads increased student social status.	✳ Students took special care to let others know that they worked with iPads. "I do really like the photobooth, it's really cool. I can send pictures to my email and put them up [on Facebook]. Then that's another way for people to know that we have iPads in our class. They're like, 'how did you do that?' I'm like, 'oh we have iPads in our physics class,' and they're like, "what?!" (Sally, 1/13/12)
#3: iPads increased student enjoyment and play.	✳ Unlike previous years, students regularly came in outside of class-time to work on physics projects. ✳ When asked how much they enjoyed doing iPad work versus traditional work, students articulated a strong preference for iPad work (see figure). 
#4: iPads shifted student autonomy and personal responsibility.	✳ When AP students were asked who determined what steps should be shown in their work, students expressed increased responsibility when creating screencasts (see figure).  "You can learn from visuals and reading, but teaching, writing, and teaching yourself again is a very effective way. I think it's the most effective way because you think that you're going to give someone a lesson and you test your own knowledge. You don't have anyone telling you, you test yourself" (Manuel, 5/4/12).

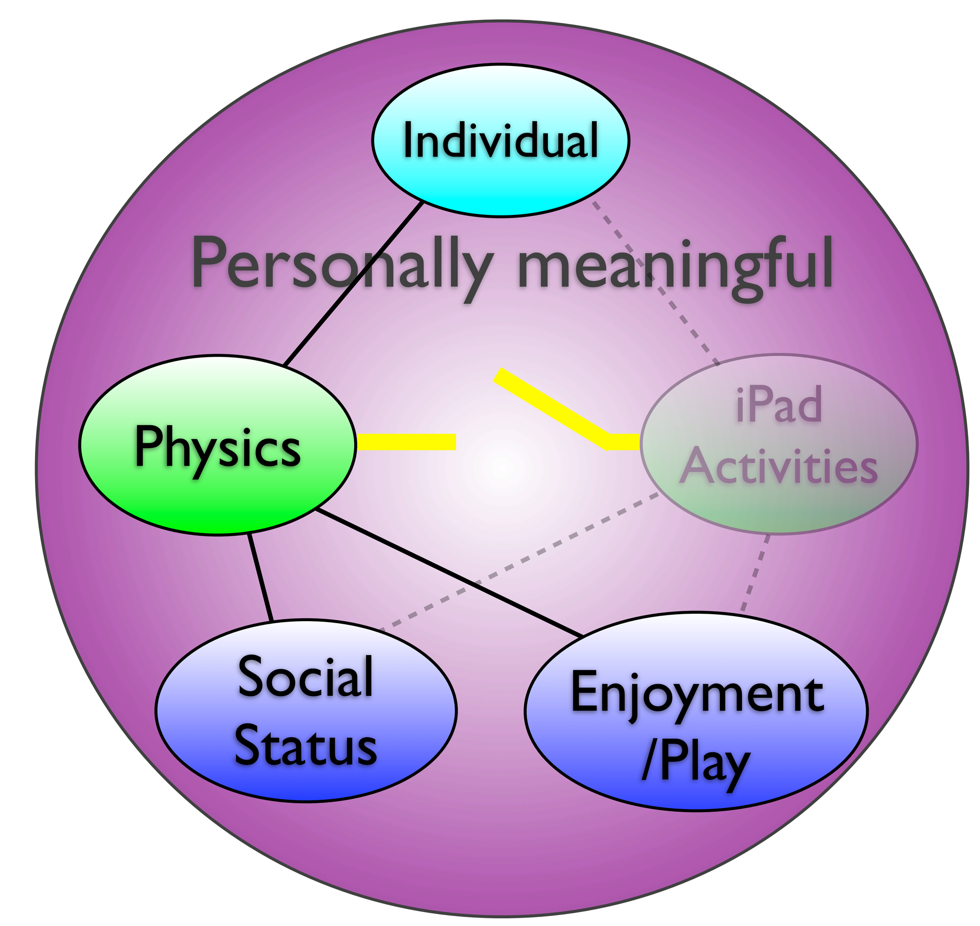
Conclusions & Implications

- ✳Student roles in the classroom and relationship to evidence are shifted through the use of iPads.
- ✳Students obtain social status and personal enjoyment/play through the iPad.
- ✳By integrating social status and play in physics activities, students are able to express their self identity.
- ✳The iPad provides an indirect connection between physics and student self identity.



Research Implications & Future Work

The iPad has *mediated* the development of positive identification with physics that no longer requires a connection to the iPad.



References:
1. Hutchins, E. Cognition in the Wild. Cambridge, MA: MIT Press (1996)
2. Hutchins, E. (1995). How a Cockpit Remembers Its Speeds. *Cognitive Science, 19*(3), 265-288.
3. Otero, V. (2001). Conceptual Development and Context: How Do They Relate? Proceedings of the Physics Education Research Conference.