

Using smartphones to collect in the moment data of the student experience

Can you look at the picture on the right and identify which students are engaged and which ones are not? How about which students are feeling stressed, challenged, or interested? The problem with this type of observational research is that it is almost impossible to do without a large degree of imprecision. The EAGER project is a unique way to measure student experiences by utilizing smartphone technology to ask the students how they are feeling during the course of their day using experience sampling methods (ESM).

Experience Sampling Method:

- Students are randomly signaled eight times during the day on a smartphone
- Each response takes 1-2 minutes to complete
- The instrument includes items for their activity and their affective states (e.g. enjoyment, confusion, etc.)
- Over the course of a week these repeated observations provide multiple observations for each student
- These repeated measures are nested within days, students, and teacher instructional data
- Additional baseline background information is also collected

Preliminary Results:

- Science teachers tend to overestimate how engaged they felt their students are against what the students actually report.
- Students report feeling lower levels of challenge as it pertains to their science classes in the course of their school day.
- Students are optimally engaged in about 20% of all everyday life situations, including school, and interestingly is typical in activities that are perceived as work or as a mixture of work and play.
- Moving forward our work will explore in more detail the relationships between teacher classroom practices, student engagement, and new science standards changes in both the United States and Finland.

Why does this matter?

Why science?

Why secondary students?

The decreasing number of students engaged in STEM learning and careers is one of the most critical issues in education and labor markets internationally (OECD, 2007). For example, in the United States STEM as a field will grow by 18% through 2018 compared with 9.8% in non-STEM fields (Langdon et al., 2011). STEM workers enjoy a 25% wage premium at all degree levels and have significantly lower unemployment rates (Langdon et al., 2011). Recently, the United States has changed its visa regulations to increase the number of individuals who can enter the United States to fill shortages in these STEM fields (Rothwell and Ruiz, 2013). Women and minorities are also disproportionately under-represented in STEM both in school and in careers (Riegle-Crumb & Moore, 2013 and Griffith, 2010). Secondary school is when students begin to start making choices about careers and studies after their secondary school work is completed so it is critical to examine these trends in engagement and under-representation in science while students are at this career crossroads.

About Paco – our smartphone application

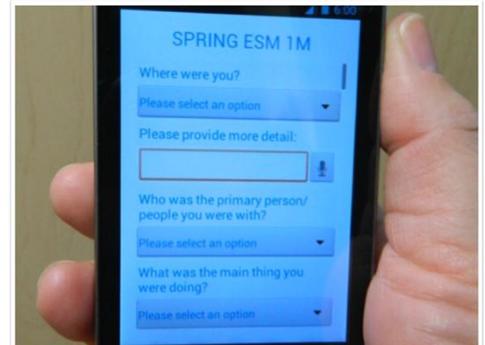
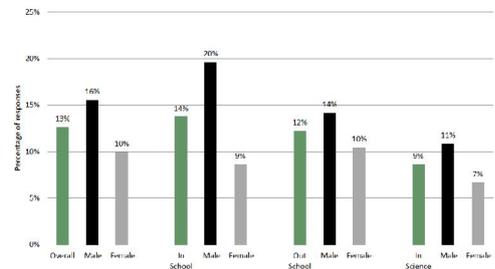
Paco was developed by Robert Evans, a Google engineer, to help find times when he and his colleagues were most productive. Paco is a free download that will work on any Android or iOS smartphone.

Anyone can become a researcher and design their own experiments. A researcher can design the types of questions asked, how frequently, and who has access to participate in the study (www.pacoapp.com).

Results are automatically uploaded to a secure server whenever a network connection is present. The administrator can then download the data as a CSV file for import into a statistics package for further analysis.



Percent Engagement Across Contexts by Gender



This project is focused on student experiences in the classroom but the ESM and Paco application are relevant to any researchers looking to capture the daily experience of individuals.

The benefits of this line of research are capturing real time, in the moment data from the subjects themselves which can be accessed almost instantly. The costs are relatively minimal given the type of information that can be obtained with this form of data collection.

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Our work takes something that is already a large part of everyday life, a smartphone, and turns it into a data collection tool. This tool provides a window into social and emotional learning in different contexts that cannot be obtained with other methods.

The use of smartphone technology for data collection has been steadily increasing. As our work continues, we will be able to expand the relevance and opportunities for learning about human behavior that Paco can provide.