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## PROJECT GOALS

- Use automated detectors of student disengagement in middle school math.
- To improve longitudinal prediction of students' choices of STEM careers.
- To improve theory on the processes of STEM career choice.

### Research Questions:

1. How well can automated measures of student disengagement predict a student's later choice of STEM college majors and STEM careers?
2. How does student disengagement drive and interact with motivational processes which lead to student career choice?

**Who may benefit?** → In the long term, results from this project may benefit:

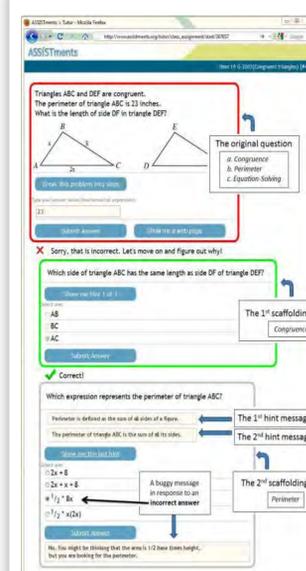
- Students engaged by STEM content, but not considering STEM careers
- Students interested in STEM careers who have become disengage by STEM content

## PROCESS

This project will consist four activities:

1. Automated Detection of disengaged behaviors.
2. Analyses to predict student career choice and to understand the role that disengagement plays in the processes leading to career choice.
3. Comparison to the role that vocational interests, self-efficacy, learning goals, and attitudes towards mathematics play in career choice
4. Integrating prediction model into ASSISTments reports for school personnel, to support school-level decision making and intervention

## LEARNING ENVIRONMENT



**ASSISTments**

ASSISTments is a free web-based platform that allows:

- 1) teachers to write or select questions;
- 2) students to get immediate useful tutoring;
- 3) teachers to get instant reports to help inform their instruction.

ASSISTments gives teachers fine grained reporting on math skills, and supports them in formative assessment.

## PARTICIPANTS

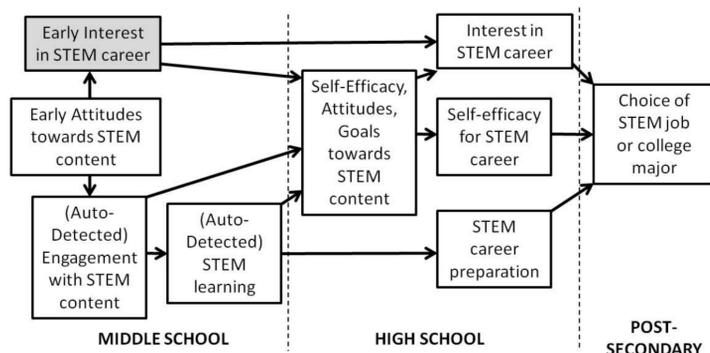
- Data will be sampled from a diverse student population in Central Massachusetts schools:
  - 36% of students are Hispanic
  - 13% are African-American
  - 8% Asian-American
  - per capita income in these schools is significantly lower than the state average.
- A randomly selected sample of 1000 students scheduled to complete high school in 2011-2013 will be tracked.
  - Data on disengagement during tutor usage in 2005-2007 will be integrated with career choice and survey data collected during the project.
- Communication with participants will be through low-cost methods (email, online communities).

## FRAMEWORKS

### THEORETICAL FRAMEWORKS:

- Students' **attitudes**, **career interests** and **self-efficacy** towards STEM careers during middle school significantly impact students' later choice of careers (Lent et al, 1999; Blustein et al, 1997; Betz & Rottinghaus, 2006).
- **Disengaged behaviors**, automatically detected within educational software, may provide a new lens and new opportunity for early intervention to:
  - **Students who are interested in stem careers but disengaged by STEM content**
  - **Students who are engaged by STEM content, but not considering STEM careers.**

### HYPOTHESIZED FRAMEWORK



## CONSTRUCTS

### Student behaviors associated with Disengagement:

- Gaming the System (Baker et al., 2004)
- Off-Task Behavior (Karweit & Slavin, 1981,1982; Baker et al., 2004; Baker, 2007)
- Carelessness (Baker et al., 2008; San Pedro, Baker, & Rodrigo, 2011)

### Motivational constructs related to career development:

- Self-Efficacy
- Career Interests
- Attitudes
- Learning Goals

## PROJECT STATUS

- Data on student behavior from ASSISTments log files processed and ready for analysis
- Carelessness model applied to data
- Application of Gaming and Off-Task models to data in progress
- Currently working to gather data on students' career choices and survey measures

## SIGNIFICANCE/IMPLICATIONS

- Exploring student disengagement as a potential indicator (together with current career choice measures) of students' STEM career choice makes it easier to identify students at risk of dropping out of the STEM pipeline, and the factors leading to that risk
- Will help identify which types of interventions may be most relevant for a given student, to help them gain interest or preparation for participation in STEM careers
- Has the potential to enrich theory on career development – how student engagement with STEM content influences the shifts in vocational interest and self-efficacy that occur in school, and which drive career choice (cf. Betz & Rottinghaus, 2006)
- Predicting future career choice and intervening during middle school is important because middle school is a key juncture in learning and career development.