Scenario-based Training and On-the-Job Support for Equitable Mentoring

Danielle R. Chine[1], Pallavi Chhabra, Adetunji Adeniran, Joseph Kopko, Cindy Tipper, Shivang Gupta[2], Kenneth R. Koedinger

Carnegie Mellon University
[1] dchine@andrew.cmu.edu
[2] shivangg@andrew.cmu.edu

http://personalizedlearning2.org/

What is Personalized Learning^2?

PL^2 is a mentor PD platform designed to improve efficiency and workplace training through scenario-based instruction and personalized support. Combining research-driven mentor training with artificial intelligence (AI)-powered software, PL^2 connects mentors, often under-trained tutors, to personalized resources with the click of a button.

Personalized Learning^2

Our *vision* is to bridge the opportunity gap in math.

We empower mentors and tutors to double learning gains for students.

We provide customized mentor support via continuous, on-the-job training and resource assistance in BOTH math content skills and social-emotional and motivational teaching.

The Problem

Now more than ever, schools and organizations are facing many obstacles to improving learning outcomes:

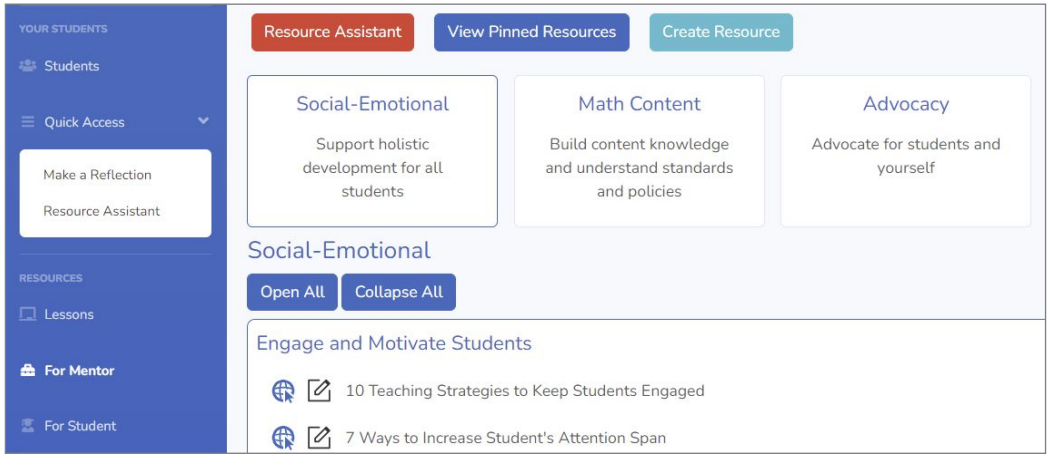
- Need for trained mentors/tutors is at an all time high
- Lower level of experience among current mentors/tutors
- Increased achievement gaps among marginalized students
- Wider diversity of need among students
- More students needing social-emotional support
- Influx of students needing academic mentoring

This work highlights:

1. Key features of the PL^2 system.
2. Recent research results determining the most effective competencies for successful mentorship.
3. In response to research, we detail the development of asynchronous, scenario-based lessons, housed within the PL^2 platform for on-demand mentor training.

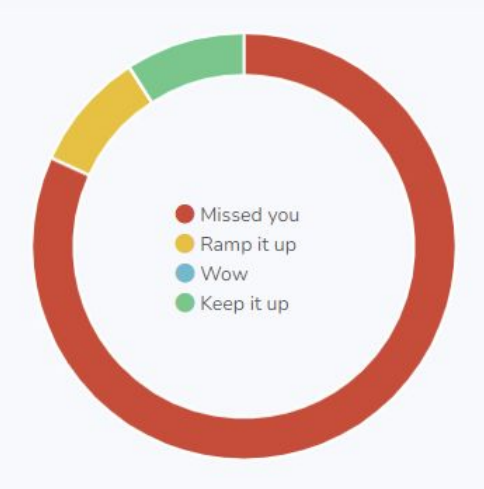
PL^2 Features- *Resource Library*

The resource library gives mentors access to the *Resource Assistant*, allows them to view pinned resources for easy access, and helps mentors to create their own resources. Mentors can also add feedback and input into the system using the *Make a Reflection* feature and participate in asynchronous lessons by clicking the *Lessons* tab.



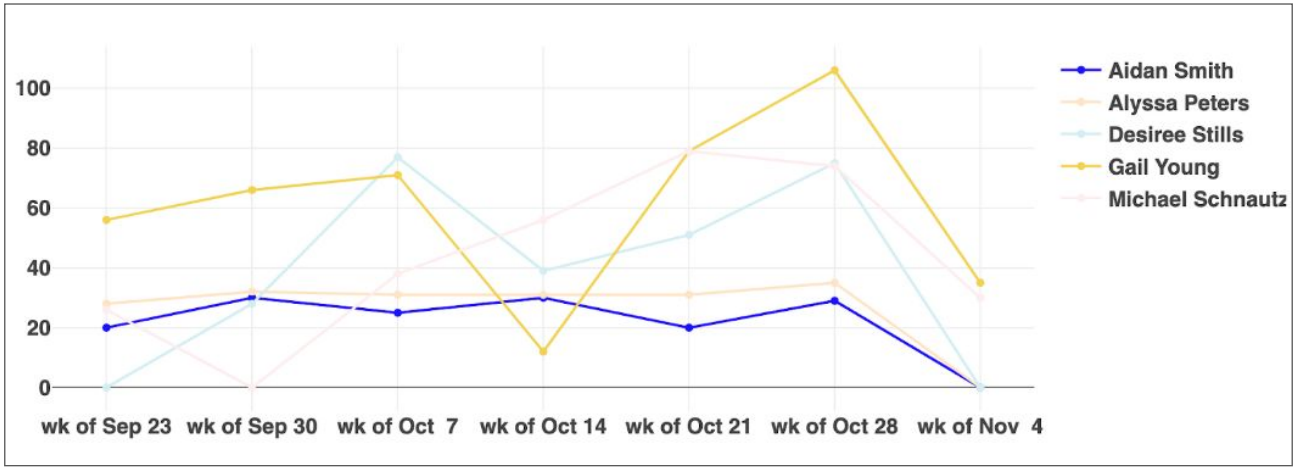
PL^2 Features- *Student Statuses*

The student status indicator details the status of students giving mentors information regarding student's performance on both their effort and progress goals. The student statuses are shown coded within the circle.



PL^2 Features- *Student Data Reports*

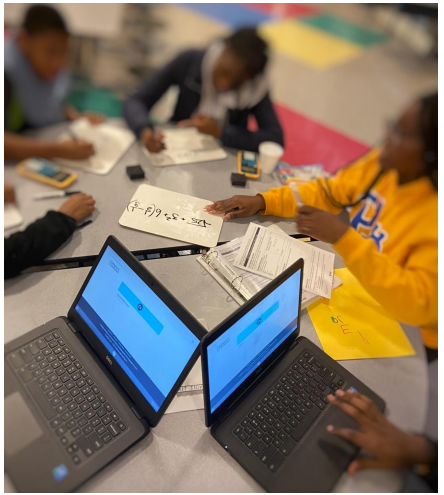
A data report displaying the progress of five students assigned to a mentor showing the time spent using EdTech over several weeks. Mentors can use this data to identify trends and abrupt changes in student performance.



Documented Results

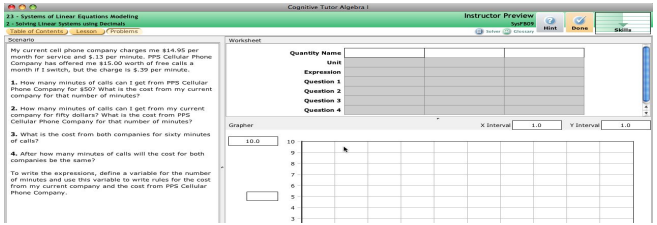
Results from the Ready to Learn program offered by the Center for Urban Education at the University of Pittsburgh (Pitt)

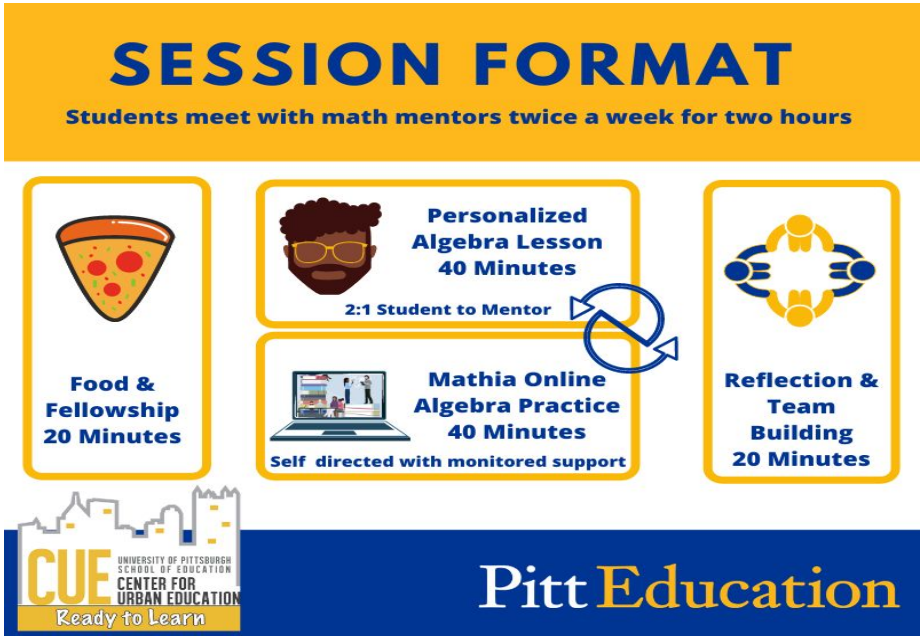
- After-school and summer math mentoring initiative
- Blends tutors and technology to create an engaging learning experience for students
- Tutors are Pitt undergraduates



Results from Ready to Learn in Person

Mathia (Cognitive Tutor)





Data Analysis Overview

Compare Math Test Scores (RIT) pre & post

- *Pre*: Fall & Winter (2019-2020) RIT Score
- *Between*: RtL/PL2 for treatment, Usual schooling & *pandemic* for all
- *Post*: Fall & Winter (2020-2021) RIT Score

Demographics – 3 local urban schools

- Mostly grades 6-7; 52% female
- ~80-8-12% black-brown-white

Propensity matching by demographics & RIT

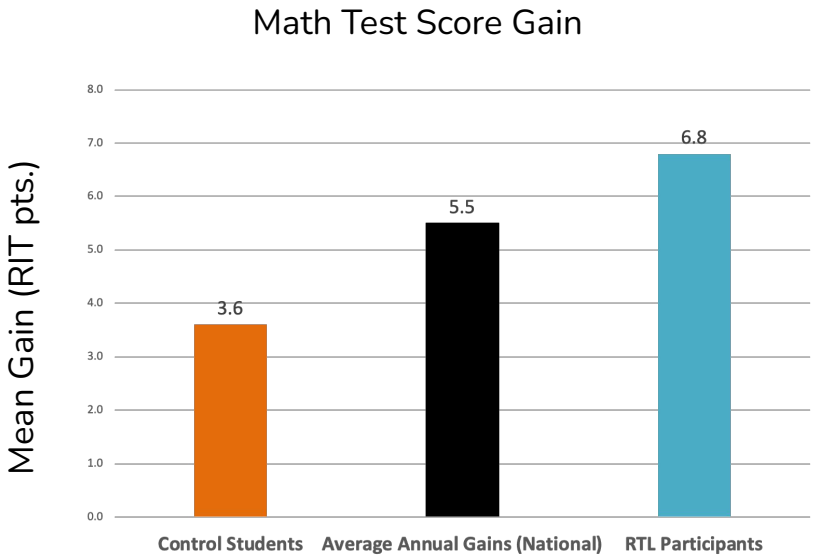
- Treatment: N=70
- Control: N=380 matched

Results

Our program nearly doubled the rate of math learning for participants!

Students who participated in the RtL program demonstrated significant learning gains compared to control students.
Effect size: 0.4

*Recently accepted into AIED'2022



Mentor Competencies, Average Rating, # of Resources

Social-Emotional	Math Content	Advocacy	Relationships	Technology Tools
Engage and Motivate Students (3.7)*(32)*	Demonstrate Content Understanding (3.4)*(19)*	Demonstrate Awareness of Biases (3.5)*(0)*	Build Relationships with Students (3.5)*(7)*	Use Technology Effectively (3.0)*(17)*
Foster Independent Learning (3.5)*(3)*	Understand Educational Policies and Norms (2.2)*(5)*	Use Culturally Responsive Teaching Practices (3.4)*(9)*	Personalize Learning (3.4)*(4)*	Stay Organized (2.7)*(0)*
Apply Social-Emotional Learning Practices (3.3)*(12)*		Practice Self-Care (2.9)*(0)*	Communicate with Caregivers (2.5)*(10)*	
Manage Learning Environment (3.1)*(0)*				

S.M.A.R.T. Framework

Based on in-house CMU research

14 competencies across 5 strategic areas needed for successful mentorship:

1. Social Emotional Learning
2. Mastering Content
3. Advocacy
4. Relationships
5. Technology Tools

PL^2 Asynchronous Lessons- Already created

Short (7-12 min) Asynchronous lessons to *engage tutors at their own time and pace*

Examples:

- Supporting a Growth Mindset
- Using Intrinsic & Extrinsic Motivation Strategies
- Reacting to Student's Errors

PL^2 Asynchronous Lessons

- Scenario-based
- Apply “learn by doing”
- Research-driven

PL^2 Asynchronous Lesson- *Reacting to Errors*

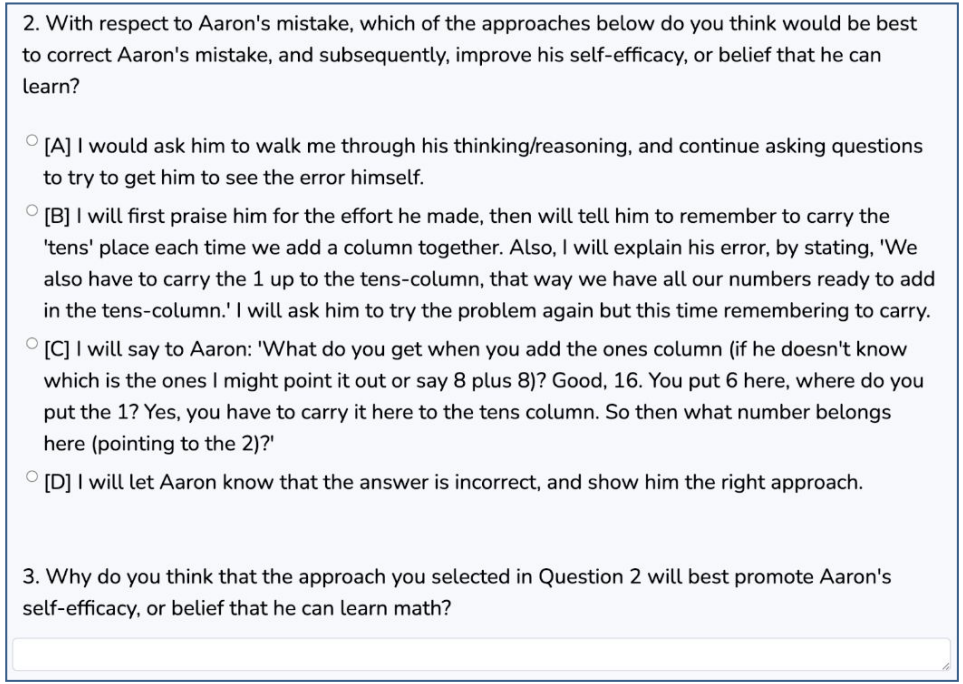
A segment of the *Reacting to Errors* asynchronous lesson showcasing the initial training scenario asking mentors to predict or choose how they would respond to the given scenario while attending to the student's self-efficacy.

1. Imagine you are a mentor to a student, Aaron, who has a long history of struggling with math. Aaron is not particularly motivated to learn math. He just finished a math problem adding a 3-digit and 2-digit number and has made a common mistake (shown below).

Briefly explain how you would approach Aaron in recognizing his mistake and be sure to the consider the impact of your comments on Aaron's self-efficacy, that is, his belief that he can learn math.

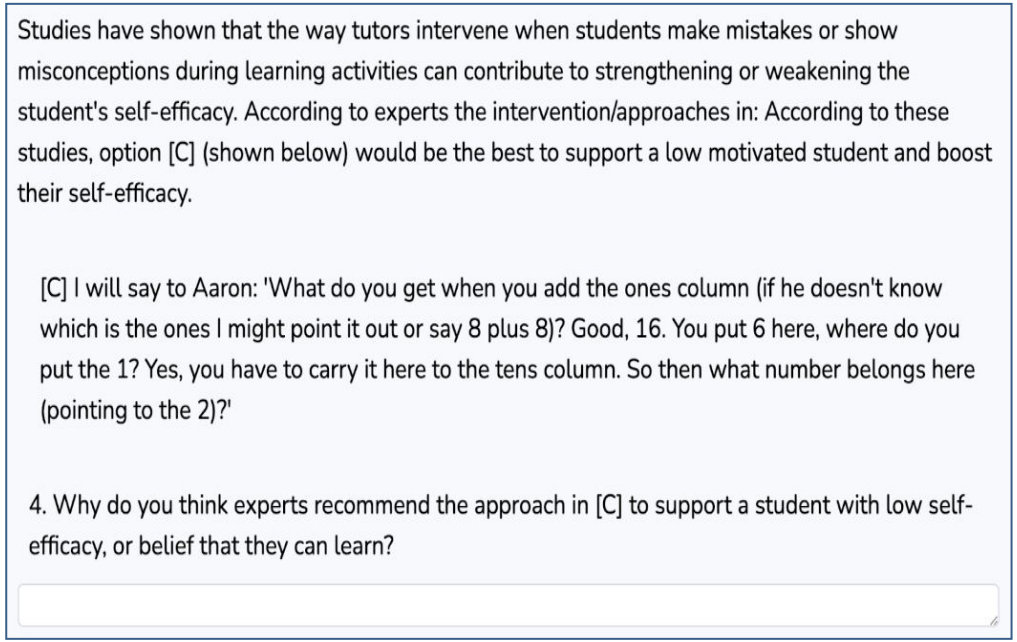
PL^2 Asynchronous Lesson- *Reacting to Errors*

A segment of the *Reacting to Errors* lesson within the training scenario displaying the selected-response question intended for the mentor to predict or choose the best approach followed by a constructed-response question asking them to explain.



PL^2 Asynchronous Lesson- *Reacting to Errors*

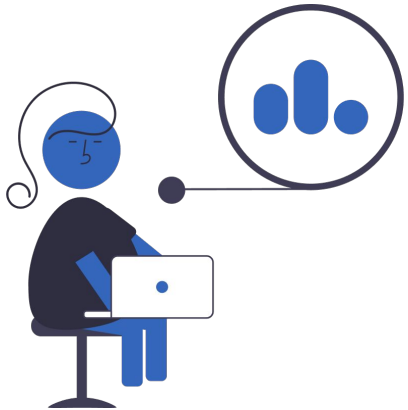
A segment of the *Reacting to Errors* lesson within the training scenario revealing the research-recommended strategy for the formative training scenario. Mentors are then asked why they think the research-recommended response is suggested by experts as both a constructed-response question and then as a selected-response (not shown).



PL^2 Asynchronous Lessons- In process

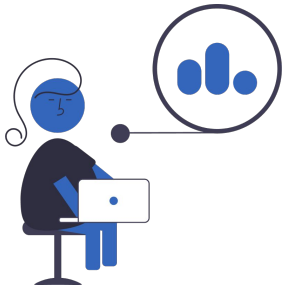
In response to our research on mentoring competencies the following lessons are being created based on expressed need:

- *Demonstrate Awareness of Biases*
- *Using Culturally Responsive Teaching Practices*
- *Demonstrate Content Understanding*

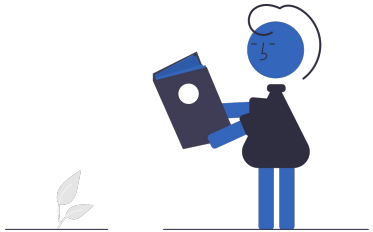


Conclusion

In response to the problem and recent research, we have developed the following 3-pronged approach:



PL² Training



PL² Toolkit

PL² Tutors

PL^2 *Training*

Resource Library

- Access to 100+ high-quality, curated resources for tutors and students
- At the time of press, we have created a dozen asynchronous lessons that were rated high-priority by competency and/or have few resources located within the mentor library (i.e., *Foster Independent Learning*, *Demonstrate Awareness of Biases, etc.*).
- Tutors can find their own resources or get assistance in finding the appropriate resources for professional development

PL^2 *Toolkit*

Repackages student EdTech status features, goal setting, and recommended resources allowing mentors to personalize the learning experience for their students.

I want to identify the root cause behind a challenge my mentee is facing

I already know the root cause and need to find a resource to resolve the issue

PL^2 *Tutoring Corps*

Highly trained, certified and cleared tutors ready for deployment!

Trained in the following:

- Social-emotional and motivational strategies
- Math pedagogy and content knowledge
- Demonstrating awareness of biases
- Building relationships with students and caregivers
- Use of PL^2 and other technology tools

Future Work

Surveying more partners in differing mentoring roles (i.e., supervisors, mentors, coaches) to determine their perspectives to answer the following research questions:

- What differences exist among mentors' perceptions of learning and their demographics (i.e., race, gender, age) and also self-reported level of experience?
- Do mentors reporting a high level of experience perform better?
- Do mentors learn new mentoring strategies and skills from short scenario-based lessons?

Functionality advances, such as a student-facing PL^2 version allowing students to directly access resources, monitor their own goals, and directly message mentors

PL^2

For more information:

Shiv Gupta shivangg@andrew.cmu.edu

Dr. Danielle Chine dchine@andrew.cmu.edu

http://personalizedlearning2.org

Carnegie Mellon University