Personalized Learning^2: A Human Mentoring and AI Tutoring Platform Ensuring Equity

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Abstract. This interactive event demonstrates Personalized Learning^2, an education technology web application that syncs with students' existing math learning software and mentor inputs to improve students' math achievement. We combine research-driven mentor training and AI-powered personalization tools to increase learning opportunities among marginalized students. This demo highlights key features of the app, recent upgrades, and showcases motivational interventions used by mentors to enhance student learning.

1   Summary

Personalized Learning^2 (PL^2) is a mentor support app that syncs with students' existing math learning software and mentor input and feedback to improve students' math achievement [5]. By combining research-driven mentor training with AI-powered software, the PL^2 approach improves mentoring efficiency. PL^2 connects mentors to personalized resources with the click of a button. This connection is achieved by a web app used by mentors and mentor supervisors. PL^2 serves out-of-school tutoring programs, which choose a computer-based math tutoring system for students to use. The data from student interactions is passed to the PL^2 web app to power mentor decisions. Mentors make post-tutoring session reflections based on reports of student effort and progress. Mentors work with students to set or modify intermediate effort goals, much like the 10,000 step goals in physical fitness apps, such as doing 40 minutes of math practice a week. When students are missing effort or progress goals, the PL^2 app provides suggestions for resources that the mentor can use themselves or with students to enhance student motivation, cognition, or meta-cognition. In this demo, we will: 1) showcase examples of motivational interventions used by mentors to enhance student learning[1]; 2) highlight the key features of the PL^2 app emphasizing recent upgrades including improvements to the mentor-facing version[2]; and 3) illustrate the student-facing version.[3] See the *Notes & Resources* section for live links and applicable information for all three listed demo objectives including a video link.

2   Impact

PL^2 addresses the opportunity gap among marginalized students by improving the number of math learning opportunities for students. PL^2 has partnered with 13 organizations, both school-based and out-of-school time serving over 150 mentors and more than 1000 students. Currently, we are expanding our reach by partnering with national organizations such as UPchieve, an online math tutoring program serving low-income high school students.

Marginalized students lack the means to access quality instructional services and experience lesser opportunities for learning [5] creating an opportunity gap. Racial and economic learning gaps are preventing millions of American students from realizing their potential, and this perpetuates inequalities of income and opportunity across generations [1]. Recently, the COVID-19 pandemic has exacerbated these inequalities with lower student achievement at the start of the 2021-22 school year than previous years hitting marginalized groups the hardest—

minority students experiencing high-poverty [4]. The PL^2 approach to tutoring assumes achievement gaps emerge from differences in learning opportunities and seeks to increase such opportunities for marginalized students, especially through after-school programs such as the Ready to Learn program. This program engages diverse middle school students from three schools in an urban district. We compared achievement growth of 70 treatment students in this program with a control group of 380 students from the same district with matched demographics and prior achievement. Based on standardized math assessments given one year apart, we found the gain of treatment students (6.8 points) was nearly double the gain of the control group (3.6 points) [2]. These promising results catalyzed recent PL^2 app upgrades, modifications to the mentor-facing version, creation of a student-facing version, and accelerated development of motivational interventions housed in the resource library.

3   Relevance to AI in Education

The impact of combined human mentoring and AI-driven computer-based tutoring on student performance is encouraging, with an expanding stream of research showing promise in improving learning gains, especially in mathematics [2, 3]. Cost effective and scalable tutoring models show promise where mentor skill identification and training is efficient and larger student-to-tutor ratios can be achieved through novel, well-engineered, AI-supported tutoring. The PL^2 approach to tutoring provides hope for AI-supported solutions to help narrow achievement gaps created by lack of opportunity.

Notes & Resources
1. Examples of motivational interventions used by mentors [link]
2. Key features and recent upgrades [link]
3. Creation of the student-facing version [link]
4. Video [link]

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