

ASSISTments Efficacy Trial: The Automatic Reassessment and Remediation System

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Abstract. It has been found in a recent large-scale efficacy trial conducted by SRI in the state of Maine that the usage of ASSISTments in the classroom and for homework nearly doubled student learning over the course of a year. This interactive event focuses on the Automatic Reassessment and Remediation System (ARRS) in the ASSISTments platform, and is intended to demonstrate how teachers and students, such as those involved in the efficacy trial, utilize the system to benefit student learning.

Keywords: Intelligent tutoring system, knowledge retention, student modeling

1 Spaced Learning in ASSISTments

The usage of ASSISTments, a free web-based learning platform hosted by Worcester Polytechnic Institute [1], has been found to nearly double student learning over the course of a year by a recent efficacy trial conducted by SRI in the state of Maine [2]. The system focuses on providing immediate feedback to students while providing a range of tools to help inform teachers of student progress.

In 2012, we developed a tool called the Automatic Reassessment and Relearning System (ARRS) in the ASSISTments platform, which utilizes the spacing effect theory to improve students' long-term retention performance. The workflow surrounding ARRS implements automated, spaced assessments over time for students and assigns remedial practice for those students who perform poorly.

The initial portion of this interactive event focuses on ARRS from the perspective of both the teacher and the student to demonstrate how this system integrates with other, more traditional, assignments in ASSISTments. The second portion of this demonstration focuses on the scheduling of assessments and remedial practice provided by the system from the student's perspective. An adaptation of ARRS, known as the Personalized Adaptive Scheduling System (PASS), comprises the final aspects of this interactive event, demonstrating how ARRS can be implemented with a more personalized schedule.

2 Automatic Reassessment and Remediation System

The first part of the demonstration will exemplify how ARRS functions from the perspective of both the teacher and the student. The system is designed to in-

tegrate with assignments known as skill builders in ASSISTments. Skill builders present problems of a specified skill, or knowledge component, to students until sufficient understanding of the material is exhibited. Commonly this threshold of sufficient understanding is defined simply as answering three consecutive problems correctly without the use of tutor-provided aid.

Once a skill builder is assigned and completed by each student, ARRS assigns a series of reassessment tests based on a spaced schedule to measure student understanding and retention of the material after a set number of days. This aspect of the interactive event focuses on the assignment of these skill builders with ARRS, as well as the control that teachers have on this process through a number of available settings. Similarly, the assigned material will be further addressed from the perspective of the student.

3 Personalized Adaptive Scheduling System

Existing as a special implementation of ARRS, the more adaptive system of PASS will be demonstrated as well. This tool implements an assessment schedule that is more personalized to the student based on demonstrated performance on each skill builder assignment [3]. The interactive event will demonstrate how teachers maintain control of the progression of assignments in this system to support a teacher-paced flow of content. We will further exemplify how PASS adapts the scheduling of reassessments based on student performance.

Since the summer of 2012 to the end of 2016, ARRS and PASS have been used by over 3,500 students, and over 1.4 million reassessment tests have been assigned. Randomized controlled trials (RCTs) have shown that ARRS and PASS can reliably improve students' long-term performance [4].

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