

Effectiveness of XLPrep.com's Program

Our program is research-based and has been proven effective through a study conducted at a high school in Lennox, California. These topics are discussed below.

Research Base

Our program is based on research on effective modes of online learning and is a form of adaptive hypermedia (Eklund and Sinclair 2000). It is hypermedia in that it offers online nodes, or web pages, that can be traversed through links. It is adaptive in that it employs an intelligent tutoring system (ITS) that presents information tailored to the student based on the student's demonstrated knowledge.

Adaptive presentation of material through hypermedia has been shown to increase user performance in terms of navigating through online material and learning the math content (Eklund and Sinclair 2000, Boyle and Encarnacion 1994, and Specht 1998). It has also been shown to motivate students to study longer and make gains in academic performance (Goldman and Pellegrino 1987; Okolo et al. 1993; Babbit and Miller 1996). Because people can become overwhelmed by large volumes of information presented to them on the Internet, adaptive methods that select content can facilitate the learning process (Specht 1998).

Our program is also based on research to keep students motivated in an online learning environment. Engaging online programs offer the following: access 24/7, adaptivity, rapid feedback, and flexible learning methods and assessment (Tempelaar et al. 2006). Our program possesses all of these attributes.

Our ITS uses curriculum sequencing (Brusilovsky 1999 and 2001), which helps the student find the optimal path through the learning material. Curriculum sequencing functions on two levels: high level and low level (Brusilovsky 1999). At the high level, our program determines what topic the student will learn. At the low level, our program determines which problems the student will work on based on their demonstrated knowledge by presenting problems on the relevant topic and at the appropriate difficulty level.

Finally, our program offers cutting edge technology based on the latest research. As most instructional material on the Internet is static and lacks adaptive instruction (Kennedy et al. 2006), SES students will have access to some of the most advanced online learning material available. Our ITS also goes beyond traditional ITSs in that it offers educational material in addition to questions (Brusilovsky 1999). Lastly, our program employs passive sequencing, a more technologically advanced form of ITS, that reacts to answer choices given by the student (Brusilovsky 1999). The student does

not dictate the end point; the ITS determines which questions are appropriate for the student and when they should be presented.

Study Results

To test the effectiveness of our program, we conducted a study using math PSAT scores at the Lennox Math, Science, and Technology Academy (Lennox Academy) in Lennox, CA. Information on the College Board's Preliminary Scholastic Aptitude Test (PSAT) can be viewed and downloaded at www.collegeboard.com.

As part of our study, a total of 110 students in 10th and 11th grades at the Lennox Academy used our program for various lengths of time from March to October of 2005. Students at Lennox were asked to complete assignments for their math class. Because our questions can be permuted to provide students with more practice, students had unlimited study time and answered different numbers of questions.

To determine the effectiveness of our program, we looked at the results of the Lennox Academy study in two ways. First, we correlated use of our program with an increase in PSAT math score for all 110 students in the study. We compared PSAT results from October 2005 (post-test) during the service period of our study to PSAT math results from the prior year (pre-test). Second, we conducted significance tests to determine how many completed questions resulted in a statistically significant increase in PSAT math score due to studying with our program.

Figure 1 below shows the correlation for all students. It breaks the students into groups by how many problems they completed and shows the average increase in PSAT math score for each group. As the number of correctly completed problems increases, the average increase in math PSAT score increases. The R^2 for this relationship is .77. Therefore, 77% of the change in score increase can be explained by the number of completed questions. The other 23% could be explained by any number of factors including human variability. The average math score increase for all 110 students in the study was 4.21 PSAT points.

Figure 1. Average PSAT Math Score Increase vs. Number of XLPrep.com Questions Completed

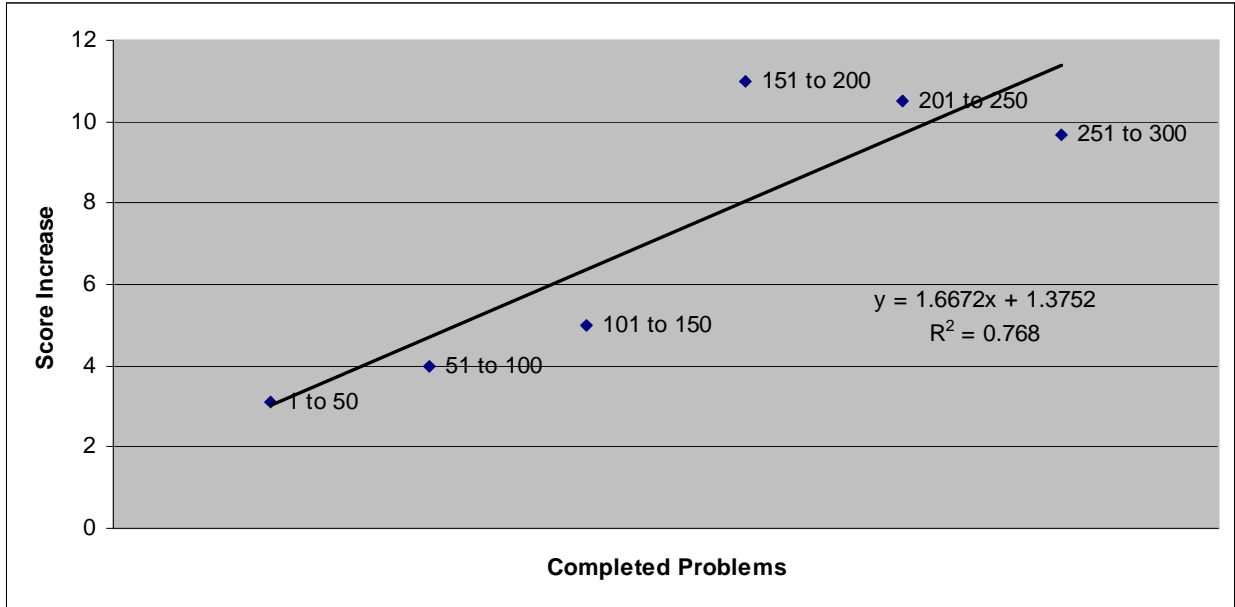


Table 1 below shows summary statistics for pre-test and post-test PSAT scores.

Table 1. Summary Statistics of Student PSAT Scores

Test	Average	Median	Standard Deviation
Pre-Test	36.2	36.5	8.26
Post-Test	39.4	41.0	8.68

To further ascertain student performance before and after using our program, we conducted significance tests to determine at what number of completed questions a statistically significant increase in PSAT math score occurred due to our program. At an alpha level of .05, statistically significant score increases were evident with a p-value of 0.032 in students who completed 90 problems or more as compared to students who completed 89 problems or less. Table 4 below shows that 75% of students answering at least 90 XLPrep.com questions increased their PSAT math scores.

Table 4. PSAT Math Score Increases by Number of Completed XLPrep.com Questions

Number of Completed XLPrep.com Questions	Average PSAT Math Score Increase	Percent with Increased Score (%)	Number with Increased Score	Number of Students in Group
At least 1 question*	4.21	60	66	110
90 or more questions	7.13	75	18	24
89 or less	3.40	56	48	85

*Includes all students.

In summary, the regression analysis for all students in the study shows a clear relationship between use of our program and an increase in PSAT math score. The results of the t-test show a statistically significant relationship between use of our program and an increase in PSAT math score. Based on these results, our program is effective in improving student math skills and performance on tests.