



Better Than a  
Private Tutor

## MATISTO – Software for Practicing Mathematics

### *Background*

Today 97% of parents think that higher education is no longer an option. More than ever before, college graduates enjoy a larger selection of job opportunities, higher income and lower unemployment rates. While the job market gets more competitive each year, the school system remains stale, with a single teacher for every 30 children. Parents are willing to go a long way in order to make sure their children are on the path for college. For example the tutoring market has doubled in the past 5 years reaching \$5 billion in 2006, in the US. However when it comes to mathematics – children need to do homework for several hours each week, and it is not practical to have it all done with a math tutor.

### *A Math Problem*

Let's look at the following problem:

*“Jane, Paul and Peter can finish painting the fence in 2 hours. If Jane does the job alone she can finish it in 5 hours. If Paul does the job alone he can finish it in 6 hours. How long will it take for Peter to finish the job alone?”*



Solving this kind of a problem can take something like 10-20 stages: understanding the data, assigning variables, using formulas, constructing the equations, combining like terms, finding a common denominator, opening parentheses and so on. Now what happens when a child makes a mistake on one of the stages? Obviously the kid will end up with the wrong answer. However the biggest problem is that **the child's has a slim chance of finding the error**. Most likely the child will be frustrated and angry about the wasted time, and will move on to the next question. If that one won't work either – that will be the end of math practice for that day.

When it comes to math **kids need someone to look over their shoulder every step of the way**, and point their errors.



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### The Solution: Matisto – Math Practice Using Intelligent Software

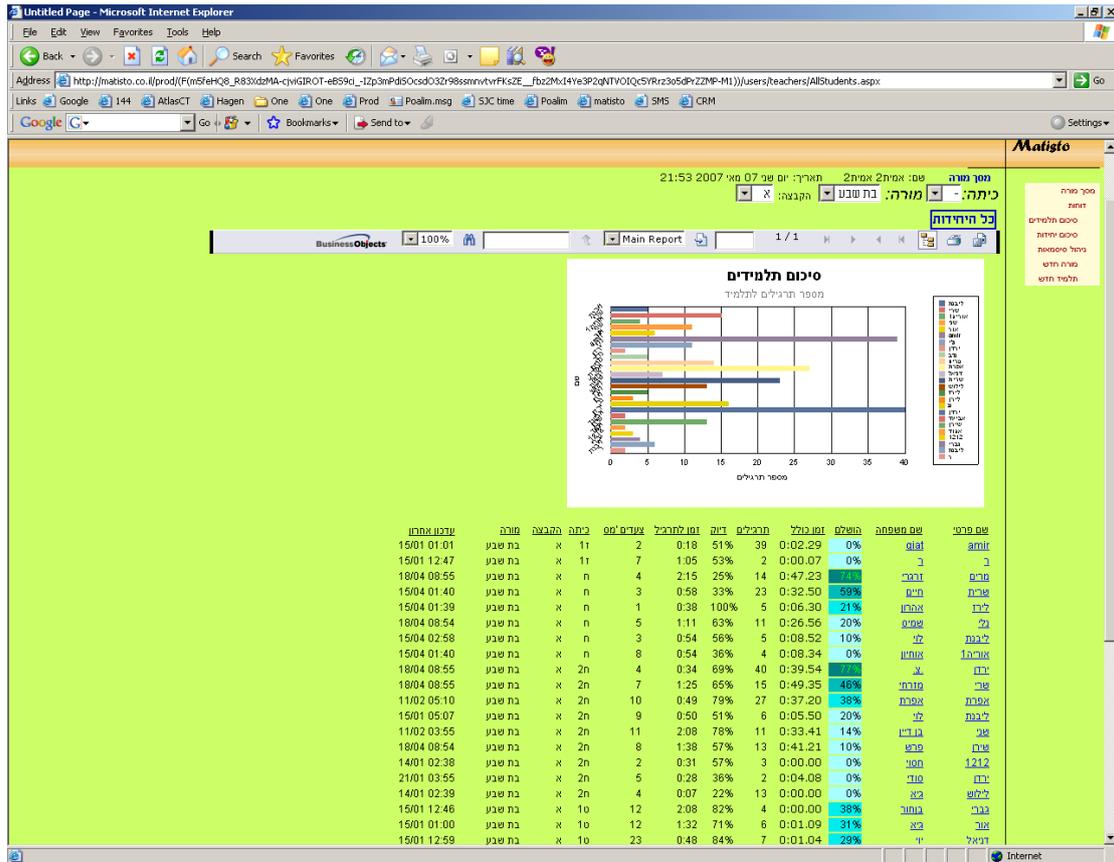
Matisto is a web based system in which **students perform the whole practice online**, step by step. The software processes the user input, figures out what the intention is, and assess whether it is a legitimate step towards a solution. It provides in real-time explicatory comments on mistakes, and rewards on success.

The screenshot shows the Matisto software interface. On the left, the slope formula is displayed:  $m = \frac{y_2 - y_1}{x_2 - x_1}$  and  $Y - y_1 = m \cdot (X - x_1)$ . Below this, the coordinates of three points are listed: A (1, 4), B (5, 8), and C (1, 7). The slope calculation is shown:  $m = \frac{8-4}{4} = \frac{4}{4} = 1$ . The point-slope equation is entered as  $Y - 7 = X - 1$ . In the center, a coordinate plane shows a line passing through points A, B, and C. The x and y axes range from -20 to 20. On the right, a sidebar contains a list of navigation options in Hebrew, including 'משוואה עם נגזרים', 'משוואה ריבועית', 'פונקציות אלגבריות', 'משוואה 2 נגזרים', 'הנדסה אנליטית', 'מערכת צירים', 'מיקום נקודות', 'מצאת YX', 'תרגיל XY', 'אמצע קטע', 'נר' אמצע קטע', 'קו ישר', 'משוואת הקו', 'הגמה קו ישר', 'תרגיל קו', 'נקודות חיתוך', 'תרגיל חיתוך', 'הסבר נקודה M', 'נקודה M', 'הסבר שברים', 'הסבר 2 נקודות', '2 נקודות', 'קו מקביל', '3 נק' נקודה', 'תרגיל פרמולה', 'טריגונומטריה', and 'בעיות מילוליות'. At the bottom, a calculator interface is visible with buttons for digits 0-9, mathematical symbols, and an 'OK' button. A status bar at the bottom shows '0%' completion, '300' points, '1' level, '0' remaining, '1' points earned, and '1' progress.

The software logs all the user activity to a database, analyzes it and produces reports that visualize the user's progress, achievements and difficulties.



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Matisto creates a profile for each user based on the activity log, and evaluates the user level on each category. Using this profile, Matisto generates exercises that match the exact level and situation of the user. The software has the ability to create thousands of different exercises, ranked to dozens of levels for each category.

### How is Matisto Different than Other eLearning Solutions?

Currently, most eLearning systems today are even less effective than the classroom. Although some of those do quiz the users, they only indicate whether the final answer is true or false - while **the practice itself is done in the student's mind or on paper**. Since only the end-result is captured by the software, it cannot understand how the students are solving the exercises, cannot monitor their methods, correct their mistakes as they're doing them, pinpoint problems and show alternative ways. While eLearning solutions have cost saving advantages, they are no different than practicing with a book.

The key principle at Matisto is that each and every step of the practice is **always online and always monitored**.