

**MATH & PENCIL**  
SOFTWARE CONSULTANCY  
MATHEMATICIANS  
PROGRAMMERS  
DATA SCIENTISTS  
NATURAL WINE + BEER ENTHUSIASTS

**CASE STUDY #7**  
VIRTUAL INFUSION PUMP TRAINING MODULE

## THE PROBLEM

Our client is a medical electronics company; we'll call them "ACME Medical." This client specializes in a specific type of medical electronic equipment: infusion pumps for intravenous medications (used in hospital and ambulatory settings for both adults and children).

Before we get to our solution for ACME Medical, let's look at how this industry had traditionally trained nurses (the primary users) on their equipment:

"My name is Scott. I'm a regional sales manager for ACME Medical. I sell infusion pumps to hospitals and ambulatory facilities with a 6-12 month sales cycle. Once a sale is made, the equipment is shipped, inventoried and processed through the biomedical department at the facility. It is my responsibility to coordinate staff training on the devices in concert with the hospital administrative staff. Depending on the hospital size, this could mean training thousands of nurses. Often, we have to work around shift schedules, covering 24 hour shift periods in order to catch all the staff (nurses are constantly being trained on new equipment and procedures, so we are at the mercy of their dictated schedule). The training presentation typically takes me 20-30 minutes per session. We then follow up the presentation with hands-on use and a brief test. Each training class will take an hour to complete (often with interruptions where nurses have to tend to patients and other responsibilities). We have traditionally used paper sign-in sheets and testing documentation to track and ensure all staff has been properly trained on the devices. Then, this is filed into a central training system within the hospital. Given all this, we still must schedule follow-up training visits for new hires, staff we missed, etc."

## THE MATH & PENCIL SOLUTION

ACME Medical hired Math & Pencil because they realized the legacy method described above is inefficient. Over a period of 18 months, we built an almost completely automated training system using modern web-based scripting languages and database structures. We photographed the equipment and developed a virtual training device. Within a training framework, users are able to "push" all the buttons on the device, virtually load the IV set (the

tubing, medication container, and clamps which run through infusion pump), program medications and various delivery rates, titrate and change those rates as they would be based on changes in the patient physiology, clear warning alerts and alarms, and take a final test to ensure proper understanding of the device.

We also built the modules to be customizable in order to suit the appropriate use cases of each user's medical setting, adding and removing training sessions based on user type. In real time, administrators and Scott can review training completion percentages and test scores and (as is common in the medical world) the entire training module can also be uploaded into a SCORM compliant legacy training system. All data is stored on EC2 servers with a backend admin dashboard with all the pertinent analytics and user info.

Before working with Math & Pencil, sales reps like Scott spent weeks of their time training hospital staff on their equipment. Now, he does one day in person to follow up on the digital training, as everything is tracked and stored and accessible from any device anywhere. If he sees the training rates are below the stated hospital goals, he can message staff or staff administrators directly to alert them to groups or individuals who have not completed the training.

The system has measurably reduced post-sale training time, given the end users vastly greater flexibility to complete the training on downtime (or at home) and offered improved insights into competency and training completion percentages for admin. Now, Scott can focus much more on his sales efforts, or just play a few extra rounds of golf.