# 2006-1852: ON-LINE VIDEO-BASED TRAINING FOR MATLAB, MATHCAD AND MAPLE

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# On-line Video-based Training for MATLAB, Maple and Mathcad

## 1. Abstract

This paper presents experiences creating and using video-based training for MATLAB, Maple and Mathcad over the Internet with engineering students at the author's university.  The author is also the owner of the company that produced the ***MATLAB Mastery*** and ***Maple Mastery*** video-based courses. The Mathcad videos, entitled ***Mathcad CBT***, were produced by the makers of Mathcad.

Courses benefit from these video-based courses because professors do not have to take time away from their lectures to train students in the use of the software.  Also professors can spend less of their office hours answering software questions. This form of software instruction has been used successfully at the author's university to train large groups of students (as many as 1,000 at once).

## 2. Introduction

Use of video-based training over the Internet is nothing new [1].  The only major hurdle is the work creating the video materials.  In our case we used the very popular Camtasia Studio from Techsmith [2] to capture video and audio of ourselves demonstrating the software.  The majority of time is not taken up with recording, but rather with scripting the lessons (at least 100 hours scripting per recorded hour).

One of the author's first experiences with video-based training was the creation of a home-grown video-based course on Mathcad.  It was designed to solve the problem of teaching Mathcad to 1,000 freshmen for use in their Linear Algebra courses.  With no other instruction, the students were able to learn Mathcad and apply it proficiently to their homework problems.

Without the videos we would have had to have conducted 60 "live" hands-on tutorials on Mathcad. This would not have been practical, consequently the plan to integrate Mathcad into the course would have been scrapped.

The course was broken up into *Lessons* (e.g. Calculus), and each lesson was divided into *Steps* (e.g. Differentiation).  At the end of each step's video a summary screen reminded the students of what they had to make *their* Mathcad screen look like to match the video.  Steps were about 3-5 minutes long.

Students could pause and replay parts of the video that they didn't understand on first viewing – something which is not readily accomplished with instructor-lead courses!  They could also view the videos at any time over the Internet.

Compared with printed tutorials, the video-based lessons gave students a constant and unambiguous view of exactly what was being demonstrated, along with concise verbal explanations.  The transfer of information is therefore much more efficient because the students don't have to decipher printed notes.

The following sections describe commercial video-based courses, and our experiences with them at our university - with engineering students mainly.

### 3. Mathcad CBT (Computer-based Training)

MathSoft, the makers of Mathcad, have their own video-based training course, **Mathcad CBT**. It is also divided into lessons, but unfortunately (at the time of writing) each lesson is not further divided into bite-sized steps, and summary screens are not provided. The author plans to make suggestions for these improvements to MathSoft.

We do not yet have much experience with **Mathcad CBT** in actual use, but we expect it will be helpful, especially as it covers much more of Mathcad than our home-grown course did.

### 4. MATLAB Mastery

This course has been used to train undergraduate and grad students on the use of MATLAB at the author's university and elsewhere (MIT, Penn State, etc.), either on their own or in a lab setting. In the lab we provide teaching assistants, but rarely are they needed to help the students through the course.

Extensive use is made of diagrams to explain various concepts, such as global variables, and reducing a $2^{nd}$ order ODE to a system of $1^{st}$ order ODEs. These were inserted based on the author's experience in teaching the former "live" course over several years. An example screenshot may be found in Figure 1.

### 5. Maple Mastery

This course has been used to make students proficient with the use of Maple. Students are usually self-sufficient while they complete the course without incident. The author has taught Maple courses over many years (including on occasion for Maplesoft), and has incorporated best practices into the videos, along with problem-solving templates for solving algebraic equations, differential equations, etc.

### 6. Conclusion

The response has been very positive since the introduction of video-based tutorials into our training courses for MATLAB, Maple and Mathcad. Indeed when we interrupt students to ask if they need any help they almost always say "no, thank you" and turn back to the videos. As the former instructor for the "live" courses, I know that I could never teach the material "live" again as well the videos do.

### 7. References

1. Little, D.C. "Distance Learning with Digital Video". *IEEE Multimedia*, Spring 1995.

2. http://www.TechSmith.com. Makers of Camtasia Studio.

3. http://www.Mathcad.com. Makers of **Mathcad CBT** videos.

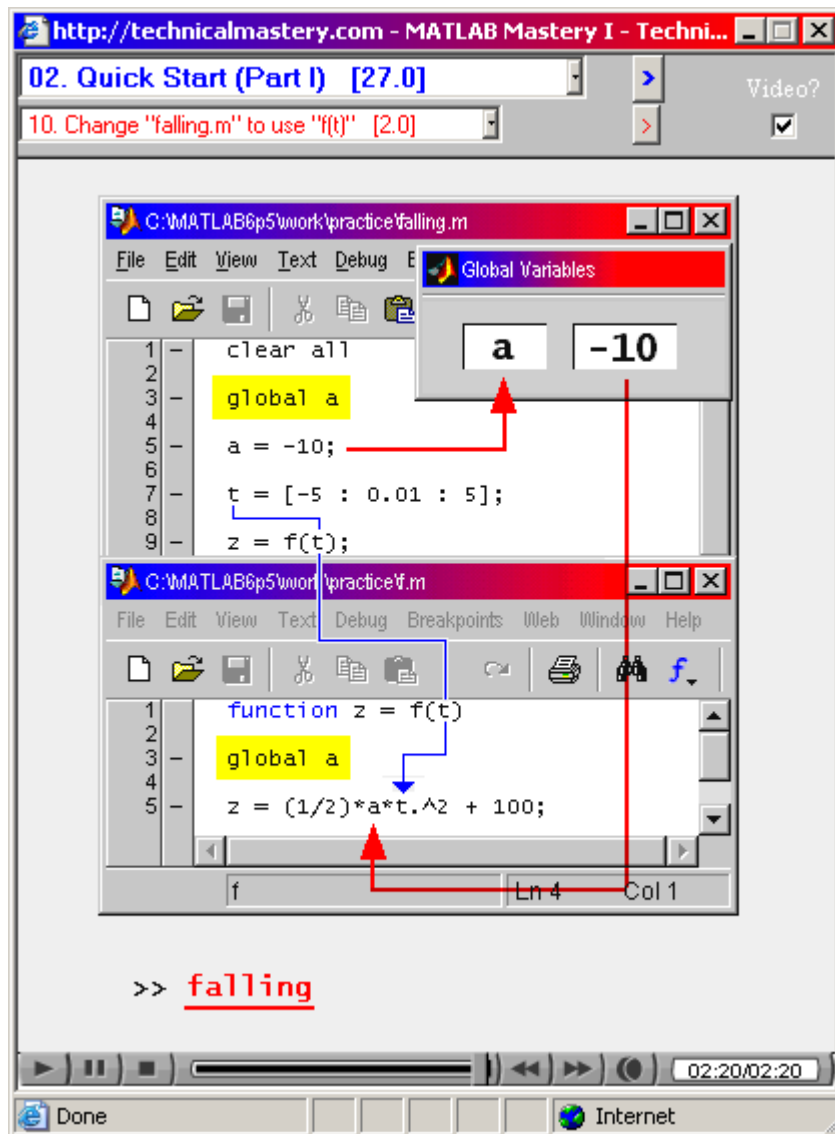4. http://www.TechnicalMastery.com. Makers of **MATLAB Mastery** and **Maple Mastery** videos.

Figure 1.  Use of global variables illustrated in *MATLAB Mastery*.