10 SAS Skills for Grad Student Survival: A Grad Student 'How To" Poster

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Overview

Throughout the many, *many*, years that I was in graduate school, I spent a lot of time learning SAS on my own. This paper is a culmination of the SAS challenges I overcame and the SAS skills that I learned outside of the classroom. These 10 SAS skills helped me to survive graduate school and successfully write a complex simulation analysis in SAS for my dissertation. This simulation was one of the most challenging SAS programs that I ever wrote.

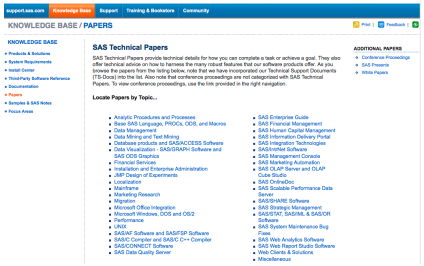
This poster and paper is the sixth in the 'Grad Student How-To' series and provides graduate students with a list of 5 essential SAS skills plus references to find more detailed information on each of the topics.

1. Finding SAS Information

Find it Fast!

The main SAS skill that helped me to survive my dissertation was being able to find the SAS information I needed. Every project has a unique set of challenges that requires different SAS skills

support.sas.com : papers, documentation, samples, conference proceedings



Learn More:

- Ship CE and Lafler KP. Top Ten SAS® Sites for Programmers: A Review. SAS Global Forum 2011. Paper 055-2011.
- Harper R and Hoverstad L. Discovering the Road Less Traveled to SAS information: A Guide for your Journey. SAS Global Forum 2010. Paper 299-2010.
- LeBouton K. Help! My SAS Program Isn't Working: Where to Turn When You Need Help. SAS Global Forum 2011. Paper 210-2011.

My most used reference books:

- Carpenter A. Carpenter's Complete Guide to the SAS Macro Language. 2nd Edition. SAS Institute, 2004.
- Cody R. SAS Functions by Example, Second Edition. SAS Institute. 2010.
- Cody R. Longitudinal Data and SAS: A Programmer's Guide. SAS Institute. 2001.
- Cody R. Cody's Data Cleaning Techniques Using SAS, Second Edition. SAS Institute. 2008.
- Haworth L and Zander C. Output Delivery System (ODS): The Basics and Beyond. SAS Institute. 2009.

2. Organization and Documentation

Don't learn the hard way!

Organization and documentation practices are key programming skills for graduate students. I learned this the hard way by losing code, misplacing datasets, and not being able to remember what my code did

- **Use a header for documentation**
- **Use a table of contents**
- **Use comments**
- **Use Enterprise Guide ®**

Learn More:

- Priest EL, Mullins B. Keep it Organized- SAS tips for a research project. South Central SAS Users Group 2012 Educational Forum.
- Levin L. SAS Programming Guidelines. SUGI 31 Proceedings. Paper 123-31.
- Martin C and Martin L. Cleanup-Comments and Code-Making it Maintainable. NESUG Proceedings (2000).

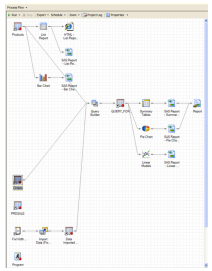
3. Enterprise Guide® software

Learn the easy way!

Enterprise Guide® is a point and click SAS interface. It is becoming more widely used for students through the SAS OnDemand for Academics Program where professors can set up a SAS server for their class "in the cloud". Students, if your professors aren't offering you SAS OnDemand for Academics and you don't have access to Enterprise Guide, you can ask them to set it up. It's free!

- **Point and Click**
- **Organize with Process Flows and Notes**
- **Learn as Enterprise Guide® writes the code for you**

From Free SAS Enterprise Guide Tutorial



Learn More:

- Slaughter S and Delwiche L. Writing Code in SAS Enterprise Guide. SAS Global Forum 2008. Paper 184-2008.
- Slaughter S and Delwiche L. The Little SAS Book For Enterprise Guide 4.2. SAS Institute. 2010.
- Free SAS Enterprise Guide Tutorial: http://support.sas.com/documentation/onlinedoc/guide/tut43/en/menu.htm

4. Program Data Vector

How SAS® Thinks…

The SAS language reference defines the program data vector as "a logical area in memory where SAS builds a data set, one observation at a time." It is key for:

- **Automatic variables: _N_ and _ERROR_**
- **Data and Set statements**
- **Variable Renaming, keeping and dropping**
- **Merges**
- **Transposes**
- **Macros**

Learn More:

- How the DATA step works: A Basic Introduction. at support.sas.com
- Overview of DATA step Processing. at support.sas.com.
- Johnson J. The Use and Abuse of The Program Data Vector. SAS Global Forum 2012. Paper 255-2012.
- Howard N. How SAS Thinks or Why the DATA Step Does What it Does. SUGI 29. Paper 252-29.

5. Sleuthing

Find it…Fix it

Sleuthing is the ability to figure out why code is not working… and it takes a combination of knowledge, attention to detail, and patience. Sometimes when your brain is tired and sleep and caffeine levels are low, even the simplest problem can take hours to fix. I've been asked repeatedly why I can spot many SAS errors easily… its because I have had *a lot* of practice!

- **Use your SAS log – errors and warnings**
- **Use Enterprise Guide modules**
- **Look at your comments**

Learn More:

- LeBouton K. Help! My SAS Program Isn't Working: Where to Turn When You Need Help. SAS Global Forum 2011. Paper 210-2011.
- Dilorio F. The SAS Debugging Primer. SUGI 26. Paper 54-26.
- Delwiche L and Slaughter S. Errors, Warnings, and Notes (Oh My), A Practical Guide to Debugging SAS Programs. WUSS Proceedings 2009.

Rest of the top 10!...

- These 5 SAS skills form a foundation for understanding and programming SAS efficiently.
- Look for the remainder of the top 10 in the paper!

Merging and Combining Data • Arrays • Longitudinal Data • Output Delivery System • Macros