

New to SAS®? Helpful Hints for Developing your own Professional Development Plan

Kelly D. Smith, Central Piedmont Community College

ABSTRACT

SAS® runs on multiple platforms and has multiple procedures for pulling in data, multiple methods to create and modify data, multiple procedures for data analysis, multiple methods to output data, multiple ways to present the data, and to top it all off, SAS offers multiple learning options. As someone new to SAS, how do you decide the best route for your own learning experience?

Three years ago, I began my own journey as a SAS rookie when I started transitioning from a career as a secondary science instructor to a SAS programmer and institutional researcher in higher education. In my own learning journey, I have utilized both online and face-to-face classes and successfully achieved certification as a SAS programmer. I have a doctorate in Adult and Community College Education, and I provide an overview of my own SAS journey from the perspective of both an adult learner and a professional adult educator. Based on both my own experience and my expertise, I provide participants with a step by step procedure for developing personalized professional development plans to fit their unique needs and situations.

INTRODUCTION

I have worked in three different fields in my career (so far). I have been a forensic DNA analyst, a secondary science teacher, and am currently a research analyst in higher education where I use SAS Base and SAS Enterprise Guide on a daily basis. Scientist, educator, and SAS programmer: what are the common themes of all these jobs? Analytical thinking, technical skills, and clear, audience appropriate communication. Working in each field has brought new challenges and opportunities, and over time, I have learned the importance of driving my own learning.

I have used my experiences to establish a framework that helps determine the next steps in my professional development. The framework incorporates what I have learned from my personal experience as an adult learner and the principles of adult learning from my doctoral studies in Adult and Community College education at North Carolina State University. In addition to presenting this framework, helpful hints and tips from other experienced SAS users and myself will be included. Useful websites are provided at the end of the paper (Table 4, p. 11).

MY JOURNEY

Before I was hired in my current position, I started learning how to program in Base SAS through the free e-Learning courses that were available: SAS Programming I and Statistics I. For each of the courses, I produced a folder of handwritten notes on the course content and practice exercises. After being hired by the Office of Institutional Research at Central Piedmont Community College, I continued learning SAS through a series of e-Learning courses provided as part of the education package for North Carolina Community Colleges. Instead of writing out notes by hand for these courses, I created digital notes with Microsoft Word and then turned my digital notes into hardcopy. After completing several more eLearning courses, I was able to retake SAS Programming 2 and SAS Macro Language 1 in a face-to-face setting with a professional SAS instructor. Course materials were issued as writable PDFs for each course.

An important part of my learning process has included two SouthEast SAS Users Group conferences (SESUG 2017, 2018) and SAS Global Forum 2018 (SASGF 2018). As a new SAS user, I applied for and received travel grants to the conferences: a free workshop was included with each award in addition to travel funds, reduced registration fees, and a discount coupon for a SAS book. I decided which workshops to attend in consultation with my mentor at CPCC. Although my work is focused on higher education, I made a point of attending conference presentations across multiple fields to gain a broader

understanding of SAS programming and its applications. Preparing conference presentations enhanced my learning by requiring me to understand in-depth the SAS programs I was creating and to be able to answer questions about the reasoning underlying programming logic. With the discount coupons, I began creating a personal library of SAS reference books.

As I started my second year as a SAS programmer, my mentor encouraged me to consider obtaining SAS certification. The most appropriate certification for my skill level and SAS products was the SAS Certified Base Programmer for SAS 9. I purchased the appropriate SAS Certification Prep Guide, downloaded the sample questions and purchased the practice exam. I used the practice exam and the sample questions to illuminate which topics needed the most review. I worked through the entire prep guide, making a point to spend extra time on the topics which were most problematic for me. Having discovered from previous courses that my retention was better with handwritten notes, I produced a review notebook that included my answers to end of chapter quizzes and the practice exam. After approximately two months of weekend review, I successfully completed the certification exam in August, 2018.

My work assignments are including more statistical analysis and modeling than in the past, so I have decided to obtain certification as a SAS Certified Business Analyst Using SAS 9: Regression and Modeling. I originally completed the Statistics I e-Learning course in May, 2016, so I felt it was a good idea to retake that course before working through the Predictive Modeling e-Learning course. I have purchased the certification prep guide and plan on using the practice exam to identify the topics that need the most review. My goal is to complete the certification process before the end of August, 2019.

GUIDING PRINCIPLES

The framework I have developed is grounded on research based principles in addition to my personal experience as a multi-career professional. The concepts of andragogy, heutagogy, and formal/informal learning are incorporated within the framework's structure.

ADULT LEARNING

In the early 1970s, Malcolm Knowles introduced the concept of andragogy, or adult learning, to the United States. Adult learning theory recognizes that adults want control of their learning process and that they bring life experiences into the learning environment (Knowles, 1990). Andragogical educators serve as facilitators and mentors for adult students ("guide on the side") rather than the primary source of information ("sage on the stage"). In a summary of his perspective on adult learners Knowles wrote:

Adults are motivated to devote energy to learn something to the extent that they perceive that it will help them perform tasks or deal with problems that they confront in their life situations. Furthermore, they learn new knowledge, understandings, skills, values, and attitudes most effectively when they are presented in the context of application to real-life situations. (Knowles, 1990, p. 61)

A primary goal of andragogy is developing learner competency: another goal is developing learners' capacity for self-directed learning (Blaschke, 2012). Self-directed learners pinpoint their individual learning needs and goals, explore learning options, and craft their learning experiences (Knowles, 1975, as cited in Blaschke, 2012, p. 58).

SELF-DETERMINED LEARNING

Heutagogy is the study of self-determined learning; self-determined learning can be considered an extension of self-directed learning (Blaschke, 2012; Blaschke & Hase, 2016). Self-directed learning focuses on the learner achieving competency while self-determined learning includes the goal of capability in addition to competency.

When learners are competent, they demonstrate the acquisition of knowledge and skills; skills can be repeated and knowledge retrieved. When learners are capable, skills and knowledge can be reproduced in *unfamiliar situations* [emphasis added]. Capability is then the extension of one's own competence, and without competency there cannot be capability. (Blaschke, 2012, p. 60).

Capability is acquired through intentional reflection on what has been learned, the process of learning, and how the learning has impacted the learner. Understanding how one learns is essential to designing an effective professional development plan so that capability increases. Capable people are desirable employees for today's complex and constantly changing work environments (Blaschke & Hase, 2016).

INFORMAL / FORMAL LEARNING

Learning can be formal or informal. Many of the learning experiences prior to and during high school are formal learning. In formal learning, the instructor develops and delivers information without input or feedback from learners. Instruction is often in a classroom setting (Marsick & Watkins, 2001). Formal learning is generally based on pre-determined curriculums and results in grades that may lead to a diploma or certificate (Merriam, Caffarella, & Baumgartner, 2007).

Informal learning, while frequently organized and structured, normally occurs outside institutional settings. Participation in informal learning is typically voluntary; participation is normally initiated by the learner and not mandated by external authority. Examples of informal learning include everything from participating in a mentoring program at work to watching YouTube videos to learn how to fix a leaky faucet. Because of the intentional reflective processes, self-determined learners realize how to incorporate formal and informal learning experiences to maximize their competency and capability.

PROFESSIONAL DEVELOPMENT FRAMEWORK

FRAMEWORK STRUCTURE

Professional development is ongoing, as the only certainty about today's work environment is that change is constant. Therefore, a framework for professional development should be cyclical (Figure 1). The framework I use for creating a self-determined professional development plan has several stages:

1. What is my current level of knowledge?
2. What do I want to learn?
3. What are some options for learning this information? How do I decide the best choice(s) for me?
4. How will I know if I was successful?
5. What worked, what didn't, and will I try something different next time?

Incorporating intentional reflection in the structure engages the learner in a self-determined context that develops capability in addition to competency.

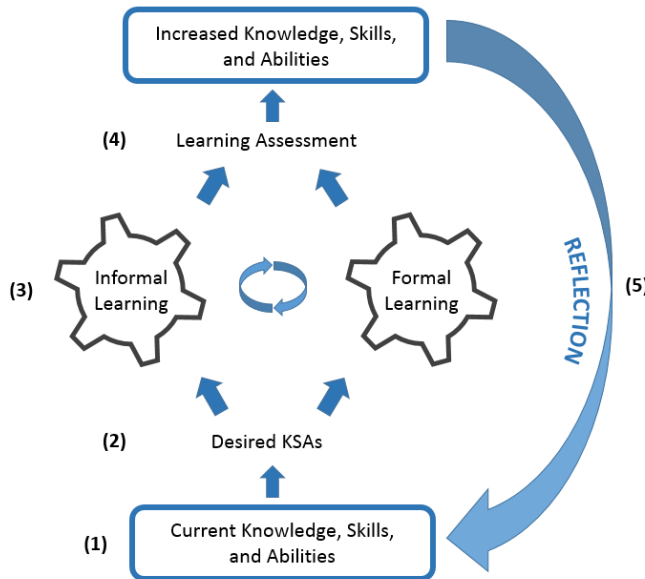


Figure 1. Self-Determined Professional Development Cycle

CURRENT KSA

The first stage in designing your own professional development plan is to take an honest look at your current skills and job role. I'm going to focus on SAS skills, but you can apply this process to any job role. These questions start the process:

1. What term best describes my professional field (Education, Insurance, Pharmaceutical ...)?
2. Which platform(s) do I use (Base, Enterprise Guide, JMP, Studio, Viya ...)?
3. What is my current comfort level with SAS?
 - A) brand new to SAS
 - B) basic – use simple procedures and create simple reports
 - C) intermediate –write more complicated code (ex: macros), use univariate statistical methods
 - D) advanced –use specialized functions and procedures, multivariate statistics or modeling
4. How do I currently use SAS?
 - A) develop new code to solve problems or answer questions
 - B) run standardized code with little or no code manipulation
 - C) perform statistical analysis
 - D) provide support to other SAS users
 - E) other tasks specific to my position (list and define clearly)

If you are not sure how to answer question 3, ask for feedback from a trusted coworker, mentor, or supervisor. You may be pleasantly surprised at what they say about your current state of SAS knowledge and skills.

LEARNING GOALS

Understanding where you are creates the foundation of your development plan. The second stage, where you determine the next step(s) along your learning path, should definitely include input from a mentor and/or supervisor. Don't just focus on the next step. Try to imagine several steps along your journey. Do you know what type of position you would like to have in the next 5 or 10 years? Identifying extended

career goals can help you determine the major steps on your professional development journey. Since change is a constant in today's world, don't try to plan too far ahead. I suggest you focus on the next 1 to 2 years in your career.

5. What are my personal SAS goals?
 - A) short term – 2 to 3 months
 - B) intermediate – 6 to 8 months
 - C) long range – 1 to 2 years
6. What are my mentor's and/or supervisor's SAS goals for me?
 - A) short term – 2 to 3 months
 - B) intermediate – 6 to 8 months
 - C) long range – 1 to 2 years

Hopefully, the goals outlined by you and your mentor/supervisor are similar. If the goals are not similar, ask for clarification: your supervisor may be considering you for future positions that extend beyond your current career goals or your extended career goals may require eventually changing employers. When you know where you are *and* where you want to be, consider the many learning options that are available to develop your SAS skills.

LEARNING OPTIONS

SAS offers a number of options for formal and informal professional development in multiple formats. Table 1 presents a summary of the resources for informal and formal learning discussed in this section. If you are brand new to the SAS universe, SAS has created a Starter Kit to help you get a firm footing. Through the Starter Kit, you can explore knowledge resources, learning opportunities and most importantly, connect with other SAS users. Otherwise, visit the “Learn How to Use SAS” website to explore all the different learning experiences provided by SAS. Links to SAS learning resources can be found in Table 3 at the end of the paper.

Source	Informal Learning	Formal Learning
SAS	Video Tutorials	Classroom (face-to-face)
	Books	Live Web Classroom
	Webinars	e-Learning
	Documentation Manuals	Global Academic Programs
	Support Communities	
	Global Forum	
	User Groups	
Other	Lynda.com	Two-year College
	Mooc.org	Four-year College / University
	Lexjansen.com	

Table 1. Informal and Formal Learning Opportunities

Informal Learning

SAS offers a variety of informal learning options including video tutorials, books, webinars, documentation manuals, and support communities. To start, more than 1,000 video tutorials are available. There are three main categories of tutorials: products and solutions (400+), analytics in action (150+), and how-to

tutorials (500+). Each video focuses on a particular topic and most of the videos run from 5 to 15 minutes in length.

More than 50 books available in the SAS bookstore. Print books are available from online booksellers and at local bookstores: e-books are available through the online SAS bookstore. There are presently eight free e-books that you can download. The free e-books cover a variety of topics:

- Artificial Intelligence with SAS®
- Data Management with SAS®
- Discovering Data Science with SAS®
- Discovering SAS® Viya™
- Exploring SAS® Enterprise Miner
- Fraud Analytics with SAS®
- Machine Learning with SAS®
- Visualizing Data with SAS®

Complimentary webinars provide information on a wide variety of topics. In addition to live webinars, SAS maintains a library of past webinars which are available “on-demand.” Documentation on SAS products and updates can be downloaded in PDF or HTML format. Support Communities enable fellow SAS users to help each other by answering questions and providing guidance. There are a number of different communities and a searchable library of already answered questions.

Informal learning occurs at SAS Global Forum and SAS User Group conference sessions and workshops. Even if you unable to get to a conference, presentation papers from Global Forum and user group conferences are available at the lexjansen.com website. Other options include online learning opportunities at Lynda.com or moooc.org (massive open online courses).

Formal Learning

For those who prefer a more formal learning environment, SAS offers approximately 300 different courses. Courses are available in three training formats and four different learner levels (Table 2) for a variety of platforms and industry specializations. There are currently eight free eLearning courses available from SAS.

Learning Levels	Training Formats
0 – No level	Classroom (face-to-face)
1 – Beginner	Live Web Classroom
2 – Fundamental	e-Learning
3 – Intermediate	
4 - Expert	

Table 2. Learning Options with SAS

Before registering for a class, check to see if your employer has an agreement with SAS to receive training at a reduced cost. For example, as part of the education package for North Carolina Community Colleges, SAS includes discounted face-to-face training and access to selected online courses (Figure 2).

e-Learning

[Creating Reports and Graphs with SAS® Enterprise Guide®](#)
[Introduction to Statistical Concepts](#)
[Predictive Modeling Using Logistic Regression](#)
[SAS® Enterprise Guide® 1: Querying and Reporting](#)
[SAS® Enterprise Guide® 2: Advanced Tasks and Querying](#)
[SAS® Enterprise Guide®: ANOVA, Regression, and Logistic Regression](#)
[SAS® Macro Language 1: Essentials](#)
[SAS® Macro Language 2: Advanced Techniques](#)
[SAS® Programming 1: Essentials \(released Sept 2018\)](#)
[SAS® Programming 1: Essentials \(retiring Feb 2019\)](#)
[SAS® Programming 2: Data Manipulation Techniques \(released Sept 2018\)](#)
[SAS® Programming 2: Data Manipulation Techniques \(retiring Feb 2019\)](#)
[SAS® Programming 3: Advanced Techniques and Efficiencies](#)
[SAS® SQL 1: Essentials](#)
[Statistics 1: Introduction to ANOVA, Regression, and Logistic Regression](#)

Figure 2. Screenshot of courses available in North Carolina Community Colleges education package (<https://support.sas.com/edu/viewmyelearn.html>)

If you have an interest in obtaining an undergraduate or graduate credential that is SAS focused, there are programs available in the United States and around the world (SAS Global Academic Programs). If you prefer a more traditional classroom setting but don't want to enroll in a formal degree program, check your local four year or two year college for courses in SAS programming.

As you can see, SAS offers multiple opportunities for professional development. In fact, there are so many options that the hardest part of crafting your professional development plan is deciding which option(s) to choose.

MATCHING GOALS AND OPTIONS

Three factors should be considered when selecting the professional development that is right for you and your situation: cost, time, and learning preferences. As you've realized, the cost of professional development varies widely. Some are free (video tutorials, webinars, free online courses) while some incur a small cost (book, local college course), and others require a more significant financial investment (conferences, college programs, SAS courses).

The second factor to consider is the frequency and total time you have to commit to a professional development opportunity. Flexible learning opportunities such as books, video tutorials, and eLearning courses may be easy to fit in your schedule; however, the flexibility of these options may make **it** harder for you to maintain a long-term commitment to the learning process. How many of us have started a book or sat down to work on an eLearning course and gotten distracted by more pressing, immediate concerns? More traditional learning opportunities like a face-to-face class may require you to adjust daily life to match the course's meeting day(s) and time and there may be mandatory attendance requirements to successfully complete the course. Conferences are both flexible and inflexible. While conferences have specific days, times, and locations, the wide variety of session topics introduces flexibility into your learning.

Finally, your personal learning preferences should not be overlooked. If you like to ask a lot of questions and get immediate feedback from a facilitator, self-study or an eLearning course may not be the best choice. If you want the ability to review an information source repeatedly, you may find a classroom setting to be a frustrating experience. The time and cost commitments of professional development are

important; however, you should be careful not to overlook the setting and format of a learning opportunity. Are the setting and format similar to previous learning experiences where you were successful?

ASSESSING YOUR LEARNING

You have determined your learning goals, researched your learning options, and selected the learning experience that seems best for you and your situation. How will you know if your learning was successful? In formal learning settings, there are usually intermediate and/or final learning assessments such as quizzes, projects, or tests to help you see proof of learning. Informal learning settings, however, may or may not have assessments built into the learning structure. In those situations, you will have to create your own learning assessments. Ask yourself questions as you work through a SAS book, or try out a procedure you learned about in a video tutorial. Find ways to examine your understanding of new material. Discuss what you've learned with a more experienced SAS user. Do you have a strong enough understanding to show someone else what you've learned?

REFLECTION

The last stage of the framework, self-reflection, may be unfamiliar for you, but this stage is an important part of the cycle. Take the time to think critically about the professional development experience you just finished. Remember, you want to be competent *and* capable: you want to acquire new knowledge/skills (competence) and to be able to apply your new knowledge/skills in unfamiliar settings (capability). Some questions to consider include:

- I expected to learn X, Y, Z – was I successful?
- Was there a good match between the learning experience and my learning preferences?
- Do I have a useful and usable set of reference material from this learning experience?
- Did this learning experience give me what I needed? Why/why not?
- How can I use X, Y, Z in the near future?
- What did I learn that was unexpected?
- Does what I learned change my thoughts about my next steps or my future career goals?

The reflection phase of the framework leads you back to the beginning, a consideration of your knowledge, skills, and abilities. The use of a cyclic professional development framework empowers you to apply the concept of continuous improvement to your career. Yes, there may be times when your employer or external events throw the unexpected at you. Being able to articulate what you know and where you want to your journey to lead will help you deal with the unexpected.

HELPFUL HINTS AND ADVICE

The following list of recommendations was compiled from my experience and from a survey of experienced SAS users in a variety of fields. Each user provided information on his/her professional development experiences, what worked well (or not) for her/him as individual learners, and the advice he/she would provide to a new SAS user.

EXPLORE AND READ

Interested in a topic or need an answer to a question? A good starting point is the lexjansen.com website. If you can't find what you need at lexjansen.com, a search engine can help point you in the right direction. Type in your question, hit search, and you will get links to SAS support, SAS documentation, and SAS support communities.

TAKE NOTES

Whether you're reading a book, watching a video, or sitting in class – take notes. Some studies have indicated your brain processes and retains information better if notes are hand-written rather than typed, but other studies have had contradictory results (Jansen, Lakens, & Ijsselsteijn, 2017; Mueller &

Oppenheimer, 2014; Stacy & Cain, 2015). Digital technology can offer a lot of advantages over traditional note-taking, especially if you have poor handwriting. Either way, you should review your notes shortly after the learning experience has ended. Add to your notes if the information is not immediately clear. When you come back to your notes in the future, will they still make sense?

CREATE A LIBRARY

Create a personal library of reference materials for your use. The hardcopy notes from my SAS courses are marked with Post-It notes so I can easily find information on SAS functions I use infrequently. Have digital notes from a recent course or a download of a Global Forum presentation? Keep a list of handy pages (and the topic) in a separate document or on a post-it note.

PRACTICE FREQUENTLY

Strengthen your new knowledge and skills by using them as soon as possible. The more you programming you do, the more comfortable you will feel, and the better your skills will progress. If you have used PROC FREQ to create a report in the past, go back and recreate the report using PROC TABULATE. If you have just finished a course on PROC SQL, find a way to incorporate this function in your daily work.

ANNOTATE YOUR CODE

Annotate your code for yourself and for everyone else that may need to use your code in the future. The more complicated the program, the more annotation you should include. Explain what a section of code does, or why you're using one function versus another. If you use a lot of macrovariables, annotation is reminds yourself the general meaning of key macrovariables throughout the code.

DIG INTO OTHER USERS' CODE

Closely examine code created by a more experienced SAS user and work through the code step by step to see if you understand what each step does. Ask her/him questions about the design and SAS function choices that were made. This is a great way to see how another person applies his/her knowledge and skills to a new project.

CREATE BOILERPLATE CODE

Don't recreate the wheel over and over. If you write a nice piece of code for a specific use, save the code (with annotation) for later use in a reference program or Word document (boilerplate). Having snippets of useful code stored in a particular location will make building new programs quicker.

TACKLE NEW PLATFORMS

As you become more comfortable working in SAS, look for opportunities to expand past your current platform. I first learned to code in Base SAS; now I use a combination of Base SAS and SAS Enterprise Guide. I structure my data in Base and then use Enterprise Guide for analysis. If you don't have access to SAS away from work, consider downloading SAS University Edition on your home computer. University Edition is free and it provides access to Base SAS, SAS Studio, and other SAS capabilities.

JOIN A SAS COMMUNITY

Become an active member of the SAS universe. Join a support community to ask (and answer) questions. If you can, attend a user group conference or a Global Forum. Share your knowledge by becoming a presenter. If you are uncomfortable talking in front of a group, submit a proposal for an e-poster. Connect with other SAS users at conferences and through LinkedIn. Many of the experienced users I surveyed are persons I met at conferences. A partial list of SAS and Data Science related groups are listed in Table 3.

SAS	Data Science
SAS Users Group	Data Science Central
SAS Professional Forum	Advanced Analytics and Data Science
SAS & Analytics Users	Research Methods and Data Science
SAS Programming Tips	Data Scientists
SAS Professional	Advanced Analytics, Predictive Modeling & Statistical Analyses Professionals

Table 3. LinkedIn groups related to SAS and Data Science.

SCHEDULE YOUR LEARNING

Daily life and work will interfere with your best intentions. Schedule a regular time for professional development and commit to the process. Here’s an easy way to get in the habit. Pull 10-12 short articles or video tutorials and place the PDFs or links in a folder on your desktop. If you don’t like to read on a screen, go ahead and print out the articles and place them in a brightly colored folder. Look at your calendar for the next month. Make a 30 minute appointment with yourself twice a week. If you use a digital calendar, be sure to mark the time as Busy. When the reminder pops up, pull out an article or click on a link. I know you have other work that needs to be done, but give yourself permission to learn. And honestly, when you go back to your current projects, you will be able to bring fresh eyes and new energy to the situation. When you’re almost out of material, go pull another set of articles and videos. Learning doesn’t have to take hours and hours to be useful – frequent, small learnings is enough to get started.

BE ACCOUNTABLE

Many people, myself included, are more likely to complete a goal when accountability is part of the process. There are several options for accountability. You can be accountable to yourself (internal accountability) by establishing a timeline for your goal. Internal accountability can include rewarding yourself for achieving your goal on time. If internal accountability is insufficient, provide a mentor or coworker with your goal and intended timeframe to introduce external accountability. External accountability can also be established by including your learning goals in the job performance review process used by your employer. Being accountable can increase your odds of success.

GET OUT OF YOUR COMFORT ZONE

This may be the hardest piece of advice to implement. We like comfort zones so we like using SAS code that we know works. SAS updates and expands platforms to improve the user experience; in the same spirit, update and expand your skills to improve yourself as a SAS user. Found a workshop or presentation helpful? Walk up to the facilitator or presenter and let them know what you found useful and how you can use the information provided. Want to learn about a topic but have difficulty squeezing learning into your busy schedule? Sign up to present an e-poster on the topic at a local conference or to coworkers. Is your work confined to a particular topic or field? Pull articles from another field or attend conference sessions that aren’t directly related to your everyday work. Expand your boundaries and your horizons. After all, you already know what the walls of your current “box” look like – go explore the SAS universe and have fun!

CONCLUSION

Thoughtful and intentional professional development is beneficial for you and your employer. Using a 5 stage framework that includes purposeful reflection will help you move from being competent to being competent *and* capable. There is a multitude of resources available to help you improve your SAS skills (Table 4). Choose the resources that work best for you. Consider not only cost and time, but also how you learn best to maximize your professional development experience.

Website Description / Name	Hyperlinked Website URL
"SAS Customer Support"	https://support.sas.com/en/support-home.html
"Learn How to Use SAS"	https://www.sas.com/en_us/learn.html
" How To Tutorials"	https://video.sas.com/category/videos/how-to-tutorials
"SAS Books"	https://support.sas.com/en/books.html
"Free SAS E-Books"	https://support.sas.com/en/books/free-books.html
"SAS Webinars"	https://www.sas.com/en_us/webinars.html
"SAS Documentation"	https://support.sas.com/en/documentation.html
"SAS Support Communities"	https://communities.sas.com/
"SAS Training in the United States"	https://support.sas.com/edu/coursesaz.html?productType=course&ctry=us
"Free e-learning to get you started"	https://support.sas.com/edu/elearning.html?ctry=us&productType=library
"SAS Starter Kit"	https://www.sas.com/en_us/sas-starter-kit.html
"SAS Academic Programs"	https://www.sas.com/en_us/learn/academic-programs.html
SAS Joint Certificates Programs	https://www.sas.com/content/dam/SAS/documents/technical/education/en/joint-certificate-program.pdf
SAS Focused Masters Programs	https://www.sas.com/en_us/learn/academic-programs.html
"SAS University Edition"	https://www.sas.com/en_us/software/university-edition.html

Table 4. Hyperlinks to SAS learning resources

REFERENCES

- Blaschke, L. M. (2012, January). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distance Learning*, 13(1), 56-69. Available at <https://doi.org/10.19173/irrodl.v13i1.1076>
- Blaschke, L. M., & Hase S. (2016). Heutagogy: A holistic framework for creating twenty-first-century self-determined learners. In B. Gros, Kinshuk, & M. Maina (Eds.) *The future of ubiquitous learning: Learning designs for emerging pedagogy* (pp 25-40). Heidelberg: Springer.
- Jansen, R. S., Lakens, D., & Ijsselsteijn, W. A. (2017). An integrative review of the cognitive costs and benefits of note-taking. *Educational Research Review*, 22, 223-233. doi: 10.1016/j.edurev.2017.10.001
- Knowles, M. (1990). *The adult learner: A neglected species* (4th ed.). Houston, TX: Gulf Publishing Company.
- Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.) San Francisco, CA: Jossey-Bass.
- Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25, 1159-1168. doi:10.1177/0956797614524581
- Stacy, E. M., & Cain, J. (2015). Note-taking and handouts in the digital age. *American Journal of Pharmaceutical Education*, 79(7), 1-6. Available at <https://www.ajpe.org/doi/pdf/10.5688/ajpe797107>

ACKNOWLEDGMENTS

While developing the section on helpful hints and advice, I reached out to experienced SAS users for their thoughts and recommendations. Their contributions were insightful and appreciated: Andrew Walker, Blake Barrett, Charlotte Baker, Courtnee Bonds, Daniel Brinton, Kirk Lafler, Paul Earls, Rachel Straney, and Stephanie Thompson.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Kelly D. Smith, Ed.D.
Research Analyst, Central Piedmont Community College
704-330-2022 x3810
kelly.smith@cpcc.edu, kds.aewas@gmail.com