Becoming a SAS® Master

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Introduction

The scope of SAS products and their continual enhancement prevents any one person from mastering the entire SAS System. However, we can become masters in the portions of the SAS System that we use.

It is not enough to know the building blocks of SAS—the statements, syntax, and concepts. We also need to know how to put them together to accomplish our work. This paper guides you to resources available and skills needed in order that you can learn faster and better on your way to mastering SAS and the Information Age.

To become a master, you must first believe that you can. Wanting to learn, knowing how to learn and continual learning are important to becoming and being a master.

Information Explosion

> *Not having the information you need when you need it leaves you wanting. Not knowing where to look for that information leaves you powerless. In a society where information is king, none of us can afford that.*
>
> —Lois Horowitz

Do you doubt that we are living in the Information Age? For many SUGI 22 attendees, the number one topic at this conference is data warehousing. There is a proliferation of data in the world that needs to be easily and logically stored and retrieved.

As an example of the information explosion, think about this. Today's edition of the New York Times contains more information than the average 17th century Englander would encounter in an entire lifetime. Five years from today there will be twice as much information in the world. In the computer field, the doubling time is even shorter. By the year 2000, the doubling will be less than every two years.

In our book, *SAS Today, A Year of Terrific Tips*, we listed SAS facts for 1976 and 1996. Let's just look at SAS publications. In 1976 there was one SAS manual *A User's Guide to SAS 76*. It consisted of 330 pages and documented the 33 procedures in SAS 76. In 1996, there were over 340 manuals and over 100,000 pages. This means that both the number of manuals and total pages doubled about every $2^{1}/_{2}$ years.

If the doubling trend continues, there will be twice as many SAS publications in the year 1999. Fortunately, more SAS documentation is being made available online.

Overview

> *Information is not knowledge. You can mass-produce raw data and incredible quantities of facts and figures. You cannot mass-produce knowledge, which is created by individual minds, drawing on individual experience, separating the significant from the irrelevant, making value judgements.*
>
> —Theodore Roszak
> *The Cult of Information*

The challenges of the Information Age require us to learn new habits and develop our skills.

We are being inundated by information related to our professional and personal lives. We need to manage that information effectively, to select the relevant information and either store it or create knowledge from it.

Using the word SKILLS as an acrostic, we describe six areas which distinguish a master.

These areas are:

- **S** Searches for Information
- **K** Keeps Learning
- **I** Improves Personal Skills
- **L** Listens to Self
- **L** Looks at the Big Picture
- **S** Shares Information

Searches for Information

Knowledge is of two kinds: we know a subject ourselves, or we know where we can find information upon it.

—Samuel Johnson

The information explosion has been further complicated by technology. Information is available not only on the printed word, but available on numerous media, such as CDs, faxes, computers, audio, video and the Internet. You can now leave messages on voice mail, e-mail, faxes, and even paper. This increase in sources, quantity and speed of transmission of information creates the predicament of too much information coming at us and too little time to deal with it.

A master knows how and where to find accurate and up-to-date information, does not spend a lot of time on details and superfluous material, knows when to stop gathering information and start evaluating, knows how to judge between useful and useless information, and is aware of a wide range of information sources, and is able to choose selectively when searching for information.

When searching for information, keep your purpose in mind. Start by knowing where you want to end up. Keep in mind what questions that you want answered.

Resources are: publications, periodicals, people, programs, email, online helps, CD-ROMs, databases and Web pages.

Two of our previous SUGI papers list and elaborate on these resources. They are *The Lazy Man's Guide to SAS® Software* and *How SAS® Software Users Can Benefit from the Internet*. (If you don't have the SUGI 19 or SUGI 21 Proceedings, you can get a copy of the papers at the presentation.) Also our recently published perpetual calendar/*book SAS Today! A Year of Terrific Tips* refers to many of these resources. In fact, presenting our first SUGI paper was the impetous for writing the book.

In this paper we will emphasize new tools and resources and some of the more important resources covered in our previous papers.

Email can save time and long distance charges. However, you can waste a lot of time on junk mail. By getting the right tool, an email program that supports rules and folders, and using rules and folders to effectively organize incoming mail and getting rid of junk mail, you can save a lot of time.

Use the indexes for the SAS Publications. With the wealth of documentation about the SAS System, the indexes are often the keys to finding the information desired. Separate indexes are available for the manuals, the *Proceedings* and *SAS Communications.* The index for *SAS Communications* is available from several sources electronically.

Solutions@Work™ is a new publication from the Institute. It provides useful and detailed examples of real applications on CD-ROM. Solutions@Work does not require SAS to be loaded to read the sample application. Also on the CD-ROM are answers to the most frequently asked SAS questions and articles highlighting new and proven development techniques.

SAS Notes is where to look when you need to search for information about a problem with SAS software and not your code. SAS Notes is a SAS database containing information on outstanding problems, fixes, corrections to documentation, etc. Notes can be browsed online on the Web or loaded on your own computer.

The Internet enables you to perform a variety of tasks. You can send questions or respond to the SAS-L discussion group; send files to a colleague; get files described in the SUGI Proceedings; share the draft of a paper with a colleague; search and find specific papers, pictures, programs and data; order publications

from the Institute and do some shopping on the Internet.

Online SAS programs are available on the Internet.The Institute's Publications Division provides SAS Online Samples. The Sample Library File Contribution Server is a repository of user-contributed SAS applications software that resides on the FTP server (ftp.uga.edu) at the University of Georgia. SAS programs and macros are available at various Web sites.

The World Wide Web is the most exciting service on the Internet. The best way to learn about the Web is to get on and use net searches, net directories, and list of cool sites to find out about the many resources on the Web.

Search Tools on the Internet are the means to finding information. On the Internet, you are inundated with information. It can seem overwhelming. Use search tools and net directories to search for papers, pictures, programs and data at FTP sites, Gopher servers and World Wide Webs. Each search tool or engine works differently. If you cannot find the information using one search engine, either change your query or try another search engine.

At the same time, more and better tools to find the information are being made available. Some Web pages now have robots (computer programs) that keep track of changes to Web pages that are important to you and emails you when changes occur. The Web search engine ProFusion provides a personalized search service so that you can have a specific query run daily, weekly, or monthly.

When searching the Web, you may not be able to link to a URL. If the server for the address is down, if the server is particularly slow, or if there is a error of some kind in the URL, you will not be able to retrieve the Web page. Simply try again later if you know the URL is good.

The SAS Institute site is the first SAS site to visit. The URL is:

http://www.sas.com

From the home page, you can select topics such as Support and Services, Upcoming Events, Other SAS Pages, Users Groups and Research and Development.

Other sites of interest to SAS users, such as with collections of documents about SAS, collections of SAS code, pointers to the SAS-L archives, Phil Mason's SASTips and the various sites that demonstration running SAS programs on the Web can be reached by visiting the Institute's Web site, selecting *SAS User Groups Web Sites,* choosing a specific group and then choosing *SAS related links* or similar topic. The regional users group NWSUG has a good list of related links. Don't forget to bookmark sites of interest.

Other sites of general interest are:

The Best Search Engines—lists over 72 of the best search engines.
http://www.wp.com/resch/search.htm

Metacrawler—a search engine that relies on the databases of various Web based sources.
http://metacrawler.cs.washington.edu:8080/

ProFusion—a search engine which uses other search engines to get initial search results and do further processing, like removing duplicate researchs or providing personal search services.
http://topaz.designlab.ukans.edu/profusion/

The Scout Report—a weekly publication of the InterNIC Net Scout project. It lists new and newly discovered Internet resources and network tools.
http://www.cs.wisc.edu/scout/report/

WhoWhere—It offers residential phone numbers and addresses for over 80 million Americans. You can find friends or family anywhere in the US that you may have lost touch with. It also offers "reverse search" capability—enter a phone number and get the person's name and address.
http://www.whowhere.com
click on *Phone Numbers and Address*

Use Your Resources Wisely. Be careful in your use of the Internet so that you don't waste resources—your time, other people's time, disk space, paper and trees, and bandwidth.

The Internet can be a time sponge. It is fun to explore the Internet. You can spend hours reading discussion groups and searching for information. You can find an enormous amount of information of which only a small portion is useful or you can find some beneficial information. Just remember to have a goal in mind and set an alarm clock.

> *With so much information now online, it is exceptionally easy to simple dive in and drown.*—Alfred Glossbrenner

Keeps Learning

> *In a world that is constantly changing, there is no one subject or set of subjects that will serve you for the foreseeable future, let alone for the rest of your life. The most important skill to acquire now is learning how to learn.*
>
> —John Naibit

No matter if you have been using SAS for one year or 15 years, continual learning is a necessity because SAS is continually changing. Learning is defined as an ongoing process of putting your attention on acquiring new knowledge and skills. Learning builds upon what you already know and sometimes requires the modification of some things you know.

To become a SAS master, you need to progress through the following levels of learning:

- Unawareness
  —you don't know that you don't know,
- Awareness
  —you know that you don't know,
- Awkwardness
  —you work at what you don't know,
- Competency
  —you know, and
- Mastery
  —you don't have to think about knowing.

Let's look at an example which involves SAS programming.

Can you remember when you first learned how to input your data into SAS or use a new SAS procedure? Imagine this scenario. You've been using SAS for a couple of years and you are proficient at using SAS to store, manipulate, and retrieve data and to generate reports using PROC TABULATE. Matter of fact, your co-workers come to you for help. You are a SAS expert at using the DATA step and PROC TABULATE. Of course, there are lots of procedures that you have never thought about using.

One day a co-worker asks you about PROC SQL. You know nothing about PROC SQL and even pronounce it "sequel" instead of S-Q-L. This is level 0, which we call *unawareness*.

A spark of interest is ignited and you decide to discover more about SQL. You are now at level 1, which is known as *awareness*. You read papers in the SUGI Proceedings about PROC SQL and purchase and read the SAS manual *Getting Started with the SQL Procedure*. You decide SQL is a good choice for an upcoming project.

Fortunately, you have extra time for this project. PROC SQL programming is quite different from other SAS procedures. With manuals in hand, you intensely write out the statements. It is awkward, time-consuming, and riddled with errors. You are at level 2, *awkwardness.* Confidence that you know what you are doing is missing. Eventually you get all the data merged the way you want it and the summary reports generated. You notice that it takes a lot less statements with SQL. However, you need to unlearn some programming habits and complex queries seem impossible. You continue using SQL when appropriate and your SQL knowledge and skills quickly improve.

You have advanced to level 3, *competency*. You purchase the book *Joe Celko's SQL for Smarties: Advanced SQL Programming*. Your confidence is moderate to high. You begin recommending PROC SQL to others and volunteer to present a beginning tutorial on

PROC SQL at your local SAS users' group meeting.

Eventually, writing SQL queries all makes sense and you write efficient SQL programs with ease. You know when and when not to use SQL. You present a paper on PROC SQL at your regional users' group conference and are excited about sharing the benefits of using PROC SQL with others. You are at level 4, *mastery*.

Let's look at the levels in more detail. You first begin with unawareness. You are only aware of those things you know to be true. You are unaware of other possibilities. You don't know that you don't know.

If something happens that you become aware of new knowledge or a skill, then you know that you don't know. You are not any better at it, yet a desire to learn more has occurred.

If you have the desire, you start working on the new knowledge or skill. You are a novice. You attend to fundamentals and mentally instruct yourself, doing everything according to the book. You are struggling. It requires intense concentration and feels awkward. Everyone you know that you consider a SAS master was at this awkward stage at one time.

You continue to work at it and it becomes automatic. You have an understanding of the fundamentals and confidence that you know what you are doing. Your conscious has yielded much of the work to your unconscious mind. You know that you know.

You practice and gain experience. Once you have learned the new knowledge or skill well so that you use it without thinking about it and know when to use it, you are a master. You don't have to think about knowing.

The requirements to move from one level to the next are decreased mental self-instruction, decreased conscious attending, increased confidence, and increased unconscious guidance.

With each new release of SAS, movement from mastery back to competency may occur. At this point, you will need to read the *Changes and Enhancements* manual and experiment with the new features.

Wanting to learn, knowing how to learn and continual learning are important to becoming and staying a SAS master. One way to speed up the learning process is to attend training. Professional SAS training saves time and is well worth the cost because of the immediate benefits to you and your organization. The Institute provides training in different formats such as public courses, on-site training and online computer based training. Other ways to learn are by attending pre-conference seminars, SUGI hands-on workshops, formal demonstrations by the Institute and sharing techniques, idea, and real-work experiences at a users group meeting.

> *Those who are always learning are those who can ride the winds of change and who see a changing world as full of opportunities rather than dangers.*
>
> —Charles Handy
> in *The Age of Unreason*

mproves Personal Skills

> *The intellectual equipment needed for the job of the future is an ability to define problems, quickly assimilate relevant data, conceptualize and reorganize the information, make deductive and inductive leaps with it, ask hard questions about it, discuss findings with colleagues, work collaboratively to find solutions and then convince others.*
>
> —Robert B. Reich

A master develops his personal skills so that he can work at peak performance and keep up in the information age.

Thinking, reading, listening, memory, writing, and speaking are personal skills that involve handling information.

A master thinks critically about information and makes associations to previous knowledge. Information that doesn't fit in to what is already known is questioned. A master

knows what technology is available and when to use it.

> *The Internet is one of the most powerful agents of freedom. It exposes truth to those who wish to see it. It can also deliver misinformation and uncorroborated opinion with equal ease. The thoughtful and the thoughtless co-exist side by side in the Internet's electronic universe. What's to be done? There are no electronic filters that separate truth from fiction. .... We have but one tool to apply: critical thinking.*
>
> — Vinton G. Cerf
> the Internet Society

Mind mapping is a technique that enables you to make associations and comprehend and recall a topic better by organizing it in the visual form of a map. It is excellent for note-taking. You begin with the central topic in the center of the map. Then you add key ideas and pictures branching out from the center. This technique is described in Tony Buzan's book *Using Both Sides of Your Brain.* Like all new skills, it requires practice to become good at it.

A master is a superior reader. From 80 to 90 percent of the information we receive comes from reading. We need to be a fast and effective reader. To gain time, learn and practice techniques to double your reading speed and to read selectively. When reading books, first scan the book before settling down to an in-depth reading.

A master has a reliable but selective memory. We cannot remember everything. Much of the information that we are bombarded with daily is not worth remembering. An important memory skill is to know what not to remember and instead where to find the information when needed.

A master develops communication and relations skills in order to deliver information efficiently and clearly. Listen actively so that you can understand and remember what was said. Ask questions. Listen with the intent to understand, rather than mentally rehearsing how you want to reply.

Besides skills that deal with handling information, there are advanced personal skills for a master to achieve. These are working with change; having a clear sense of purpose; goal-setting; and being able to delay gratification in order to aspire to higher objectives.

To improve your personal skills, investigate training courses, materials and books on these skills. Learn the techniques and practice. One book that we recommend is *Mastering the Information Age*. Visit the self-help section or business section of your bookstore or public library or search on the Internet for relevant material.

The question always arises is when is there time to improve personal skills. Remember that these are the keys to peak performance. By investing the time to improve your personal skills, you save time in the long run.

> *"I always wanted to be somebody. Now I see I should have been more specific.*
> —Lily Tomlin and Jane Wagner

Listens to Self

> *People are going to be most creative and productive when they're doing something they really are interested in. So having fun isn't an outrageous idea at all. It's a very sensible one.*
>
> — John Sculley
> Apple Computers President

A master takes care of self. In order to operate at peak performance, stay healthy and alert so that your brain can operate at its full potential. Eat nutritional foods and exercise regularly. Exercise makes a major difference in energy, ability to handle stress, attitude, confidence, and performance. With the advantages of exercise, you would think that more people would exercise regularly. But it takes commitment.

When working at the computer, take breaks. Take a few moments to breath deeply. Learn stretching and energizing exercises to do at the computer. Exercises and pictures of exercises for the computerized office can be found at:

http://www.scdetails.com/Exercises.html

Stress reduces productivity and diminishes our abilities to think clearly and creatively. It is a major challenge in the information Age. Stress comes from both internal and external sources. We can't seem to work fast enough or have enough information or background to do the job. Have you ever felt when you are under a lot of stress that your brain seems to shut down? You can practice relaxation techniques to manage stress effectively. Also, leave office problems at the office. Learn to laugh and laugh often. It's a great stress reducer.

Create a good work environment. Have good lighting and ergonomic furniture to reduce injury and tension. The University of Washington Health Sciences Center provides pages on workplace health. Their URL is

http://www.hslib.washington.edu/your_health

Authors of super-learning techniques believe that listening to Baroque music enhances creativity and focus and that it supports learning. You might want to check it out.

Without music, life would be a mistake.
—Friedrich Nietzsche

Looks at the Big Picture

A desk is a dangerous place from which to observe the world.
—John Le Carre

A SAS Master sees the big picture, not just the details.

Take time to think and see how your solution fits into the entire system. Think that it can be done in SAS and also remember there are other tools besides SAS.

Visit the end users of your system and listen to them. Explore new ideas and imagine new possibilities. Don't keep on doing things the same old way.

Problems arise from narrow thinking and from using the quickest solution. Consider the implications and ramifications of an action both in the short and long run.

One way to expand your view is to read books and periodicals, outside your expertise. We started this paper with the illustration about the information explosion and the amount of information in a daily edition of the New York Times. On the Internet, you can expand your view by subscribing to the online New York Times. Currently, domestic subscriptions are free. To keep abreast of technology, read the section Cybertimes. It also has an excellent list of resources on the Internet. This is the homepage used by the newsroom at the New York Times and is a starting point into the World Wide Web.

Shares Information

None of us is as smart as all of us.
—Anonymous

A master provides information to others. This is done when you network with your colleagues and within your organization. Other ways to share your expertise, SAS code, and experiences is to become involved in a users group, SAS-L and conferences.

Participating in a users group is one way of getting information and sharing information. Hundreds of in-house, local, regional, and special-interest groups have formed all over the world. A list of the local, regional and special interest users groups is available on the Institute's Web site. Also, on the Web are links to users groups that have their own homepage.

If you have the interest in starting a users group or want to request services for your group, call the Institute's Users Group Support staff at 919-677-8000, x3474 or send email to SUGWEB@UNX.SAS.COM. They will send you a start-up kit and provide advice and assistance in starting a group.

SAS-L is the most active SAS users group. It is an electronic discussion list and available as a Usenet newsgroup. Join SAS-L so that you can both give and receive SAS expertise. Several SAS experts consistently assist SAS users with their SAS questions. The SAS-L archives is a repository of previously sent messages and is a good source of information.

Conferences include the annual SUGI conference and regional conferences. A list of

the dates and locations can be found in *SAS Communications* and on the Institute's Web site.

Get involved with a conference. The annual regional conferences are planned and organized by SAS users, like you, who generously donate their time and talents. Volunteers are always needed and essential to the continued success of the conferences. A partial list of tasks and talents needed is section chairs, session coordinators, speakers, publication and registration coordinators, registration staff, and coordinators for the facilities, audio-visuals, special events, and pre-conference courses.

So, if you don't want to speak, remember that there are many other ways to share your talents, time, and expertise at a conference.

Conclusion

The difference between a master and someone who knows a lot is that a master

- searches effectively and efficiently for information and evaluates the quality of the information,
- keeps learning,
- improves personal skills so they are peak performers,
- listens to self, cares about their work and enjoys their work,
- looks at the big picture, sets goals and accomplishes them,
- shares information and supports others.

It's a tall order. There is no shortcut to mastery. It takes vision, planning, learning, patience, commitment, and action. If you want to become a SAS master, you can. The question is "will you?"

> *When you stop trying, you stop growing. Keep the facility of effort alive in you by a little gratuitous exercise every day.—*
> William James

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