

Adapting a SAS® System Training Program to the Job Market

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ABSTRACT

SAS training in an academic environment traditionally reflects the resources available, the required use of the software for academic purposes, and special research related topics by request or as time allows. However, academic use of the software often does not reflect real world situations and requirements for prospective employers wishing to employ SAS programmers.

Based in part on a four-year study analyzing specified experience and training requirements from local recruiters and job postings on the Internet, The University of Memphis has altered its SAS training program to reflect real world requirements. Specifically, the University has added support, training materials, handouts and short course offerings in applications development, SAS/EIS, and data handling to the present SAS training program.

Since SAS code is portable, an effort is made to provide training and training materials that can be used across a variety of operating systems. Because prospective employers look for SAS programmers who are experienced on multiple operating systems, an effort is made in training classes to expose students to more than one operating system.

INTRODUCTION

The role of the SAS software trainer in an academic environment traditionally has been entry level training for the volume of new students, faculty and staff that join the University each year. While this has been coupled with keeping pace with current developments and expanding capabilities for the continuing user base of faculty and researchers, training and instruction only built upon the modules of the SAS system used for classroom assignments and ongoing research, such as SAS/STAT, SAS/IML, and SAS/GRAPH, and ignored other SAS system modules and options. Therefore the average user, whether student or researcher, is not aware of what is available to them in SAS beyond those limited products, procedures, training classes, and locally produced documentation.

The SAS training program at The University of Memphis has been and remains open to the public, free of charge. As part of the University outreach program to the community, any seats not filled by University faculty, staff, or students may be utilized by members of the local community. Attendees in these training classes have included employees of Federal Express Corporation, Dover Elevator, Memphis City Schools, Smith, Nephew & Richards, and St. Jude Children's Research Hospital. However, The University of Memphis student population makes up the largest number of attendees for on-campus SAS training classes.

For these students and others in the community, The University of Memphis traditionally has served as a training ground for new programmers entering the job market. Over the past few years, employment opportunities for SAS programmers have increased in the Memphis area. Recruiters for local employers call our office looking for candidates to fill these positions with escalating frequency. What was noted was that, increasingly, these recruiters were looking for SAS programmers with skills that were not part of the training program at the University. This has resulted in the

inability to provide referrals to these recruiters and businesses, forcing them to look outside Memphis to fill SAS programmer positions.

In an effort to track the needs of the job market and to adapt the training program to that market, all SAS jobs posted on SAS-L, the on-line SAS users group, were placed into a database. In addition, ads from the local newspaper and any recruiting calls we received directly were also added to that database.

Analysis of that database has resulted in changes in how SAS is taught at The University of Memphis. Although the revised training program still places emphasis on what skills are necessary for administrative functions, classwork, and research at the University, especially the basics of SAS as a programming language, additional offerings reflect those specific SAS programming skills that the survey showed employers to be looking for.

SAS training is conducted using SAS for Windows, OpenVMS and UNIX. Current versions here at The University of Memphis are SAS/Windows 6.10 and 6.11, SAS 6.09e for VMS and SAS 6.11 for UNIX. The UNIX operating system is on a Sun SPARCclassic running Solaris 2.

THE SURVEY

The survey was begun in the beginning of 1993 and ran through the end of 1996. The date of the posting was used so that changed trends in the job market could also be tracked.

Information entered into the database from the job postings included information on the recruiter and type of position as well as the qualifications sought. Variables entered into the database were:

- Type of recruiter
- Type of position (permanent or temporary)
- Operating system or systems
- SAS modules and knowledge required
- Other software listed as a requirement
- Educational qualifications
- Type of Industry
- Location
- Date of job opportunity

Because the majority of job postings did not include information on whether the position was considered entry-level, professional or otherwise, that variable was dropped from the database. Variables most useful in terms of planning a training program were operating system, SAS modules, and knowledge required.

Some interpolation was necessary in entering data from jobs. The following criteria were followed concerning numbers of positions. Unspecified plural positions were counted as two, "several" was interpreted as three, and "multiple" or "numerous" as four.

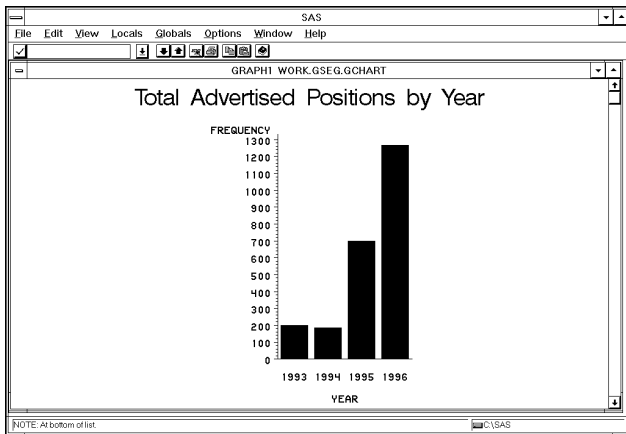
Duplicate position descriptions were listed only once. Despite different wordings in position descriptions, at least two months' separation between listings was required for position descriptions from major recruiting firms to be entered into the database.

THE SURVEY RESULTS

Most position descriptions had incomplete information for all qualifications. As expected, most of the jobs were in the eastern United States and requested applicants to have at least a bachelors degree in a research or computer related field. Consulting firms placed more job ads than did private industries.

Some of the requirements were interesting: SAS programmers are expected to be: "little experienced," "high-energy," "non-smoking," etc. One recruiter for a United States research company on cancer data wanted programmers to be able to read Chinese characters. One job advertised "low pay and long hours," while another promoted "resort living on a pristine lake..."

The total number of positions advertised on the Internet went up significantly during the four years of this survey as illustrated below.

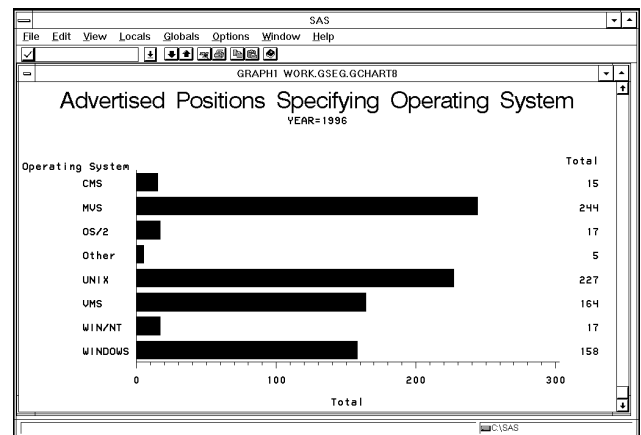
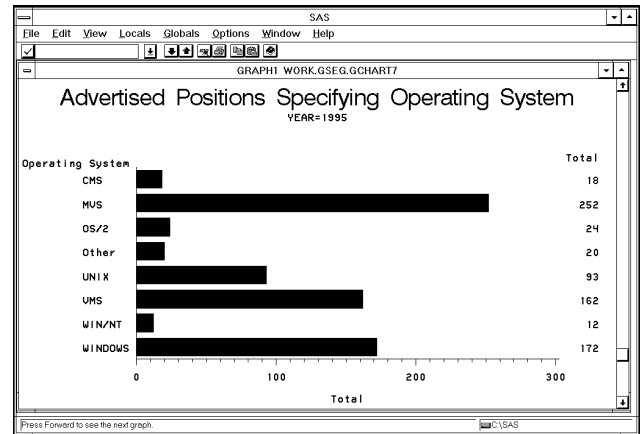
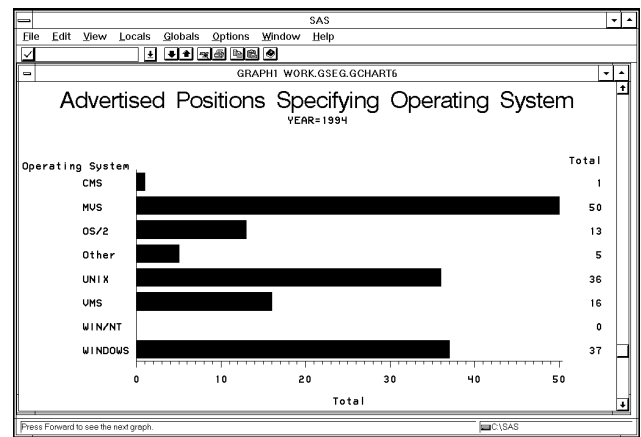
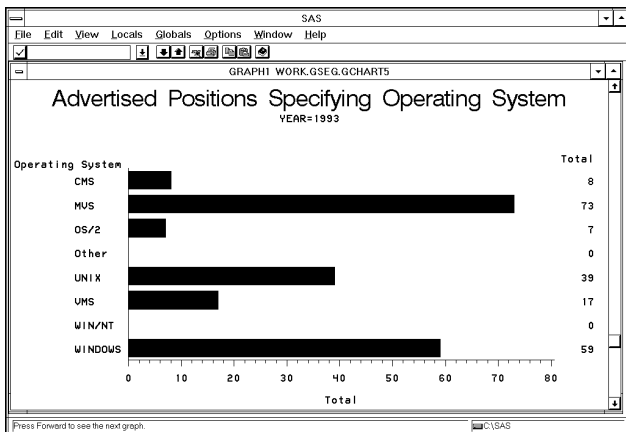


Databases received the most frequent mention for required experience with other software with Oracle leading the way. Programming languages and spreadsheets were also frequently mentioned.

Pertinent to the SAS training program at The University of Memphis were those position descriptions that specified operating system and type of SAS experience. Unfortunately, the majority of the job postings did not provide this information. Those that did provided an interesting look at trends in the SAS programming market.

The Windows category includes Windows95. VMS includes VMS Alpha.

Operating systems included in the OTHER category are VSE, Macintosh and NeXT.



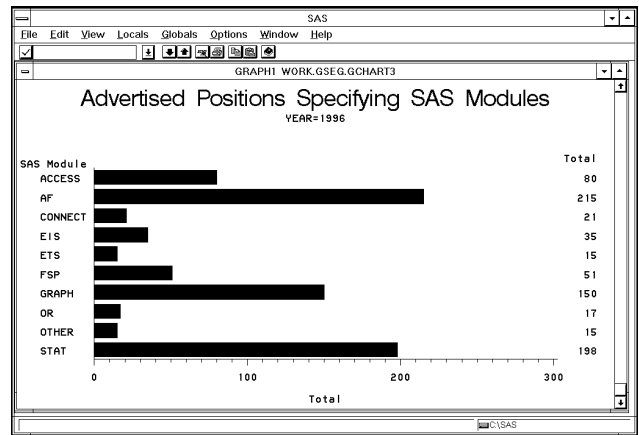
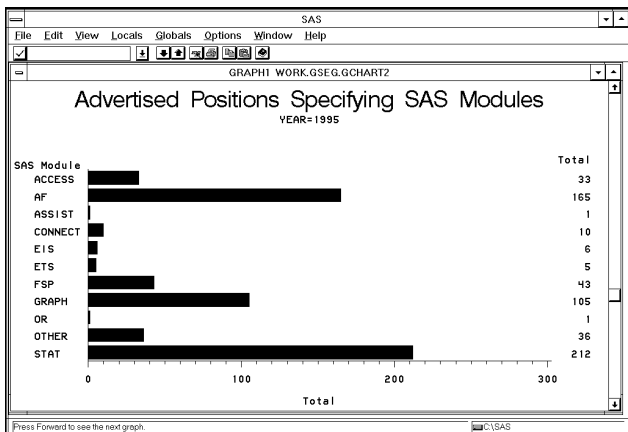
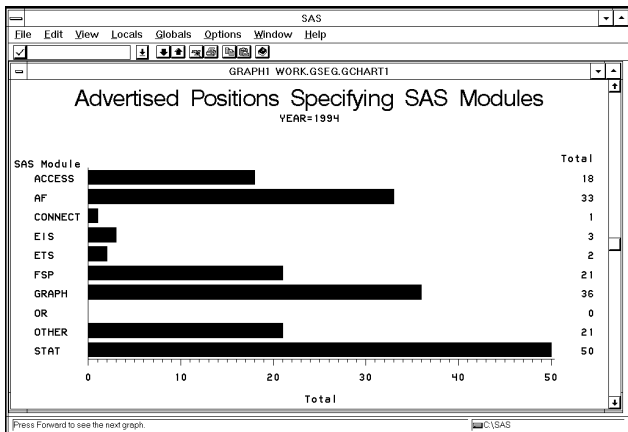
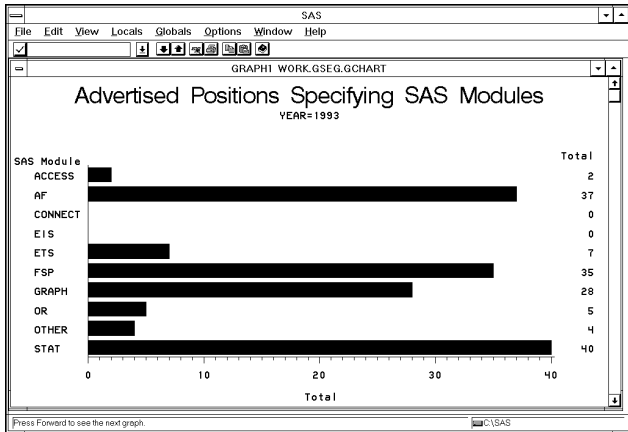
Originally SAS training at The University of Memphis was only offered on the VMS operating system. Classes are now offered on the UNIX platform as well as on the Windows platform. Although the job postings indicate that IBM mainframe experience is still the most sought after operating system skill for SAS programmers, the University does not have this operating system available and is therefore unable to provide training in the necessary JCL's, batch parameters, and unique system instructions.

When looking at international positions only, MVS skills still top the requirements, followed by Windows, and UNIX.

The results of this survey also show an increasing emphasis by employers on applications building skills. That trend could be

demonstrated over the four years of this survey. It should be noted that this trend is slower in the international market than in the domestic market, but those job postings, while still overwhelmingly emphasizing statistical expertise, also show an increase in requirements for applications development skills.

When looking at SAS module or product experience requested, it should be noted that macro and SCL experience are frequently mentioned as is clinical trials experience. Work with large data sets, especially those housed in external databases, is also a frequently-mentioned requirement.

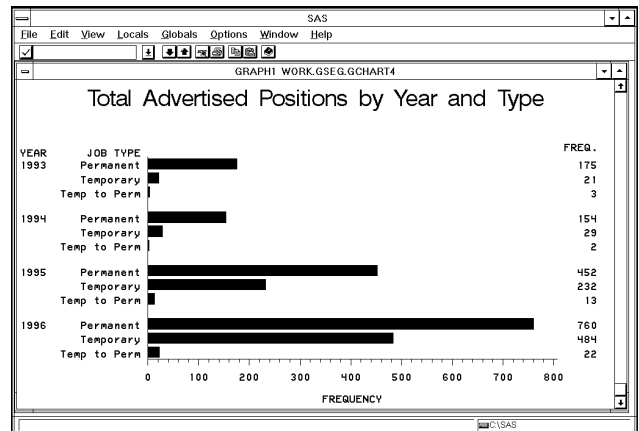


The survey shows SAS/AF moving to the top position, replacing SAS/STAT as the most requested SAS module. One hundred percent of local recruiters calling this office for programming prospects during 1996 asked for SAS/AF skills.

An increase in requests for SAS/EIS skills is evidenced as well. Connectivity and data warehouse issues are also gaining in importance. More position descriptions require SAS/ACCESS and SAS/CONNECT experience.

SAS modules specifically requested by employers and included in the OTHER category are: SAS/ASSIST, SAS/CALC, SAS/CPE, SAS/GIS, SAS/IML, SAS/PH-Clinical, SAS/QC, SAS/SHARE, and SAS/TOOLKIT.

Although permanent SAS positions are still in the majority, a higher percentage of the posted positions are for short-term or contract positions as evidenced below:



TRAINING RESULTS

Past SAS training has emphasized Base and SAS/STAT procedures and has included short seminars on such topics as: Dichotomous and Polychotomous Logistic Regression, Loglinear Models, Introduction to Time Series Modeling and Forecasting, and others. Although these topics and other topics necessary for coursework continue to be offered when requested, training emphasis has moved to include SAS skills needed outside the University environment.

Classes and demonstrations for building SAS applications and Executive Information Systems using SAS/EIS, SAS/AF, and SAS/FSP software have been added to the short courses offered here at the University. In addition, the need to be responsive to the job market and current employment needs has become an ongoing part of the training program.

The first short seminar on applications building with SAS was offered in the fall of 1996. The class was full with a number of prospective attendees forced to wait until spring. This first offering was introductory only, providing an overview of the capabilities of SAS/AF and SAS/FSP software. A more in-depth offering is planned for April 1997. Support for those wishing to build an application is now available by our office.

Training materials are being developed for SAS/ACCESS and SAS/CONNECT software. Although short courses are not planned for these topics, tips and techniques for their use on the available operating systems at the University were made available in handout form beginning in the Spring of 1997 with sample session materials to follow.

Future plans include offering SAS-based courses for academic credit hours with emphasis on business and medical community applications.

The Academic Systems Division of Information Systems at The University of Memphis will continue to monitor the job market for future directions in the SAS programmer market.

CONCLUSION

The SAS programming required for University research and courses at The University of Memphis did not include many of the skills necessary to enter the SAS programmer job market. In order to respond to local as well as national and international need for SAS programmers, The University of Memphis has adapted its training program to include real-world programming issues in addition to classwork necessary SAS training.

REFERENCES

The data used in this paper was obtained from public job postings on the Internet and print media in addition to personal requests from local and regional SAS recruiters.

ACKNOWLEDGMENTS

SAS, SAS/ACCESS, SAS/AF, SAS/ASSIST, SAS/CALC, SAS/CONNECT, SAS/CPE, SAS/EIS, SAS/ETS, SAS/FSP, SAS/GIS, SAS/GRAPH, SAS/IML, SAS/OR, SAS/PH-Clinical, SAS/QC, SAS/SHARE, SAS/STAT, and SAS/TOOLKIT are registered trademarks of SAS Institute, Inc. of Cary, North Carolina.

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