Acquisition of SAS at Manville Corporation was initiated in the Capacity Planning area of Data Processing. However, users throughout the company heard of the capabilities of SAS and wished to use SAS in applications such as statistical analysis, report writing, graphics, etc. The Remote Computing Services group, also under Data Processing, was designated to train and support users in SAS and SAS/GRAPH. RCS, an Information Center group, trained users throughout the company in several aspects of Data Processing. These are: using TSO to communicate to the IBM 3033 mainframe; using DATA ANALYZER as a report writing language; and, using FORESIGHT for financial modeling.

An evaluation was done on how to meet user training requirements for SAS. Two key topics were examined in determining an appropriate education strategy:

- Course Presentation Alternatives;
- Scope of the course

Training in the other user languages has usually been conducted in a classroom environment using an instructor from the Remote Computing Services group. This method has proved cumbersome in aspects such as course administration, tutor preparation, etc. Thus, several factors were examined in determining an effective way of teaching SAS to the user community. These factors were:

- Cost
  - Servicing Remote Locations
  - Ease of Administration
  - Ability to Handle an Initial Surge of Students
- Cost

Expenditures on materials outside the company were to be kept to a minimum. This was due to the company experiencing a recessionary pinch in sales, thus a push was on to keep outside costs down.

However, a complete advertising department, copy center, video and audio production facility, and stationery supplies were available within the company.

- Servicing Remote Locations

Manville has over 100 plants across the U.S. Traditionally, if personnel within the plants wished to take SAS courses, the instructor would have to travel to the plant location. Management wished to keep travel to a minimum. Most plants do have at their disposal a video recorder, a tape recorder, and some type of terminal to access the Denver computer.

- Ease of Administration

Arrangements for students to attend courses, location of courses, notification of students, providing course material to each student etc., posed a large administrative task. With the new SAS course, it was desirable to try to keep these administrative duties to a minimum. Also, the preparation time for an instructor to teach a class was usually one to two days. Actual instruction time was also one to two days. Since instructors had other duties within the company, this meant they had to remove themselves from day-to-day activities for about a week. This kind of manpower loss was to be reduced.

- Ability to Handle an Initial Surge of Students

SAS was a new language with capabilities users had desired but had never had through other software packages in the company. Hence, there was an anticipated high demand for training once SAS was announced as available for use. This initial surge of approximately 97-75 people (mainly in Denver) had to be considered heavily in evaluating course presentation alternatives.

With the above considerations mapped out, three course presentation alternatives were considered. Figure I shows a matrix of the factors against three course presentation alternatives:

1. Purchase of the SAS Video Basics Course
2. Develop and use an In-House Self Paced Course using either a video or audio media
3. Develop and teach a 2-day course in a classroom environment

Each type of course was rated a 1, 2 or 3 as to its desirability (1) or undesirability (3) by factor.

A self paced course developed in-house had the best overall rating. This seemed to provide the best long run solution to the training problem. Students could proceed through the course at their own pace with very little tutor intervention or administrative burden. They would only have to see or call the tutor if they had a problem or question. The tutor could familiarize himself or herself by taking
the course and be able to handle most questions that would arise.

Thus, a self paced course developed in-house was determined as the long term training solution. A workbook, the SAS Introductory Guide, and an audio portion would be used in the course. Tape cassettes would be used rather than video to cut down production time.

Short term, however a self paced course developed in-house had several drawbacks. Production time would be at least two to three months. This would include writing and recording the audio portion, producing the workbook, illustrations, etc. Thus, to handle the initial group of users anxiously awaiting SAS training, a stand-up course was developed. The basis for the course used SAS Views as a guide. This course could be ready for presentation in approximately 3 weeks. It was also felt that teaching the course "live" would give invaluable feedback for the development of material to use in the self paced course.

- Scope of the Course

The scope of the course was also evaluated. Several factors determined what should be included in a SAS Basics Course. These were:

- DP background of the students
- time allotted for course
- types of Applications needed

- DP Background of Students

Although the users had report writing and financial modeling packages at their disposal, many had not used them. Thus the DP background for most of the potential students would be minimal. This fact narrowed the types of topics covered. For example, program statements beside a simple IF-THEN/ELSE statement would be too complex to learn in a basics course. The SAS Introductory Guide was used as a basis for the kinds of concepts that should be presented.

- Time allotted for the course

In many cases, students could only spend two days in a classroom environment or an equivalent amount of time with a self-paced course. Thus, it was necessary to provide enough information to make them feel self sufficient in a relatively short period of teaching time.

- Types of applications using SAS

The types of applications users wanted to program were items such as report writing, simple descriptive statistics (i.e. MEAN, PCC) and graphics (CHART and PLOT). The second chapter examines a DATA step using a DATA statement, INPUT statement, and CARDS statement. Only list and column input are discussed in the class. The user is referred to the SAS User Guide: Basics for examples of formatted input. The third chapter highlights the SAS PROCs available, where they are documented, and typically what is contained in that documentation. Some PROCs (SORT, PRINT, MEAN and FREQ) and options for these PROCs are also examined. The fourth chapter continues with two more PROCs - CHART and PLOT. At this point, the student has learned the basics of SAS - a DATA step and a PROC step. He/she can generate reports, charts and sort his/her data.

Chapter 5 goes back to the DATA step to discuss program statements and the SPP statement. This chapter contains some difficult concepts to grasp for a non-programmer person. When this material was presented in a classroom environment, some students were lost in the program statement area and since PROCs were presented afterward, they were never able to grasp how simple most SAS programs really can be. Thus, rather than muddle the issue of a simple DATA step all at once, this information appears after chapters about PROCs.

The final chapter teaches the student to read an external file with an INFILE statement and write a SAS data set to a file using a two-level SAS data set name. The necessary JCL to accomplish this is presented. The concepts of associating INNAMES with physical files and writing a SAS data set to a TSO file were extremely difficult for the student to conceptualize. Students got confused on how a SAS data set of one name could reside on a physical file, the data set name was different, and options for those PROCs are also examined. The fourth chapter continues with two more PROCs - CHART and PLOT. At this point, the student has learned the basics of SAS - a DATA step and a PROC step. He/she can generate reports, charts and sort his/her data.
These topics were presented with putting data in a SAS data set, it seemed to cloud a fairly simple concept — the DATA step.

Thus, the scope of the self-paced course was tailored to the student requirements and background with an objective of the student learning a few basic concepts well. Also, the arrangement of the topics emphasized the simplicity of SAS, saving the more difficult concepts for the end of the course.

Each chapter contains five sections. Figure 3 shows the sections within a chapter. The first section states the objectives to be learned. Only four to five objectives were defined in any one chapter. Next, a reading in the SAS Introductory Guide was required. A short synopsis about the reading was also given in this section. The audio section required listening to a cassette while following illustrations in the workbook. At the end of every audio cassette there was a restatement of the objectives outlined in the first section. This put the student back into perspective on the overall topics of the chapter. The student then completed exercises (true/false, fill in the blank, etc.). Answers to the exercises were found in the back of the workbook. Finally, for every chapter the student submitted a program for execution on the computer. Keying was kept to a minimum by having students copy datasets that contained raw data, JCL, etc. This requirement of actually coding six programs gave the student confidence to pursue his/her own applications independently.

The most valuable input gleaned from teaching the class several times was the idea of presenting a few simple concepts and learning them well versus trying to get in the "nice to know". Teaching the course "live" helped point at subject matter that should be included in the self-paced course, and what other topics were best left for future seminars and/or advanced courses. The order in which topics were presented in the self-paced course was based on reaction to the classroom course. Since most students were never exposed to a computer language the more "programmer like" topics (i.e., JCL) were left until the end of the course. The 2-day stand-up class reflected the fact that these topics were the hardest understood, and if presented early in the course, left many students in the dark for the easier topics such as options in IF-THEN statements.

The education strategy used at Manville has been effective in making users confident in their knowledge of SAS and ready to discover aspects not presented in the course materials. This education strategy consisted of developing a self-paced audio course in-house for the long term. To handle an initial high demand for the course, two-day classroom sessions were conducted. A self-paced course, either developed in-house or purchased, relieves alot of the administrative and preparatory burden on support personnel. Using a 2-day class initially provides valuable insights into the kinds of topics and features a self-paced course should have to meet the user education requirements.

For information or a copy of the workbook and tapes, write or call:

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FIG. 1

TYPES OF COURSE PRESENTATION

<table>
<thead>
<tr>
<th>LIMITING FACTORS</th>
<th>SAS VIDEO BASICS COURSE</th>
<th>IN-HOUSE DEVELOPED COURSE SELF PACED</th>
<th>TWO DAY CLASSROOM COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. COST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OUTSIDE EXPENSE</td>
<td>LITTLE OUTSIDE EXPENSE</td>
<td>LITTLE OUTSIDE EXPENSE</td>
</tr>
<tr>
<td></td>
<td>DIFFICULT TO JUSTIFY</td>
<td>MANY MATERIALS AVAILABLE WITHIN THE COMPANY</td>
<td></td>
</tr>
<tr>
<td>2. SERVICING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REMOTE LOCATIONS</td>
<td>ANOTHER COPY OF COURSE WOULD HAVE TO BE PURCHASED (HIGHER OUTSIDE EXPENSE)</td>
<td>SELF PACED GOOD WAY TO SERVICE REMOTE LOCATIONS VERY LITTLE TEACHER SUPERVISION NEEDED</td>
<td>TEACHER WOULD HAVE TO TRAVEL TO LOCATIONS FOR STUDENTS TRAVEL TO WH</td>
</tr>
<tr>
<td>3. EASE OF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADMINISTRATION</td>
<td>VERY LITTLE ADMINISTRATIVE BURDEN</td>
<td>VERY LITTLE ADMINISTRATIVE BURDEN</td>
<td>ALOT OF ADMINISTRATIVE WORK ROOM SETUP, NOTIFICATION, ETC.</td>
</tr>
<tr>
<td>4. ABILITY TO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENABLE AN INITIAL</td>
<td>GROUP SESSIONS NOT AS DESIRABLE BUT COULD BE DONE</td>
<td>IF 25-30 PERSONS TAKING COURSE AT ONCE, TUTOR OVERLOADED</td>
<td>SEVERAL CLASSES COULD TRAIN MANY STUDENTS QUICKLY</td>
</tr>
<tr>
<td>SIZE OF STUDENTS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIG. 2

MARVIN SAS SELF PACED CLASS

TOPICS COVERED

CHAPTER 1. INTRODUCTION
- SAS Terms
- Typical SAS job

CHAPTER 2. GETTING DATA IN A SAS DATA SET
- DATA Statement
- INPUT Statement (list, column)
- CARDS Statement

CHAPTER 3. SAS PROCEDURES
- GENERAL INFO, DOCUMENTATION, ETC.
- SORT
- PRINT
- MEANS
- FREQ

CHAPTER 4. PRINTER GRAPHICS
- CHART
- PLOT

CHAPTER 5. MODIFYING DATA
- ASSIGNMENT (including functions)
- IF THEN/ELSE
- Subsetting IF
- DELETE
- LIST
- SET

CHAPTER 6. READING EXTERNAL FILES & CREATING PERMANENT SAS DATA SETS
- JCL
- INFILE
- Two level SAS data set names

FIG 3

SECTIONS FOR EACH CHAPTER

1. OBJECTIVES
2. READING ASSIGNMENT IN SAS INTRODUCTORY GUIDE
3. AUDIO
   - Reinforced points in reading, but brought in new ideas on the same topic
4. EXERCISES
   - Fill in the blank, short statements to write, true-false
5. CASE STUDY
   - A problem where the student wrote a SAS program & submitted the job to the computer