

# **"IT-LABS:" A BAKER'S DOZEN YEARS OF EXPERIENCE**

## **- THE CASE OF THE POST-GRADUATE SCHOOL OF ADMINISTRATIVE SCIENCES SPEYER -**

by

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Paper presented to international association of schools and institutes of  
administration (iasia) 1988 annual conference  
Brisbane/Australia  
4 - 12 July, 1988  
working group VIII  
"new technologies and management"

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## **1. The Speyer School: Mission, Clientele and Structure**

Before a detailed description of the Laboratory for Information Technology (henceforth: "IT-Lab") is given and conclusions are drawn, it is necessary to show the institutional background of the IT-Lab.

The Speyer School offers both pre-service and continuing education with equal emphasis (Figure 1).

### **1.1 Pre-Service Education**

As far as pre-service education is concerned, there are four different programs, all of which are post-graduate, admitting only students who already hold a Master's degree in fields with relevance for public administration.

#### **(1) Speyer Semester**

The oldest program is the three-month "Speyer semester" which is offered two times a year (May 1 to July 31 and November 1 to January 31). Most of the students are serving their two and a half years of probation between their graduation from university and their second or "great" state examinations. During this preparatory service they go through several stages of professional practice (courts, governmental agencies, and so on), one of which can be the optional Speyer semester. This is also part of the preparatory service for trainees of the Federal Labor Administration.

The one-term course, which is open to young civil servants sent by their training authorities as well as to other students who may be interested in a future career in public administration, aims at broadening the participants' knowledge in accordance with the findings of recent administrative research. In addition, students learn administrative skills and can practise them under realistic conditions. Towards this end, there are some 100 lectures, seminars, etc., each term, covering a wide range of subjects.

#### **(2) The Master's Program**

The School also offers a one-year post-graduate course in administrative sciences. This course aims at providing future senior civil servants with an understanding of the duties and requirements of present-day public administration.

A graduate of this course is expected to be able to judge and solve administrative problems on the basis of both her/his university education and her/his knowledge of other fields. The one-year course is thus directed at above-average graduates of law, economics and sociology who wish to extend their knowledge and their qualifications.

The Master's Program begins every May 1 and lasts one year. This year comprises two terms at the School, at least eight weeks of on-the-job training in administration and an examination period of three months, which begins immediately after the second term at the School. Foreign students, wishing to follow only the Master's Program, are normally required to complete a preparatory term beforehand.

### (3) Master's Program for Third World Students

In 1982, the Speyer School of Administrative Sciences, in cooperation with the German Foundation for International Development/Central Bureau for Public Administration (Deutsche Stiftung für internationale Entwicklung/Zentralstelle für öffentliche Verwaltung DSE/ZÖV), introduced a two-year course in administrative sciences for foreign students, aimed particularly at lecturers of schools of administration in developing countries. This course is integrated into the Master's Program. The first part of the two-year course takes place at the DSE/ZÖV offices in Berlin and lasts six months. During this period, students can improve their German and are given an introduction to German background studies (culture, politics, economy, etc.). In the ensuing winter term, students attend the Speyer School to prepare for the Masters's Program, which they begin only after an additional period of project work.

### (4) Doctoral Studies

The fourth program in pre-service training is the long-existing doctoral studies program which leads to the degree of a "Doctor of Administrative Sciences".

## 1.2 Continuing Education

Turning to the Speyer activities in continuing training, one has to bear in mind that, in our country, many civil servants have had no real education in administrative science in the first place. "Continuing" education actually is very often the participants' first exposure to concepts of policy making, organization, personnel, communication and so on, rather than an updating of this knowledge. Therefore, we consider continuing training as one more opportunity to acquaint civil servants with administrative sciences, to balance out university education, and we place a comparatively high emphasis on our four core programs.

We offer two types of standard seminars on recurring subjects which have been developed and are revised in collaboration with the State Departments of the Interior as the agencies in charge of personnel. The first we call **Entrance Seminars** because they are addressed to younger civil servants at the entrance levels of the higher service. The program consists of three parts - methods of problem solving, organization and personnel, and public administration in its environment - each taught for one full week and the three parts stretched over one and a half years. The second of the standard seminars is called **Management Seminars**, and is addressed to senior administrators with leadership responsibilities; it consists of four full weeks - perspectives of public administration; personnel management; organization, planning and information technology; and state and economy - spread over two years.

Additional continuing training activities are **Conferences** of two types, the first being open congresses on actual political and administrative problems, offered twice a year. Finally, some five **Special Seminars** are organized per year. They last one week each, concentrate on more specialized topics and have a restricted number of participants.

This, then, is the environment, the IT-Labs have to take into account:

- All our clientele are (future) higher civil servants

- Their educational background is normally law, sociology, political science, economics, or business administration (no engineers or scientists)
- They hold a master's degree already
- The knowledge they bring along about IT, so far has been close to zero, however
- They stay only for a comparatively short period of time (post-graduate training).

## **2. The Professorial Chair for Administrative Sciences, Data Processing, and Quantitative Methods**

The Professorial Chair for Administrative Sciences, Data Processing, and Quantitative Methods of the Speyer School was established in 1974. The overall seminar and research program of the chair can be broadly described as follows:

Since information technology is featured by user-oriented computers and communication networks, it is no longer possible to exclude information technology from administrative action itself. The effective use of information technology requires - and allows - the re-shaping of the organizational design, of the user's sphere of activity, and of task execution. Modern information technology has the potential for administrative reform and is much more than just a technical means. Information technology directly concerns administrative policy and requires the study of its implications on organizational design, public personnel, and public tasks as well as the policies concerning them, if its potential is to be fully exhausted for improving the effectiveness of public administration.

A more detailed view of the structural implications of Information Technology on Public Administration is shown in Figure 2 at the end of the paper.

## **3. The "IT-Lab"**

### **3.1 Brief History and Goals**

It all started in the winter term 1974/1975 with a course called "Computer Programming: Group Projects in ALGOL". Since the Speyer School had no computing facilities at that time, we used the State Computer Center, some 100 kilometres distant, offline (in fact, programs and printouts were exchanged via mail). Beginning with the winter term 1976/1977 we could dispose of our own computer (a DIETZ 621 minicomputer, equipped with four terminals and connected to a remote big computer center). The courses were now called "Introduction into the Use of Department Computers and Computer Centers". In 1985 the minicomputer was replaced by personal computers and workstations and we renamed our course into "IT-Lab".

Obviously, this brief history of IT-courses offered by the Speyer School reflects the rapid technical progress during that period of time. However, although the technical instruments, the computer-support, has changed tremendously (and has only since five years reached a level which justifies the term "IT-Lab"), the goals we pursue have remained more or less the same:

- The fundamental idea is that goals and means are always interdependent. One facet of this is that a person is not likely to promote, control, or apply a technique which he/she is not able to understand and to master. From this we concluded that we have to

provide for training and education programs in which the practical use of IT-systems plays an important role if we want our civil service to make effective and efficient use of the information technologies available today

- The characteristic feature of our IT-Labs, therefore, is a balanced mixture of practical work with personal computers and telecommunication facilities on the one hand, and lectures and discussions about the potential, the effects, and the prerequisites of IT-applications on the other
- In more detail: We want to enable the civil servant
  - to overcome possibly existing fears of and prejudices against modern IT by personal hands-on experience and, thus, to reduce mental impediments and psychological roadblocks against computer-use
  - to communicate more effectively with IT-specialists or with superiors and subordinates in matters of IT
  - to further develop her/his knowledge and skills in the IT-field by herself/himself by giving her/him a solid base and the motivation for future self-education
  - to recognize the fields of IT-applications in her/his sphere of competence and to take the initiative whenever necessary
  - to understand information and information technologies as resources which need her/his dedicated design and management efforts if a management vacuum is to be prevented which otherwise necessarily would be filled by technocrats
  - to realize the enormous potential of modern IT for administrative reforms and, therefore, the need for control and assessment of information technology from the point of view of administrative policy
- As a consequence of the specific clientele which the Speyer School serves, it has not been a goal of its IT-Labs so far to train IT-specialists, e.g. programmers, although the equipment available would allow this, of course.

### **3.2 The Technical Infrastructure**

The IT-Lab equipment described here (see Figure 3) represents only part of the IT-infrastructure of the Speyer School.

The IT-Lab is supported by

- a central computer
- 13 PCs, 12 of them hooked to a LAN which is in turn controlled by the central computer
- a sub-network, connecting 3 additional PCs (two of which are hooked to the public telephone net and the public packet-switching net, respectively) and itself connected to the LAN.

The main hardware components:

- The central computer is a Philips P 4800 office computer with 1.5 MB main storage and 150 MB hard disk capacity, 2 operating terminals and 2 printers
- the network
- 12 of the 13 PCs are Philips 3105 with 768 KB main storage, 2 floppy disks (360 KB each), monochrome monitor, and keyboard. The other PC is a portable NEC Multispeed (640 KB main storage, 2 floppy disks 720 KB each, LDC monitor) and used for presentations
- the sub-net contains 1 PC AT 02 (640 KB main storage, 1 floppy disk 1.2 MB, 1 hard disk 20 MB, color graphics monitor), 1 PC/XT (512 KB, 1 floppy disk 360 KB, 1 hard disk 10 MB, monochrome

- graphics monitor), 1 PC (512 KB, 2 floppy disks 360 KB, 1 hard disk 20 MB, monochrome graphics monitor)
- 4 matrix printers
- a color video projector SONY VPH-1030QM.

The main software components:

- On the central computer
  - the operating system DINOS 4000 which, among others, allows (1) to use the PCs as terminals of the P 4800, (2) to do file transfer between the P 4800 and the PCs, (3) to use the P 4800 as network computer (e.g. as file and printer server for the PCs)
  - an office communication package (word processing, electronic mail, business graphics, filing, data base query, etc.)
  - a local administration program package (citizen registration, budgeting and accounting, personnel administration, taxation, etc.)
  - programming languages (COBOL, PASCAL, ASSEMBLER)
- On the PCs
  - MS-DOS operating systems
  - utility programs (mouse, graphical user surface, etc.)
  - communication software
  - word processing, spreadsheet, data base, business graphics, project management packages
  - integrated software packages
  - planning and statistics software
  - programming languages (BASIC, PASCAL, C, PROLOG etc.).

### 3.3 Costs

The **purchase costs** for hardware and software of our IT-Lab at today's prices are <in German Marks and rounded>:

	Hardware
-- central computer	200,000.-
-- 16 PCs (some 2,000 each)	33,000.-
-- 4 printers (some 750 each)	3,000.-
-- network adapters (some 3,000 each)	40,000.-
-- wiring	10,000.-
-- video beamer	24,000.-
	<b>310,000.-</b>

(Notice that as much as 250,000.- thereof are due to the central computer and the network. Also, LCD-displays are a cheaper alternative to beamers and cost only about 4,000.-)

	Software
-- central computer operating system	30,000.-
-- PC applications software	
a) school versions (10 users) of dBase, MS-Word, MS-Multiplan and MS-Chart (between 2,000 and 6,000 each)	15,000.-

- b) regular versions for presentations of Framework, Windows, communication procedures, etc.) 5,000.- **50,000.-**

**Total hardware and software investment** **360,000.-**

**Standing costs** per year are <in German Marks and rounded>:

- Maintenance contracts
  - central computers 16,000.-
  - 16 PCs (some 800 each) 13,000.-
- PC software supplements and updates 4,000.-
- supplies (paper, disks, ribbons, etc.) 1,000.-
- telecommunication connections (without data base charges) 1,000.- **35,000.-**
- personnel (1 higher service position, 1 elevated service position) 170,000.-

**Total annual standing costs** **205,000.-**

**Charges** for IT-Lab participants range from 0.- (for students, staff people etc.) to 650.- German Marks per participant and week (for some continuing education courses).

### **3.4 Clienteles**

The IT-Lab of the Speyer School is for the benefit of three clientele, more or less: Students of our pre-service programs, higher civil servants in our continuing education programs, and staff of our school.

By the end of 1988, for example, some 200 students, studying in any of our four pre-service programs, will have completed the IT-Lab as a three-month term (one three-hour class-room session weekly plus homework assignments and final examination). In total, we will have trained more than 1,000 students by the end of this year, so far.

In addition to that, the IT-Lab is utilized in 7 continuing education courses in 1988 and will reach some 200 higher civil servants. Among them are 30 section heads of a big German city which trains its complete top management in the Speyer IT-Lab, and 30 section heads of state ministries and heads of major state agencies.

The third group, this year, consists of 10 secretaries and other staff members of our school.



### **3.5 Programs**

The curriculum of the IT-Lab can be understood as sort of a kit with several building blocks to be combined according to the respective target group. Here, it is only possible to list the main features and topics:

- The backbone, of course, is the practical PC-use and, therefore, the necessary introductions into information technology and the common PC-software packages
- However, since IT is only a means to ends and in order to reach the goals listed under paragraph 2 above, the curricula of our IT-Lab feature many substantial topics as well, among them
  - the status of IT-applications in public administration (examples, assessment)
  - empirical effects of IT on society and public administration
  - IT and economic development (employment, growth, international trade etc.)
  - the potential of IT for administrative reforms (administrative policy, especially with regard to aspects of public tasks, personnel and organization)
  - citizen/administration relations
  - management information systems
  - IT and the world of labor (from ergonomics to co-determination)
  - privacy and other legal issues
  - data security and data integrity
  - systems analysis (from requirement analysis to implementation)
  - cost-benefit aspects
  - information management (decision making to treat information and IT as resources)
  - technological trends.

## **4. Some Rules and Conclusions**

### **4.1 Technical Equipment**

(1) It is absolutely critical that the technical infrastructure of an IT-Lab is easy to use. Make sure that course participants are not discouraged. In order to prevent the PC to become a barrier you should meet the following prerequisites:

- instant access without longer waiting time should be possible
- handling by the user should be reduced to switching on or off and to insert or remove floppy disks
- the operating system should be hidden under a user menu which appears on the screen automatically after the PC has been switched on (experts nevertheless should have access to the operating system level)
- the handling of all devices must be foolproof, e.g. have self-explaining instructions; intercept as many handling mistakes as possible by software measures.

(2) Install a computer system which allows to demonstrate with only one user interface (the PC!) all typical computer arrangements used in public administration, namely

- centralized data processing (the PC as terminal)
- distributed data processing with a central computer (PC mode, terminal mode, utilization of central resources, file transfer; single-user and multi-user mode)
- distributed data processing without central computer (the PCs as network stations of equal priority)

- decentralized computing (autonomous workstations, single-user mode)
- connection to wide-area networks (WAN) for demonstration of modern telecommunication services like interactive videotex, packet-switching networks, electronic mailboxes, teletex etc..

For reasons of economy and user-friendliness avoid to install dedicated systems for the modes listed above.

(3) To employ the PCs in single-user mode as autonomous workstations allows to use any device at any time without necessity to have the central computer system working at the same time. This is especially favorable when it is too difficult or too expensive to have attendants on duty "round the clock".

(4) However, when PCs are run without supervision it becomes close to impossible to prevent users from copying licensed software illegally. Some measures against software theft are:

- As long as PCs are used in single-user mode and without supervision, employ only software which is free of copyrights (e.g. BASIC which is contained in the purchase price of the PC already or demonstration versions of software packages without printout and store capabilities)
- Store licensed software in the central computer only (disk server mode),

-- either as many copies as workstations are connected (single-user mode)

-- or one network version which is usable by several stations at the same time (multi-user mode).

Illegal copying, then, can be prevented by software measures. (In this case, it also suffices to equip the PCs with floppy disks. The absence of hard disks on the PCs not only prevents illegal copying but also the permanent protecting and securing of programs and data which otherwise would be necessary.)

(5) The technical infrastructure of the IT-Lab should be compatible with the pre-dominant standards. This way

- you have access to a huge software market
- system components can be exchanged or supplemented more easily (large independency of producers).

(6) Given today's low prices, the main storage capacity should be extended up to the upper limit supported by MS-DOS (640 KB) in order to be able to use even larger program packages.

(7) As far as software equipment is concerned it is necessary to have one approved package each for

- word processing
- spreadsheet
- data base systems
- business graphics
- integrated program packages.

(8) For presentations and demonstrations a video beamer or LCD-projector is indispensable (the latter is cheaper and more mobile but less capable). Have also a portable PC, in order to avoid the necessity to re-install devices over and over again.

(9) It is advisable to maintain an archive with learning media (from books over programmed instructions and computer-aided instructions to videos) in order to promote self-instruction of the course participants.

#### **4.2 A Few General Recommendations Regarding the Lab Sessions**

(1) By all means, obtain instructors and tutors whose goal is not to show off what **they** know and how brilliant **they** are. According to some bad experiences we had, it seems to be easy to scare off even the most motivated and interested course participants if appropriate teaching methods are not applied.

(2) Rather, make sure that every participant experiences personal success very early in the course, that her/his learning progress is steady and that he/she really manages to solve a complete problem with the computer finally, instead of being frustrated by having to study lengthy and complicated manuals, by too difficult task assignments or by mistakes in handling the machine.

(3) Build small groups in the class-room, that is to say not more than 20 participants. The instructor should be able to trace the learning progress of every single group member. Too big a size prevents people from asking questions. Anonymity of the audience is fatal for the goals intended with the IT-Lab.

(4) An IT-Lab must go beyond the mere manipulation of electronic machines. When designing the program, aim at an appropriate mixture of technical and administrative-political topics. For, understanding and handling the PC and the main software packages is important, but so is the role IT is able to play for raising the effectiveness and efficiency of public administration.

(5) Based on our experience made especially during the last years, the curriculum of the IT-Lab steadily needs to be further developed along with the following trends:

- Emphasis on those parts of the program which intend to teach the basics of computing and to reduce resistance against IT can be lessened because more and more course participants will already have IT-experience from previous education and training stages
- On the other hand, the need grows to adapt knowledge and skills acquired in earlier training stages to the changing environment and technical progress
- Also, the emphasis on those parts of the curriculum must be extended which address topics like how to implement IT into one's sphere of responsibility and how to utilize its potential for organizational change and administrative reforms.

#### **4.3 Pre-Service Training of Students**

(1) A three-hour course taught over a three-month term, is sufficient to teach the basics of information technology, the use of PCs, the application of a programming language and of some PC-software tools.

(2) For our purposes, the programming language BASIC has proven to be a useful alternative. It only requires a few formalities so that the student is able to start her/his first BASIC-programs without much ado. Other programming languages we have tried so far (like FORTRAN, COBOL, PASCAL), obviously were more difficult for the students. On the other hand, we found it possible to teach our students a medium command of BASIC within six to eight weeks only.

(3) For teaching the application of PC-software tools we use standard software packages of spreadsheet, data base, word processing and others.

(4) Each lesson is normally accompanied by a homework assignment. The student is expected to solve a certain problem mentally and then to feed programs and data into a PC. Printouts of programs and results are to be handed-in to the instructor. As an example, the sixth and final BASIC homework assignment could be: Calculate the number of parliamentary seats after an election, and, while doing so, compare the effects of two different procedures (e.g. d'Hondt and Hare) on the resulting distribution of mandates.

(5) Encourage students to utilize the IT-Lab for their personal work (e.g. for typing seminar papers, for obtaining useful information from a data bank etc.). For, obviously, the more people experience the applicability of IT for their own personal work, the more they want to learn about it.

(6) Write a test at the end of the course in order to prevent students from relying too heavily on the copying capabilities of PCs when they do their homework assignments. On the average, 10 per cent of the students fail this test.

(7) This clientele apparently is motivated and clever enough to find out about the handling of computers by themselves; in addition, they cooperate and support each other mutually. Therefore, in the course of time, we gave up to have official tutors in the computer room. Instead we prepared self-explaining written instructions and discuss handling problems in the class-room sessions.

(8) As a rule of thumb, you need one PC per some ten students (given the computer room is open from 8 a.m. to 10 p.m., five days a week).

(9) Build classes with a homogeneous level of IT-knowledge. The more the "experts" show off their IT-terminology and know-how, the more the beginners are intimidated. It is better to split students into groups in accordance with their fore-knowledge, if necessary. However, because of the goals we pursue with our IT-Lab, we never apply admission tests.

#### **4.4. Continuing Education of Higher Civil Servants**

(1) On the one hand, it is important to reach this clientele because they decide on many IT-matters, although, because of their age, IT most probably was not part of their pre-service education. On the other hand, it is difficult for them to leave their desks for more than a week.

However, if a one week program is well designed it is by all means possible to raise the participants' interest for IT, to reduce technique fear, and to make them recognize the potential which IT is able to offer for their work and for their sphere of responsibility.

In these times of rapid technological progress it is more important to provide the civil service with a compass rather than with a detailed road map, anyway.

(2) Homogeneoususness among the group of participants in terms of rank is of utmost importance. Although everyone's interest to learn about the use of IT is high, so is the concern to save her/his face. According to our experience, it is all right to admit one's ignorance before peers but rarely before subordinates or participants with a lower hierarchical rank. Therefore, one

should make sure that training courses consist of members who are more or less of the same rank.

(3) Expect that those who participate in the same training course probably develop something like "esprit de corps" which will allow them to communicate preferably and more easily among each other. (It is interesting to observe, by the way, that sometimes communication processes between course participants which should have been part of their regular work already, start only during the IT-Lab.) Expect also that the participants of a continuing education course, back in their offices, probably will have more and better ideas about IT-applications - and are probably going to take the initiative, to propose respective projects and to demand the resources necessary.

(4) As we know from former participants: One week of good IT-training (in the sense of this paper) is sufficient indeed to open the civil servants' eyes for the potential of modern IT and to provide them with a base from where they can develop their respective knowledge and skills on their own.

(5) In order to use the telecommunication devices installed in the IT-Lab, short and self-explaining written instructions have to be prepared for the participants. E.g. for the use of a videotex system, an electronic mailbox system or a data base query system, one should provide for

- one page with technical instructions (how does the system work?)
- one page with user instructions (what does the user have to do to handle the apparatus?)
- one page with sample applications.

According to our experience, written instructions **must** be short because participants in this kind of training courses apparently are neither used nor willing to study lengthy information.

(6) In addition, each participant needs a set of written instructions for each software package dealt with. These instructions (about 10 to 20 pages) must also be tuned especially to the goals and to the character of the course. User manuals which come with the programs bought, are not appropriate normally (they serve a different purpose, are too voluminous, are not always easily understood by our clientele, etc.); furthermore relevant books and articles are usually not at hand and it would be too time consuming to study them.

Written instructions should include

- a synopsis of the main keyboard functions
- a short introduction into the main program functions and how they are used
- a sample application with each step fully documented and explained so that the course participant is enabled to repeat this example by herself/himself
- a few more sample applications.

With this kind of instructions, the course participant is able to explore the main features of the respective software tool by herself/himself.

(7) Let each PC be used by two participants. Those small groups facilitate mutual support and self-help. On the other hand, provide for so many PCs that not more than two persons have to share one machine either.

(8) Start each instruction of a program package (like word processing, spreadsheet, data base, or computer graphics) with a short and video projector-supported demonstration of its functions and handling. Allow

about 30 minutes for this. Let this demonstration be followed by about one hour of practical use of the software tool by the course participants.

(9) Be sure that about two hours daily (e.g. after lunch-break and in the evenings) are at the participants' disposal to practise what he/she wants and at her/his own pace.

(10) Here, intensive personal guidance is important. Expect that one tutor is needed for about seven participants because there is not enough time to study written material and because questions should be answered immediately in order to prevent frustration and resistance on the side of the participants.

(11) Make sure that the time slots which are reserved for individual practice are really utilized by the course participants. One way, we found, is to open each of those sessions with a five to ten minute demonstration of interesting applications of IT like electronic mailboxes, computer graphics, prototyping, videotex, or speech mail.

#### **4.5. Training Staff People**

(1) The training concept for staff people differs from that for the other clienteles dealt with above. The goal of a training course for staff people is immediate application in their daily work of what they have learned. Therefore they must learn perfectly how to handle software and hardware in routine as well as in exceptional situations.

(2) Staff people should only be sent to an IT training course if they are expected to practice right away what they have learned. In other words, here, the best results are achieved when the training course is part of a broader process of organizational development in the respective office or agency. The participants' learning motivation is much higher when they know that they are not learning for an indefinite future.

(3) The superiors of the course participants must really want and support the training program. Neither should this be misused as an alibi, nor should the superiors expect their staff people to apply what they have learned in their daily work before the very end of the training program.

(4) This sort of training is extremely delicate in one respect: The participants know each other very well; they have worked together before the course and they will do so in the future. Therefore, for each of them, her/his performance and success in the course is of utmost importance for their self-esteem and for their reputation among their colleagues and superiors. As a consequence, the instructor has to make sure that each participant keeps pace and saves her/his face.

(5) Teach only those parts of a software tool which are really needed and used in the daily work of the course participants. This means that it often does not make sense to teach a complete program package for its own sake within one or two weeks. For, only parts of the information learned is really useful for the participant and it is difficult to digest so much information in such a short period of time. It is much more important to provide a solid base for the daily work and for self-instruction if this should become necessary later on.

(6) Different from the two clienteles discussed before, each participant here needs one PC in the class-room on her/his own. In addition to that, the office in which they work normally must be equipped with the necessary hardware and software.

(7) For standard situations (certain program functions which are needed routinely, certain handling errors which are to be expected, and so on) the course participant needs special written instructions. Here, again, ordinary user manuals are not appropriate (e.g. often even fail to have a problem-oriented index; also they normally presume that the user knows how to handle a computer) and must be supplemented by a few pages of taylormade "first aid" information.

(8) After a certain subject matter has been taught by the instructor with support of a video projector, the course participants should practice what they have learned. Different from the two clienteles mentioned before this should be done synchronously and under the direction of the instructor.

(9) After a certain amount of class-room instruction (let us say: three hours) the course participants should have the chance to return to their own offices and to practise within the work environment they are used to. The learning progress should be checked via homework assignments. Of course, it is important that the superiors provide enough practice time.

(10) Thus, a good course schedule seems to have three hours of class-room instruction twice a week, followed by individual periods for practice in accordance with the needs of the single participant. Besides, a schedule like this can be easily adjusted to the ongoing regular work.

(11) Allow roughly two weeks before technique fear and stress disappear. Here, as in the case of students, motivation of the participants must be secured by the instructor over a comparatively long period of time.

(12) Make sure that, after the training course is completed, an "IT-coordinator" is available (an expert for hardware and software problems which definitely will occur).