

Microcomputer Training for Transit Managers

MARK ABKOWITZ

ABSTRACT

The introduction of microcomputers to the transit environment is creating much excitement as managers recognize the tremendous potential of these machines to improve transit decision making at many levels of operation. However, the majority of transit agencies has been cautious about procuring and using microcomputers. This is often due to lack of direct experience with microcomputer systems and to concern about the information furnished by computer vendors who are more interested in sales than in the configuration that is best suited to the transit property. In response to this situation, Rensselaer Polytechnic Institute staff have developed and are administering a microcomputer training course to familiarize transit managers with many functional areas where microcomputer capabilities can be harnessed. The course emphasizes hands-on experience and provides considerable exposure to decision making using microcomputers. System selection issues and procedures for conducting a needs assessment are also included in the course content. The development of the course and reactions of class participants are described. The course is being expanded to a regional offering through coordination with several universities.

Microcomputer systems have introduced the potential to significantly alter the management and operations practices of transit properties in the United States. The capabilities and the accessibility of these machines at an affordable price have stimulated and will continue to stimulate the development and implementation of policies and procedures directed at computer-assisted decision making at many levels of transit operation, including administration, budget analysis, routing and scheduling, maintenance, and marketing activities. This should directly and indirectly enhance transit efficiency and productivity.

In response to the microcomputer age, the UMTA Office of Planning Methods and Support established a Transit Industry Microcomputer Exchange (TIME) Support Center to serve as a clearinghouse for transit-related microcomputer activities. Operated by Rensselaer Polytechnic Institute (RPI), the support center has three primary functions:

1. Publish a quarterly newsletter containing information about microcomputer applications in the transit industry, advances in hardware, availability of software, and so forth to increase communication among users;
2. Serve as a clearinghouse for microcomputer software developed by members of the transit community to facilitate a direct exchange of information and software; and
3. Serve in an advisory capacity to address

questions or problems relating to microcomputer systems and software.

The support center went into full operation in November 1982. In the first few months of operation, more than 700 transit professionals indicated their interest in being members of the user group, several software programs were submitted for testing and dissemination, and hundreds of programs were distributed and advisory telephone calls fielded. The initial response has been overwhelming because service-oriented projects generally have a lag time associated with them while the target market becomes more fully identified. The response clearly indicates a high level of interest in microcomputers in the transit industry.

In addition to those operators who have already purchased microcomputers, the center received comments from several others who were in the process of making a commitment to microcomputers but were limited by their lack of on-site experience with microcomputer systems and their application. On the basis of comments received at several professional meetings, this latent demand appeared to be significant, perhaps even larger than the number of operators presently using microcomputers. A survey subsequently taken by the support center of its users substantiated this conclusion: only 33 percent of the user group members reported owning a microcomputer at the time. It is rather unusual to have such a large share of a user audience with little or no experience with the subject in which they have indicated such an active interest.

It was concluded that the latent market was so large because many transit managers were reluctant to request microcomputer procurement without having more direct experience with microcomputer capability. Furthermore, it appeared that many managers were not comfortable with the information they were receiving from computer vendors, because this advice was not always objective and vendors did not have the manager's interests in mind.

In response to this situation, RPI, with UMTA support, developed a training course to provide personnel with the basic skills necessary to procure and effectively use microcomputer systems. The primary objectives of the course are for participants to

- Understand how to select hardware and software,
- Develop an operational familiarity with a small computer,
- Learn about selected programs of immediate use, and
- Gain an awareness of the range of work-related uses of the microcomputer.

COURSE DESCRIPTION

The overall emphasis of the course is on exposing participants to a variety of microcomputer functions, which may be useful in their profession, through hands-on experience. Participants work at microcomputer terminals under the supervision of workshop instructors and staff and receive a workbook and software templates they may keep at the end of the training session. Attendees are exposed to the following microcomputer functions:

- File management,
- Word processing,
- Spreadsheets,
- Graphics,
- Data-base management, and
- Custom software.

Case studies are formulated to demonstrate these functions. These case studies use problems common to transit professionals involved in service planning, scheduling, finance, administration, and maintenance. In addition to specific microcomputer functions, three other topics are covered in the course: (a) system selection issues, (b) conducting a needs assessment, and (c) organizational issues of managing microcomputers. Each course module is described in more detail in the following discussion.

File Management

File management is perhaps the most basic capability of a microcomputer system. This segment focuses on learning how to create files, modify them, and sort information for analysis and distribution. The applications example concerns maintaining personnel records of transit employees. File management software is also used to demonstrate production of a telephone directory of employees and preparation of mailing labels for letters.

Word Processing

The text-editing function of a microcomputer, including formatting, entry, and production, is covered in this segment. This material is interfaced with the file manager to demonstrate how renewal letters are prepared and sent to drivers whose licenses are scheduled to expire in the next 60 days.

Spreadsheets

This is perhaps the most versatile and widespread use of a microcomputer in the transit environment. The course covers formatting, entry, and manipulation of spreadsheets to perform a number of transit analyses. Spreadsheet programs are used to illustrate several applications relevant to the transit industry. These include cash flow forecasting, operator wage budgeting, performance analysis using data collected as part of Section 15 ride checks, and timetable construction. Each of the applications uses progressively more sophisticated features of spreadsheets, and collectively the applications demonstrate nearly all capabilities of spreadsheet software.

Graphics

The graphics module is interfaced with the spreadsheet segment. Output from the spreadsheet programs serves as input to the graphics software, resulting in the production of tables, figures, and plots illustrating analysis results. Applications include graphic representation of cash flow forecasts and ride check data, and peer comparisons based on performance measures derived from Section 15 data.

Data-Base Management

The data-base management and custom software modules of the course are treated as advanced microcomputer

subjects. The important objectives here are to alert the transit manager to

- Applications for which this capability should be used,
- Situations in which outside contracting should be considered, and
- How to contract with a software programmer.

Data-base management is the most complex subject covered in the course. It is introduced after the attendee has become familiar with file management, spreadsheets, and related capabilities. The primary emphasis in this module is on showing how multiple files can be structured and manipulated to perform a comprehensive analysis. The applications example focuses on maintenance tracking using records of shop activities and vehicle on-the-road performance. Attendees are also asked to formulate their own data-base management design for the transit payroll problem.

Custom Software

This segment addresses the need to personally develop software for a specific transit problem when "off-the-shelf" programs are not suitable. The participant is introduced to the complexities of writing and testing code and managing contracts for custom software development. Applications examples include a route-monitoring package and a technique for planning data-collection activities using statistical sampling designs.

Simulation Game

The climax to the hands-on environment is a simulation game scheduled after the instruction modules. A hypothetical transit problem is defined in which microcomputer analysis is needed at several departmental levels. Having gained a familiarity with various microcomputer functions and programs, attendees must conduct the analysis, work with other departments, and make a presentation to the board of directors at the end of the day. The purpose of the simulation game is to provide participants with an opportunity to gain additional confidence in formulating problems, using the microcomputer system, and using the results in the decision-making process.

System Selection

The system-selection module of the course focuses on disseminating all the information necessary to understand various system options and introducing criteria for selecting among the feasible alternatives. The introduction to this module focuses on the state-of-the-art in microcomputer applications at transit agencies. Subsequent material is divided into understanding microcomputer terminology, describing hardware options and costs, evaluating software options and costs, issues of system integration, and a priority ranking of selection criteria. The system integration discussion is particularly important because success in using microcomputer systems hinges to a large extent on compatibility of hardware and software, transferability of programs from one microcomputer system to another, and potential micro-mainframe linkages.

Needs Assessment

Although needs assessment precedes system selection

chronologically, the order is reversed in the training session so that attendees are familiar with system attributes before they learn the procedure for identifying whether these attributes are relevant to their agency needs.

At the conclusion of this module, some attendees may be self-sufficient to conduct their own internal needs assessment, and others may recognize the need to obtain outside assistance for conducting an assessment. The principal objective is to convince each participant of the importance of conducting a needs assessment in order to proceed rationally and logically, rather than impulsively, in developing a microcomputer system.

The module begins with a general description of the two key elements in a needs assessment procedure: (a) conducting an analysis of current procedures and (b) performing a requirements analysis. The remainder of the session is devoted to an actual case study of a microcomputer needs assessment.

Organizational Issues of Managing Microcomputers

An important aspect of implementing a microcomputer system that is often overlooked is the management of the system when it is in operation. It is common for different departments or individuals to have difficulty about who has priority access to the machine. Potential misuse of the hardware and software and protecting personal files are also important security considerations.

Another potential problem is the human-machine interface within the agency and the resulting impact on job productivity. Although microcomputers have significant potential to improve productivity, there is a practical limit to their value and, in fact, the implementation of a microcomputer system can be counterproductive if personnel do not accept its arrival in the agency.

COURSE IMPLEMENTATION

The training activity at RPI was divided into two phases. The first phase involved course development and the offering of a pilot course at Rensselaer Polytechnic Institute in August 1983. The pilot course was monitored and evaluated to make improvements to the course content before making it available to other institutions interested in using the material for instruction.

The second phase of the project is focusing on RPI coordination with three UMTA University Centers that will be offering this course in their regions. The university center concept was developed by UMTA in response to expressed congressional concern for (a) the transit industry's vital need for middle management training and (b) identifying focal points for transit research and training activities. The centers' activities include development of continuing education courses in management and operations issues for transit officials.

The pilot course was held at the RPI microcomputer laboratory, which houses 12 personal computers. Enrollment was limited to 36 people per session (3 per microcomputer), with reservations accepted on a first come, first served basis. Class size was restricted to permit individual instruction and limit to a manageable size the number of people per microcomputer.

The response to this offering was extremely good. Despite the fact that UMTA Section 10 reimbursement was not available, enrollment reached capacity within 3 weeks. Registrants were mostly transit personnel (with a few academics and consultants) repre-

senting a diverse set of job responsibilities including finance, administration, scheduling, and maintenance.

The nature of the course and the backgrounds of attendees resulted in the identification of several key issues that are likely to affect the success of microcomputer training. Many of these issues were raised by attendees in completing evaluation forms distributed near the end of the session. The ensuing discussion focuses on the major issues that were identified.

Keyboard Eagerness

From the moment they arrive in class, attendees are anxious to "play with the machine." It is imperative to encourage this attitude by starting off immediately with keyboard exercises and games designed to establish a familiarity with the machine. The danger of deferring this activity in favor of introductory lectures is the loss of enthusiasm that is important to starting a training session off on the right foot.

Class Size

There is an important distinction between the theoretic and the practical limit of attendance for hands-on training. Initially, it was believed that three persons to a microcomputer was a reasonable solution to this problem. It became apparent during the pilot course that two persons to a microcomputer is the practical limit to ensure retention and participation without losing group interaction.

Previous Microcomputer Experience

The class was split nearly in half between those with previous microcomputer experience and those with no prior experience. The strategy used in the pilot course was to establish groups, consisting of a mix of experienced and novice users, at each computer station. In this fashion the experienced members of the class also served as tutors for their group. In this way a consistent instructional pace was maintained because all groups progressed at a similar rate.

The alternative arrangement, placing novices with novices and experienced users with one another, would have been counterproductive. In fact, a more reasonable approach would be to hold separate training sessions for novices and experienced users.

Occupational Responsibilities

This is one of the important distinctions between microcomputer training and other training courses offered to the transit community. The market for microcomputer use cuts across department lines within the transit agency, resulting in a large market for this type of training. The challenge of meeting the training needs of each individual is also more difficult. No explicit attempt should be made to assign individuals to work stations according to their job descriptions. Rather, the course should be structured to demonstrate a wide variety of microcomputer applications within transit operations. The intent of this approach is to reach every attendee with at least some applications of personal interest and provide exposure to other applications that the attendee can absorb as a representative of other departments within the agency that might also benefit from microcomputer implementation.

Hands-On Instruction

Hands-on instruction is a more dynamic forum for training than courses that do not require technological interaction. The participant must be able to grasp the material quickly and retain it because learning microcomputer capabilities and applications is an incremental process. It is rather easy for students to fall behind, so a primary emphasis must be placed on organized instruction and effective learning aids. A detailed course workbook should be prepared, including "cheat sheets" on how to operate the system, load software, file programs, and print hard copies. The applications should also be documented in the workbook along with copies of typical screens if the program is being run successfully. Instructors should also make reference to the workbook, whenever possible, to effectively coordinate their presentation with the written instructional material.

The course structure has been modified to reflect the lessons learned from the pilot course. Additional offerings were subsequently held at Texas Southern University and at Indiana University. Reactions to these courses were extremely positive, and attendance continued to meet enrollment capacity. As a result, additional offerings of the course have been scheduled to serve transit training needs in this area.

CONCLUSION

The introduction of microcomputer technology to the transit environment has been a slow and gradual pro-

cess. The majority of transit professionals has been reluctant to procure microcomputer systems without first obtaining sound, objective advice on functional requirements, system capabilities, alternative hardware and software options, and present uses of the microcomputer in the transit industry. Training is an important element in providing this information and also serves as an avenue for exposing participants to the wide range of uses and benefits of microcomputer technology, particularly if hands-on opportunities are provided.

The course described in this paper provides a good, fundamental exposure to the uninitiated and many additional insights to those with limited previous experience. It is seen as the basic unit of microcomputer training for transit managers from which other more specialized courses can be developed based on market needs.

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Interactive Decision Process for Public-Private Cooperative Projects

G. ROBERT ADAMS, TERRY L. GOTTS, and JON M. WESA

ABSTRACT

Both the public and the private sector can often benefit from the cooperative financing of essential transportation services that neither would undertake alone. In Michigan the question often revolves around jobs--jobs that would be lost if a rail subsidy were discontinued, or jobs that would not be created if a service road to a plant expansion could not be built. Opportunities for cooperative involvement between the public and private sectors have often had to be considered with less information available than decision makers might desire. The calculations of benefits and costs have been so lengthy and time consuming that only a narrow range of alternatives could be considered if the relevant information was to be

timely. The model described permits timely and understandable evaluations of the personal income and tax impacts resulting from employment changes that are outcomes of transportation improvement projects. The model has been designed to be simpler to operate than a multifunction hand calculator. The intent is to allow a decision maker, who knows or cares little about a computer, the opportunity to test a variety of "what if?" questions very rapidly, calculating the balance between public costs and benefits and generating reports and business graphics at will.

Transportation departments in many states face an imminent drop in real revenues. The overall decline