15. Maximum level of ridership that can be developed if a very high level of transit service is provided;
16. Appropriate ranges of marketing expenditures as a percentage of operating expenses for various population groups and types of service;
17. How best to conduct a "transportation academy" or a series of regional universities that will include the many varied functions of a transportation academy;
18. Means for evaluating a city's transportation and transit network, including walking distance to transit service, waiting time, travel time, waiting time for a transfer vehicle (if applicable), riding time, walking time to destination, quality and comfort level of the transit trip, safety and passenger security of the trip, cost of the trip (whether the cost is only the fare or whether it involves all of the operating costs as included in any subsidized or "absorbed" costs), and social benefit with regard to the use of the system by the transit deprived;
19. Means of interfacing existing transport systems with future personal rapid transport systems;
20. Means of encouraging an intensive PRT system to be constructed in Europe, Asia, or South America so that the effect of the human values, transfer questions, and construction costs can be analyzed somewhere other than in the United States; and
21. Means of testing a transit system (as described in areas 15 and 20) by the intensive use of buses on extremely short headways in a medium-sized community (one of the advantages of such a study might be the consideration of how best to accomplish the cross-jurisdictional decision-making necessary for such an intensive and comprehensive project).

EDUCATION AND TRAINING SEMINAR

William L. Grecco
University of Tennessee, Knoxville

Gilbert T. Satterly, Jr.
Purdue University, Lafayette, Indiana

In the dictionary, one can find the word "training" in the definition of education, and some believe the terms to be synonymous. The difference used for this report is that education is oriented to mind development while training indicates exercise or practice in order to develop skills. The objective of this seminar was to determine the educational and training needs of the public transportation industry. One way to determine the needs of an industry is to identify all the components of that industry and then to examine in detail the specific needs of each component.

TRANSIT OPERATING AND MANAGEMENT FIRMS

The types of skills required to operate a public transportation firm can be classified as either management or operating. Most positions, from the vehicle operator to the top manager, can be plotted along this continuum. Each job will, to varying degrees, require some of both management and operating skills.

The specific needs of the transit operating firm vary depending on whether it is bus transit or rail rapid transit. Because of the large number of them in this country, bus transit systems will be used as an example. Positions required to operate a bus system that are somewhat unique to that industry were discussed; common positions such as bookkeepers and stenographers were not included. The greatest need of the bus transit industry is for bus drivers. The problems are typically ones of recruitment, training, and retention.

Bus Drivers

Applicants for the position of driver come equipped with the basic driving skills, but many transit agencies provide specific driver training. In addition to actual operation of the vehicle, there are other facets of the position that require training such as route information, customer consideration, and vandalism control. In some properties, it has been essential that drivers have the mechanical ability to keep aged vehicles moving.

Dispatchers

In addition to the basic responsibility of managing people, the dispatcher must have the ability to schedule vehicles and predict passenger demands. The nature of the tasks is generally perceived by many transit properties as requiring previous driver experience.

Management

Depending on the size of the transit property, the number in the management group can vary from several to many. The management skills required are somewhat typical of other labor-intensive, consumer-service-oriented institutions. If the transit property is large, the managerial responsibilities may be separated into operations, planning, and marketing. These positions, whether singly or in combination, require formal education in basic management principles that are somewhat independent of industry type. There was some disagreement among seminar participants concerning the relative importance of the above principles compared to those learned on the job. These latter management skills are job-specific and were regarded by some as requiring skills acquired by working up from driver to each level. The best compromise is that neither of the above choices should be selected to the exclusion of the other.

CONSULTANTS AND PLANNING AGENCIES

The demand for education to meet the needs of consultants and the urban or regional planning agencies has generally been provided by various university programs. In most instances, the professionals come from civil engineering and urban planning graduate programs. As a result, these institutions have, in general, attracted additional staff capabilities to maintain their share of the market. Programs of UMTA providing research and training grants to universities tend to broaden the base, but funds by themselves do not ensure additional quality programs.

The consultant must be educated to assist the community or its planning agency that has no in-house expertise. He must have a general understanding of the problems of public transportation. This is essential to his assisting the community in the identification of their problems. Most essential to his education is a familiarity with the planning process and its application to the problems previously identified. Both consultants and planning agency personnel must have organizational capabilities in order to see that the studies are performed efficiently. Proper inputs by professionals and interested and informed citizens can be achieved through care in this phase of the process.

The most critical phase affecting the quality and cost of planning for proper decision-making in public transportation is data collection. The educational program must assist the professional in identifying the proper data on which to base analysis and plan development. This is the most costly phase and is extremely critical to the quality of the recommendations. There are many university-level courses that can assist the professional public transportation planner; these include statistical courses on regres-

sion, experimental design, and psychometric scaling techniques. In many instances, the educational program is so extensive that a course on each need cannot be taken. On these occasions, newly designed courses combining several needed subjects are taught.

The other phases of the planning process are analysis, forecasting, plan development, evaluation, and implementation. Each of these has its unique educational requirements. Many of these needs are job-specific so that the need is less likely to be satisfied by existing courses unless they are offered in a transportation planning or urban planning curriculum. In the cases of plan evaluation and plan implementation, there do not exist courses in even the more advanced public transportation curricula. The students need assistance in developing and filing the proper grant applications. There are courses generally available in the business college on marketing principles, which are necessary to implement a successful transit operation.

CONCLUSIONS

A distinction was made between demand and need for trained managers. One of the problems in the transit industry is that there is not a demand for trained managers because the industry believes that it cannot afford to hire college-trained managers for middle and upper level management positions. This is not to say that the transit industry does not need college-trained managers.

Seminar participants estimated that transit companies would need approximately 100 college-trained managers per year during the next 15 to 20 years. If the needs of the various levels of government for persons trained in transit management but working in research, planning, and liaison are included, the total number of college-trained persons in public transportation would be approximately 200 per year.

Questions raised were, How can high school graduates be interested in public transit management? How can they be motivated to study to become transit managers.

Decreasing enrollments for freshman engineering students in colleges across the country have been the trend in recent years. The publicity in the press about unemployment of engineers in the defense and aerospace industries has had an adverse effect on freshman enrollments in engineering schools. Also the interest among high school students in ecology and the identification of engineers with the development of products that pollute the environment have not helped to increase an interest among high school students in studying engineering. In general, high school students are not aware of the challenges and opportunities available to them in either engineering colleges or business management colleges that would prepare them for a career in public transportation. High school counselors and math and science teachers will have to be educated so that they may inform the high school sophomores and juniors about these opportunities in public transportation.

The consensus of the group was that a 4-year bachelor's program in either an engineering or a business college within a university would provide the necessary education for potential transit managers. Of the possible 120 semester credit-hours in the program, approximately 20 to 30 hours would be in specific transportation courses (planning, design, operations, management). Additional courses in areas such as labor relations, accounting, public relations, law, marketing, urban planning, sociology, psychology, and political science would also be included to supplement the major in transportation.

Many universities have interdisciplinary degree programs available today where persons interested in public transportation can build an educational program in public transportation that involves them in more than just one college. For example, at Purdue University, a student can enroll in an interdisciplinary engineering department and, with the aid of an adviser, develop an integrated program with a major in public transportation including courses in a number of different schools and colleges (engineering, business, humanities, and social sciences). The student must meet minimum requirements in math, science, and engineering sciences in addition to his or her major and supporting minor areas of study. Upon completion of this program, a bachelor of

science in engineering is given. Similar programs are now possible in many civil engineering departments that have adopted a more flexible curriculum.

A need that exists within the university is the development of public transportation course content material such as course outlines, bibliographies, texts, case studies, and audio-visual materials. The suggestion was made that transit company operators work with university faculty in the development of this material. The transit operator is in a position to know what the problems are in the real world and can pass these on to the university community so that students get the feeling of working with realistic problems. A clearinghouse for curriculum materials was suggested to enable an exchange of information among universities.

The question of financial support for students studying public transportation management at the undergraduate and graduate levels was raised. At the present time most, if not all, support for students in the field of public transportation comes from the federal government through the research and training grants of the Urban Mass Transportation Administration. UMTA has been placing most of the emphasis on the research aspects of the program and wants research results that the transit industry can use. Other research funds in the area of public transportation are very limited, and much of the money goes to research companies. This practice achieves results without the additional benefit of support for undergraduate and graduate students.

If the emphasis is going to be placed on training of transit managers, someone or some organization or organizations, possibly the federal government, are going to have to support the students either through scholarships or through traineeships similar to what the federal government did several years ago in the area of water resources. It does not appear feasible to suppose that transit properties are going to support the college education of future transit managers, especially when most of the properties are financially marginal operations. One possibility would be to provide for co-op job opportunities for students to work alternate semesters for transit properties at salaries high enough for them to pay for their college expenses on the alternate semesters.

During the on-the-job training periods, the student would be rotated from department to department where he or she would be given experience at certain jobs, for example driving a bus in service for a period of 6 to 8 weeks. In other situations or tasks, the student may only be an observer for a shorter period of time. The idea of the program would be to give the student exposure to as many facets of transit as possible. Another possibility is to employ the student just during the summers after he or she has finished the freshman year or selected transit management as a major area of study. Again the student would be rotated from department to department within the transit company.

Another problem discussed involved the lack of interaction between persons who are involved in providing public transportation and the faculty of universities who teach courses and do research in public transportation. In the area of highway engineering there is generally good communication and interaction between the state highway departments and highway engineering faculty. Federal, state, and local highway engineers also interact with university faculty through the many activities of the Highway Research Board. Efforts should be made to establish similar types of communication and interaction between university faculty and persons in the transit industry.

RECOMMENDATIONS

1. Encourage the American Transit Association to form an educational committee (transit property personnel and educators) to address the problem of education of managerial personnel for all areas of public transportation. This committee would set out specific objectives and course requirements and assist in the development of needed text materials.
2. Encourage UMTA to seek personnel for employment who have had transit operating experience.
3. Encourage universities to hire educators who have had transit operating experience or to encourage present faculty to seek transit operating experience through sum-

mer work or sabbatical leaves. The latter would require possibly UMTA financial support plus cooperation of the transit operating agencies. The coordination of the options could also be the responsibility of the previously mentioned committee.

4. Encourage the personnel employed in transit management to publish case studies on operations that would serve to educate others on the state of the art and disseminate more widely the results of demonstration projects.

LEGISLATION SEMINAR

Daniel Brand
Harvard University, Cambridge, Massachusetts

Richard Haines
Purdue University, Lafayette, Indiana

Legislation is a government act that gives the force of law to a decision on public policy. It can take several forms, including regulation, setting goals, and distributing public money. Through these authoritative expressions of the public interest, legislation can command or encourage appropriate action to help solve public problems such as those in public transportation. The charge to this seminar was to consider the role of legislation (local, state, and federal) in solving various problems in public transportation. The seminar considered general problems, financial problems, operating standards, and marketing.

The seminar considered legislation to be synonymous with implementation. In the course of legislation, a policy is agreed on, as are the constraints under which it is to be implemented. But uncertainty about the contingencies of implementation consistently requires administrative discretion and professional judgment. The intention here is to provide this judgment to help inform the legislative process itself.

GENERAL PROBLEMS

The broadest possible scope of action for legislation was the focus of the seminar. The more narrow set of actions normally governed by regulatory legislation for public transportation received only brief discussion at the outset. The basic powers of regulatory agencies are not able to overcome the current problems of public transportation. Regulation is restrictive in nature, deriving from the notion that private capital, let loose without regulation, will seek after limitless profit and bloodletting competition. Neither of these excesses, when they existed in the past in the case of transit, served the public interest. Thus, while existing transit regulation may have been justified in the past, conditions have changed. Regulation that limits profits is inherently not suited to promoting profit and the increased quality of service that can be provided by a profitable and healthy industry. Also, regulation that inhibits competition also restricts the ability to adapt to changing conditions and to innovate and try new transit services in new ways. Decreased regulation appears to be one action that legislation could accomplish. The objective of such legislation should be to encourage innovation that promotes ridership and service.

The seminar agreed with the prevailing view at the conference that, since private properties were more and more being combined with their public regulatory bodies in one public transit authority, the problems of overregulation are decreasing. In fact, a second area for legislation is how to regulate the now public self-regulating transit authorities.

Accountability of public transit agencies in their expending of public funds is required, without making the compilation and reporting of performance measures so burdensome