and occurs most often immediately on receipt. Readers review magazines by scanning or reading articles. The abstract is not used to make the decision to read or not to read.

5. Ninety percent of those who describe themselves as planners earned less than $30 000, whereas only 38 percent of the administrators and 36 percent of the teachers in our survey earned less than $30 000.

6. Almost no one was interested in a journal that concentrated on only one subject area. Well-balanced subject matter, theory, modal treatment, and policy issues are preferred.

7. Most readers obtain their journals through office or firm subscriptions, but journals associated with organizations have a high proportion of readers who have individual subscriptions.

8. Readers are most interested in reading about issue-oriented studies and applied procedures. The most popular journals are those that focus on these topics.

9. Few journals have a narrow readership. Content of specific articles much more than association or name is what determines whether journals are read.

10. The primary function of most journals for their readers is to provide general awareness and information on new techniques.

The picture that emerges is of a dichotomy between reader and literature. On the one hand there is the busy professional who scans a number of journals and their articles (not abstracts) for issue-oriented studies and applied procedures. Apparently few are found, since this only takes 7 h/month. On the other hand there is a growing number of journals, each of which offers a slightly different selection of articles. Through experience, exposure, and membership, our busy readers have learned in which journals to find material to their taste, and they focus on those publications. The image of a narrow-subject reader who immerses himself or herself in one journal or topic is a myth.

If only 5 percent of the professional's time goes to reading journals, what other reading is done? We have no evidence but suspect that, of the 30 percent or so of the professional's time spent reading, 20 percent goes to office material and subsurface professional literature and perhaps 5 percent to trade publications of various sorts. We have not studied these sources here; we leave that for a later effort. But one thing is clear: If 17 journals are collectively publishing material on which only 5 percent of the average professional's time is spent, then that literature must be collectively irrelevant.

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REFERENCE

1. D.T. Hartgen. Application of Behavioral Science to Issues in Transportation Planning. Planning and Research Bureau, New York State Department of Transportation, Albany, PRR 148, Nov. 1978.

State and Regional Roles in Public Surface Transportation: Education, Training, and Research Contribution of Universities

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This paper presents the results of two panel discussions that focused on the education, training, and research contribution of universities in helping state and regional transportation agencies identify and solve local problems. The panelists identified five areas in which universities can make important contributions—policymaking, formal education and training, continuing education, special training programs, and technical assistance. However, universities are facing serious problems in financial support and enrollment that could potentially reduce the role that universities play in helping transportation agencies in the future. In terms of research, the panelists distinguished between long-term (basic) and short-term research, identified a strong need for diversity in problems on which universities can work, discussed the need for continuity of research funding, and outlined the characteristics of a university that make it unique for investigating transportation problems. It was concluded by both panels that a dialogue between the universities and the transportation agencies must be established to ensure better integration of university capabilities into transportation policymaking.

Over the past several years, state and regional agencies have become actively involved in the planning, management, and financing of passenger transportation services. To examine some of the issues being faced by these agencies, the Transportation Research Board sponsored a conference in the summer of 1980 that brought together a diverse group of transportation professionals who were concerned with some aspect of the emerging roles being played by state and regional agencies. Two conference sessions were devoted specifically to the potential contribution of universities in supporting the needs of these agencies. The first session, Transportation Education and Training Needs, focused on the role that universities play in providing the educational and training opportunities for existing and future transportation professionals. The following participants were present: Frank Enty, Urban Mass Transportation Administration (UMTA); Harry Heiges, U.S. Department of Transportation (DOT); Chester Higgins, Massachusetts Bay Transportation Authority; Byron Lewis, Southern California Rapid Transit District (SCRTD); John Fuller, University of Iowa; Les-

ter Hoel, University of Virginia; Michael Meyer (session chairman), Massachusetts Institute of Technology; and Louis Pignataro, Polytechnic Institute of New York. The purpose of the second session, State and Regional Research Needs--The University Role, was to examine the conduct of transportation research at universities and to determine how universities could better contribute to the identification and solution of local problems. The participants were Thomas Larson, Pennsylvania Department of Transportation; Louis Pignataro, Polytechnic Institute of New York; Robert Ravera, Transportation Systems Center; Sandra Rosenbloom, University of Texas at Austin; Arthur Saltzman, North Carolina Agricultural and Technical State University; and Robert Paaswell (session chairman), State University of New York at Buffalo. The purpose of this paper is to summarize the results of these two sessions.

TRANSPORTATION EDUCATION AND TRAINING NEEDS

The purpose of this session was to examine the role that university programs play in helping transportation agencies meet the challenges they face in the coming decade. Each panelist was asked to prepare comments based on three questions that served as the underlying themes of this session:

1. How can university programs help transit agencies meet the challenges they will face in the coming years?
2. What experience have you had that illustrates this type of interaction?
3. What are some of the problems that will be faced by universities and transit agencies in developing joint-action programs?

Because the presentation of each panelist followed the outline suggested by these questions, this session summary will follow a similar format.

Role of Universities

Several panelists began their discussion of this topic by asking what the challenges are that face the transit industry in this decade and who has defined them. Although the challenges will surely include a declining funding base and a need to gain increasing public acceptance of transit service, several panelists from the transit industry suggested that the most serious challenge is the lack of skilled managers. According to one transit official, because of their age (middle to late 50s), transit managers will need replacement in great numbers, which will make the next five years critical for the industry. Key staff persons lost through death, early or normal retirement, or other reasons will accelerate the rate at which management personnel must be replaced. Some replacements will be new to the industry, straight from college. Others will come from the ranks. The first group will have to learn the transit-specific job-related skills needed to supplement their academic preparation, whereas the second group will have to acquire needed skills in management, administration, and finance. It appears that greater use of short, intensive continuing-education courses that contain transit-specific material and are taught (at least in part) by transit personnel who have such expertise would be the best way to transmit the needed skills to both groups.

It was pointed out by one university representative that the universities will also be facing challenges in the next 10 years, some of which are already demanding attention. Specifically, many university transportation programs are facing a large influx of foreign students, which creates administrative problems as well as serious concern about curriculum offerings. Other challenges include the difficulties of incorporating a management emphasis in technically oriented education programs and of encouraging more women to enter the transportation field.

The panelists suggested several ways in which universities could help transportation agencies in the future. Five areas of involvement were identified in which opportunities are available for important contributions by university transportation programs:

1. Policymaking: Through its research program and publications the university provides a forum for influencing public policy regarding public transportation. In most cases, the university is the only place at which basic research on transportation policy is being conducted. Also, the university serves as a natural meeting ground for the analysis and discussion of public policy issues.
2. Formal education and training: The university can develop new curricula (or courses), new degree programs, or both in response to perceived needs for personnel. The major purpose of a university transportation program is educating future transportation professionals, and the university should thus be sensitive to the needs of the industry. Closer interaction between transit officials and educators is needed.
3. Continuing education: The university can provide courses and programs scheduled or arranged to meet the needs and orientation of industry personnel. UMTA Section 10 grants for management development have made it possible for many industry personnel to attend such programs. These continuing-education programs should be designed to help all management levels of the industry.
4. Special training programs: Universities have unique resources for providing training programs in response to industry and university perceptions of need. Seminars and workshops can be used to provide special training needed for mid-level and upper-level management personnel, and university faculty can also participate in establishing training programs at all organizational levels.
5. Technical assistance: University programs through research or faculty consulting can provide services, resources, or both to address specific transportation problems. Student projects often serve as a good way to provide this assistance and also serve as an educational opportunity for the student.

As can be seen from this list, there are several areas in which universities could have an important impact on transportation agencies and their employees. As pointed out by one university panelist, however, the primary objective of graduate programs in transportation education is to prepare broadly educated and well-trained students to deal with the complex problems of transportation in future urban and rural areas. The student's educational experience should prepare him or her to become an effective decision maker without the need for a vast amount of experience upon which to base the decisions. It is in this area of education that the university's greatest impact will be felt.

Recent Experiences in Interaction Between the Industry and the University

Several examples of university programs that have undertaken activities in the areas listed above were given by the panelists. The most interesting one as

it related to interaction between a transit agency and a university was a program developed between SCRTD and local universities. Several local universities provide ongoing programs for SCRTD personnel; these include the following:

1. California State University at Los Angeles is teaching advanced computer programming for district personnel only.
2. Each of SCRTD's top-level and mid-level managers (approximately 100) has a profile of training needs; universities provide the classes to meet many of these needs by means of short courses and seminars.
3. Employees who participate in two tuition-reimbursement programs attend at least four different universities or university systems on 10 different campuses.
4. University faculty are often used as consultants to conduct in-house programs on such topics as conflict management and technical writing.

Perhaps most interesting, however, is an SCRTD program with the University of Southern California (USC) to provide a regional transit training center for the western United States. The purpose of this center was to find a way to train new and newly promoted employees economically, to share knowledge among transit properties, to ensure that all training is transit specific, to combine both the practical and the theoretical needs of transit properties, to provide continuous training in commonly needed subjects, and to provide one-time training in special subjects as needed. The role of USC in this center was to develop a curriculum, conduct some training activities, and evaluate these training efforts.

Five programs were developed for the first year's effort: training of operations supervisors, selection and promotion of personnel, organizational analysis, mid-level management training, and an executive institute. SCRTD officials involved the university in the program because it was best suited to incorporate new managerial and technical concepts into the curriculum and because professors were important contributors in deciding how the training should be conducted and evaluated.

The SCRTD-USC program is one example of how universities can become involved with local transit agencies. However, as stated by several panelists, there are often many problems that must be overcome to develop such cooperative programs.

Problems in Developing Joint-Action Programs

One of the most chronic problems in agency-university cooperative actions is the lack of communication between the academic community and the transit industry. One transit agency panelist complained that too many university offerings are irrelevant to the needs of the industry and the result of little effort on the part of universities to find out what these needs are. It was felt that colleges and universities could work toward becoming more responsive to the needs of the transit industry in several ways. They could survey the transit properties. They could and should continually revise and update their course offerings to reflect the quickly changing situation with regard to transportation. And they should ask more personnel from the transit industry to become guest lecturers. There are many such potential guest lecturers in both transit agencies and UMTA and the American Public Transit Association to fill such roles in transit-specific programs.

From the university perspective, there are several difficulties caused by recent enrollment trends and by the structure of disciplinary fields within the university organization. A major problem that faces engineering and science programs in general is a national trend toward a declining graduate enrollment. Specifically in the transportation area, the evolving impact on the graduate programs is that

1. Total enrollments in transportation programs have leveled off and are declining,
2. A greater percentage of students in transportation programs are from foreign countries, and
3. A greater percentage of students in transportation programs do not have technical backgrounds.

This enrollment problem is one that will greatly affect the industry in the middle and late 1980s. In addition, however, solution of many of the problems that face transportation agencies requires a multidisciplinary approach, and many university departments are unwilling to conduct such efforts. Many disciplines do not recognize the need for interaction, others cannot communicate with each other, and few understand each other's concerns. These are serious obstacles to an effective university contribution to the solution of the problems of the transit industry.

In summary, this panel session identified a set of opportunities for closer interaction between universities and the transit industry. In some cases, interesting and productive programs have already been established. However, the universities will be facing serious challenges in this decade, as will the transit industry; both groups need to recognize that one can help the other face these challenges. The most important task in the short term is to open a dialogue between the two groups that will, it is hoped, lead to effective joint-action programs.

STATE AND REGIONAL RESEARCH NEEDS--THE UNIVERSITY ROLE

The purpose of this session was to conduct a dialogue between those in federal, state, and local agencies and those in universities concerning the conduct of transportation research at universities. The panelists were asked a number of questions about both the conduct and the management of research. These questions included the following:

1. Can university research programs respond to transportation needs as defined by departments of transportation (DOTs) at every level (federal, local, and state)?
2. How can universities organize to respond to such research needs?
3. How can universities respond to local needs?
4. How can state and local governments take advantage of university capabilities?

Because many of these questions are interrelated, the panelists did not respond to each one but instead addressed the more-general aspects of transportation research at universities in the context of these questions. The more-salient points are summarized below.

Long-Term Versus Short-Term Research

The distinction between long-term and short-term research is one that must be made. Long-term research is critically needed to gain a better understanding of the development of transportation needs at future horizons of more than five years. However, much of the research being undertaken today by various DOTs is of short term and very strongly de-

cision oriented. Efforts at meeting state and local needs are directed at finding solutions to daily crises; long-term needs are rarely considered. The research requested is very applied and may have no great impact on the evolution of long-term problems. State and local agencies often do not have funds to establish any but the most basic research programs--those that provide quick answers to immediate problems. Research per se is of low priority at state and local levels. The emphasis on long-range problems does not take advantage of some of the unique aspects of the organization of universities. These include continuity of staff and the ability to put together unique research teams to examine complex problems over a period of time.

Need for Diversity

In addition to the time scale of research, there is need for greater diversity in the transportation problems on which universities work. This diversity must cut across the various modal issues, transmodal issues, and overall transportation policy. There should be more-widespread input to the origin of problems that universities address. In particular, the Research and Special Programs Administration (RSPA) program of the Office of University Research of DOT was perceived as being too narrow, the problems too focused. Although it is the intent of DOT to have these problems addressed in a somewhat more-general way, it is the perceptions of university researchers and their responses to these perceptions that create the general impression of narrowness of the program. It was noted that there is no longer a plan for university-originated research topics within the two categorical research programs (UMTA and RSPA). This was believed to limit the definition of problems that DOT would address and to limit the diversity of responses possible from universities.

Lack of Clarity in Federal Needs

Coupled with the above decision, it was noted by both DOT personnel and university representatives that there is a lack of clarity in federal research needs. There is little continuity, for example, from one year to the next in the RSPA solicitation. This reflects changes of priorities within DOT and makes it difficult for universities to put in place research teams capable of dealing with complex problems over long periods of time.

Continuity

To sustain a research effort, there must be assurances of continuity within a university. Thus, DOT programs should be organized to allow some continuity of funding and support on more than a yearly basis. One method of organization for such support could be transportation centers or programs. UMTA now has program support at universities, but the level of funding from UMTA programs is low, which limits the extent and scope of such programs. Through such programs, universities can organize themselves to allow for spells of low funding for research. These programs could also have specific themes at various institutions, if one assumes that there is diversity of effort and long-term approaches to research. Programmatic research would also put more pressure on universities to conduct multidisciplinary work and to remove more traditional department barriers.

Uniqueness of Universities

Universities are unique. They are not like consulting firms or federal agencies. The main objective of universities is the advancement of the state of knowledge. Universities also have a responsibility to train and educate persons in special areas by using both the philosophical and the programmatic foundations of knowledge in these areas. In this context, research has a special role within universities.

The academic staff has a degree of independence and unique and diverse views that are necessary in both the conduct and the questioning of research. Universities can often do work for agencies that may be too controversial for consultants or work on projects that need an out-of-house viewpoint. Because of the breadth of skills present at a university and the high level of knowledge represented in each of these skills, unusual or multidisciplinary teams can be used on these research problems. The uniqueness of universities is also represented by students. Federal, state, and local agencies want to hire the best talent available. In addition to the technical, in-class training, students benefit from working on problems similar to those they will address as practicing professionals. Further, the connections the students make between their class theory and the pragmatism of problem solving will increase their value to future employers. This latter concept cannot be emphasized enough. Research programs must be supported at universities to ensure the integration of the formal academic training of undergraduate and graduate students with the problem-solving skills needed by the transportation professional.

Training of Minorities

There exist a number of institutions for minorities that have institutional handicaps that make addressing transportation research problems a difficult task. There are federal commitments, some programs for schools for minorities, and some dollars set aside, but these are not enough to overcome the difficulties faced by these universities. Reduced federal research budgets will make it difficult to extend research at all universities and in particular at institutions for minorities.

In summary, a number of major issues were raised at this session. The most significant concerned the lack of a long-range research focus by DOT and the emphasis on solutions to current crisis problems (most often applied rather than innovative solutions) at the state and local levels. Universities, through their composition and organization, have unique contributions to make, and it was concluded that the dialogue must continue to ensure a better integration of university capabilities into the DOT research agenda.