



Transportation Education— Meeting the Challenge

First, the problem: the biggest challenge in surface transportation is the rebuilding of our infrastructure and its expansion to serve future growth. We must produce a new generation of professionals to replace the postwar generation that is retiring—professionals equipped to design and manage the rebuilding. Another dimension of the problem is that the requirements for future professionals, and the environment in which they work, will be different, making it difficult to know which education and training programs are best. The problem is sorely aggravated by two other important aspects: the shortage of funds for research and the relatively small and diverse scale of education for the transportation industry.

No wonder this conference is timely and needed: we are looking at an industry on the threshold of its biggest days, shaped by new technology and unfamiliar forces, staffed by a mix of near-retirees and relatively untrained and inexperienced successors, and supported by a university base desperately short of money and often out of touch with the industry. Given this characterization, we

might wonder whether we are courageous enough, or foolish enough, to stay and discuss meeting the transportation education challenge. Or shall we pack it in right now?

I urge you to face the challenge squarely—and offer you some encouragement in the knowledge that outside the transportation industry we are not alone. Let me quickly remind you of some developments outside the transportation industry that serve to illuminate our problems and show us that other sectors have similar difficulties.

In education, we have been told again and again in a barrage of studies that our public schools badly need reform. A “rising tide of mediocrity” threatens our republic, “a place called school” is boring, untrained and poorly paid teachers populate our classrooms, large numbers of “at risk” children have no preschool or kindergarten experience, 25 percent of high school age children drop out and do not graduate from high school, and reform and renewal are hard to achieve in such a large, diverse, decentralized, and fragmented industry.

A new report informs us that quality

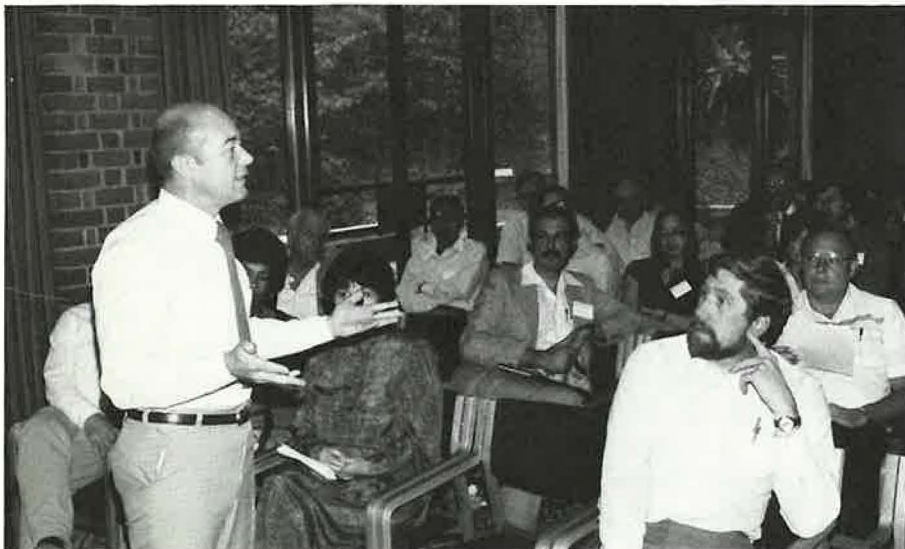
in our colleges and universities is slipping badly. Graduate examination scores have declined over the past two decades, especially in subjects requiring high verbal skills; students are majoring in increasingly narrow specialties; faculty are not paid well and have lost space, equipment, and staff; and the physical plant is deteriorating.

Another study indicates a trend that has application for the transportation industry: university presidents are quitting after relatively short terms and are more difficult to replace. The common problem seems to be growing responsibility without any commensurate increase, or perhaps even a decrease, in authority. Clark Kerr headed a commission for the Association of Governing Boards of Universities and Colleges that uncovered a long litany of woe, reported that average tenure for a president has declined from 11 years in 1960 to 7 years today (which is still higher than that for urban transit general managers), and found that half of the number 2 and 3 people do not want the top job.

Many of you are affiliated with universities and colleges, and may have



Top left: Michael D. Meyer, of the Massachusetts Department of Public Works and chairman of the Conference on Surface Transportation Education and Training, opens the meeting by outlining the objectives of the conference. *Above:* Among those listening to Meyer's charge to the conferees are: *first row, right to left,* Thomas D. Larson, Pennsylvania Department of Transportation; Lester A. Hoel, University of Virginia; and Phillip Hughes, Urban Mass Transportation Administration; *second row, right to left,* Arne L. Gausmann, Wisconsin Department of Transportation; Bruce Wilson, Broward County, Florida; and William Hyman, TRB staff. *Left:* Dave Cyra (left), University of Wisconsin at Milwaukee, confers with Roger L. Dean, Federal Highway Administration, on issues related to transportation training and continuing education. *Below:* Cyra leads the discussion of his paper "Transportation Technical Training and Continuing Education."



opinions about these trends and how they affect our industry. Certainly, they paint a gloomy picture in my mind. Recently, a friend involved in the search for a major transit general manager remarked to me: "There's not much seasoned talent out there. . . ." When I quote a recent newspaper article that "there is really a terrific shortage of talent for serious jobs," you might think it is referring to transportation; but the field being described is retailing. The article continues: "We're beginning to see another round of movement at the top in retailing with significant earnings being offered." The movement is a source of concern—but at least retailing offers significant earnings!

Let us look at our environment. Professor Beimborn reminds us that it is only 16 years to the 21st century. College freshmen today will spend most of their working life in the first third of that new era. Before we try to picture what our industry will be like, and what education and training will be needed, I invite you to look back 16 years to the year 1968.

Most of us here can remember the primary characteristics of the transportation industry environment:

- Engineers were in their heyday;
- The Interstate system was under full-scale construction except in cities where the "freeway revolt" had occurred;

- Transit was still almost entirely provided by private companies and the few public agencies were monopolies;

- BART had not opened;

- Conrail and AMTRAK did not exist;

- UMTA was created in July 1968 but offered only a small capital, planning, and research budget;

- Only a few transportation centers or education programs were in existence;

- The emphasis was on new construction and expansion;

- Transportation decisions were still largely private and, with a few exceptions, were not yet the subject of much political, public, and media attention;

- Surface transportation was heavily regulated at the state and federal levels;

- Environmental impact assessment was not even a gleam in the Sierra Club's eye;

- The energy crisis had not occurred (gasoline sold at 35 cents a gallon!); and

- The computer was not a household word; its use was just beginning in the public sector.

Stop and think a moment: just 16 years ago we were precomputer, pre-energy crisis, pre-EIS, virtually pre-UMTA, pre-public transit management. In fact, looking back, we were "pre-worry" compared to life as we know it now! These and other changes have transformed the transportation industry (not to mention social changes such as civil rights, the women's movement, the desire for personal growth, the increase in single-parent families, and other changes).

In 1968 the professionals who dominated the transportation industry had the same skills, professional training, and often the same orientation as their immediate predecessors. The traditional academic disciplines, especially engineering, predominated. Few people

transferred in at high levels of highway agencies or transit companies. Transit companies relied heavily on veterans who came up through the ranks of operations and maintenance, and on finance people who had to cut costs and try to find a profit.

What are some of the trends or forces or environmental determinants shaping the industry today? What kind of world will it be 16 years from now—or in 36 years? What changes are coming, which we cannot possibly foresee, of the magnitude of those that have transformed our industry since 1968?

I cannot answer all these questions. What I can offer are some trends already visible that continue to alter and transform the nature of our business. One is the computer, once applied primarily to financial transactions but now useful for transit scheduling, parts inventories, computer-aided design, quick communications permitting decentralized control, and many other applications. Others here can flesh out the potential of the computer better than I.

Another industry-shaper is maintenance. It is now vividly clear that our preoccupation with new construction and technology resulted in expensive neglect of existing assets. It is also clear

that we cannot afford such neglect any more. Maintenance of roads, trackbeds, parts, vehicles—even maintenance of our human assets, but that comes later—is vital to a healthy transportation industry. Strengthening the importance of maintenance and training people to be leaders in maintenance are desperately needed.

A third trend is conservation—of energy, of natural resources, of money, of people. This is an era of fiscal constraint; we must be smarter and tighter about spending the public's money. It is also the era of energy and resource constraint; we know we simply cannot squander our natural resources in the future as we have in the past. This means that there is a growing emphasis on businesslike practices, emphasizing cost and budget. Choices will be even tougher in the future.

Another continuing trend is the increasing public exposure of transportation issues. We know this will continue because these issues and decisions are important to society. Citizens care where a road will go, what it looks like, and how much noise it produces, and they have been given legal means to intervene. Members of Congress earmark UMTA capital grants rather than allow-

Joyce Johnson, North Carolina A&T, leads the discussion of the issues related to transportation careers for minorities during the Williamsburg conference.



ing UMTA to make the decisions because transit investments make a difference to communities. Boards of directors and state legislators intervene significantly in what used to be management issues, partly because we have not helped them govern by policy and because budget, personnel, maintenance, and project control are all matters of concern to voters. In addition, policy board members understandably are not willing to leave such important matters entirely to the staff.

Finally, our industry is being shaped today and will be shaped tomorrow by a growing appreciation for the value of human resource development. This trend is apparent in at least two forms: First, the transportation profession is becoming increasingly diversified. Our earlier reliance on engineering and operations has expanded to embrace a variety of new disciplines; and within each discipline the "basic" curriculum is being broadened, as engineers learn to manage and administrators are forced to acquire sophisticated quantitative skills.

A second form of expression of the human resources movement is the growing recognition of individual needs. People are far less willing to do routine, boring work day after day. They want recognition, they want variety, they want responsibility, they want opportunities for growth—on the assembly line, in the bureaucracy, and in the field. And they will not work for employers who do not or cannot offer these things.

Perhaps you can think of other determinants, but even my short list is significant. What my list omits is any transforming change in transportation itself. I guess I do not see this happening—the kind of change marked by the automobile and the airplane earlier in this century. Our transportation world will, I think, continue to rely heavily on the private automobile, and the bus and the rail car and the jet plane in varying combinations. Television and the computer may reduce the need for movement, but delivering goods and moving people safely in an increasingly densely popu-

lated and economically interdependent world will make heavy demands on us.

What kind of professional do we want? What kind do we need? What skills, education, abilities, and attitudes are we looking for?

Our industry has been marked by change, and the next few decades will surely bring more changes in transportation patterns, technologies, and governance.

This points to several characteristics of our ideal employee profile. Equipped by education and temperament to deal with change, the transportation professional must be flexible and adaptable to different kinds of work settings and instruments. This contrasts with employees in the past who have sought the routine, who have been rigid and inflexible, who have been scared by change. I fear that they have not served our industry well. I also fear that we—public and private employers and universities—may have failed them by not re-educating them or helping them adapt.

Our ideal employee will come from many different academic backgrounds, not just engineering or accounting or

operations. Given the broad, decentralized nature of this industry, and the evident opportunities for travel and job mobility, a variety of disciplines are relevant and can help. Above all, though, a solid grounding in the arts and sciences as an undergraduate seems essential. This can provide an understanding of our more technical disciplines, demands good communication skills, and offers a base for continuing education. At the graduate level, education in engineering and planning will continue to be valuable. But so will degrees in the social sciences, business and public administration, and computer science.

For men and women who seek to be senior professionals, there is no substitute for knowing their subject matter. It may be in planning, project management, procurement, law, accounting, or personnel. Those who want to be managers, especially top managers, must also have a solid base in a professional field. In addition, they must understand what it takes to manage large-scale systems, to succeed in the ambiguous world of politics, and especially to be able to make decisions involving the al-

Kevin Heanue (*left*), Federal Highway Administration, discusses education for transportation planners in the workshop on Transportation Planners and Demand by Government Agencies and Their Consultants. Also shown (*left to right*) are Christina Steinman, National Association of Regional Councils; Katie G. Dorsett, North Carolina A&T State University; William Hyman, TRB staff; and Louis F. Cohn, Vanderbilt University.



location of limited resources. Above all, they must be leaders, keen at evaluating people and capable of motivating subordinates.

When I say keen at evaluating people and capable of motivating subordinates, I am referring to the most important dimension of a top manager's job: understanding the way people work and behave in organizations and how organizations affect individuals. Only when a manager grasps this can that manager begin to shape and change the organizational culture. The effective manager must learn to think in new ways and to lead subordinates to think in new ways in order to improve an organization's performance rather than accept and continue in the accustomed organizational patterns and results.

Our ideal employee must also develop a willingness to take responsibility. By this I mean both the ability to take the initiative and the courage to be accountable. Organizations run from the bottom up, and the transportation industry especially will not succeed if our employees in the future sit around waiting to be told what to do.

In addition, an essential part of our ideal employee's profile must be the ability to learn. Transportation professionals must have an eagerness, a curiosity, a willingness, and attitude open to learning. They must be aware that their formal education has a half-life of 10 years or less. They must realize that renewal is necessary. They must appreciate the value of teamwork with co-workers. They must recognize the importance of such fundamentals as personal health and integrity.

Now, with these broad strokes about the employee of the future, what can be said about preparing the transportation professional? What is it we need from our colleges and universities? What contribution can transportation centers make?

Here, I am on thin ice—even thinner than before, given this audience of experts! But, having come this far, let me sketch the profile of the ideal university program.

Some of the deficiencies I mentioned previously have to be corrected. The transportation industry will not excel if its professionals are not properly trained in written and verbal communication skills. I know this sounds simplistic, but I do not think that it can be overemphasized. As an employer, I tried to hire only people who could write concisely, clearly, and correctly, and who could stand up and make a logical presentation.

Universities will also need to correct what seems to be a narrowing of the curriculum and to resist the students' desire to specialize too soon. Young people have the next 50 years of their life in which to specialize!

Research is needed, badly needed. Part of it should be basic, and much of it must be applied. Applied research must be relevant to employers' needs, to the real problems of the transportation industry. Most of us know that this is not always the case. But we also know that it makes little sense for UMTA to spend one-third less on university research today than in 1970! Or that we spend a paltry \$70 million a year on highway research nationwide! What does make sense is the apparent new consensus in the highway program on research priorities, forged by the strategic transportation research study led by the Transportation Research Board and assisted by AASHTO's Select Committee on Research. We need such an effort in all of our surface transportation programs.

Continuing education in a variety of places and forms is an essential requirement of our ideal university. It must update professionals; it must offer retraining for those wishing to change specialties; it must refresh and renew worn-out managers; it must broaden and heighten the perspectives of public and private employees alike. It can especially serve to encourage new forms of public-private collaboration.

Universities must also recognize that they do not "provide" an education; at best, they should seek to teach students how to learn. Faculties become not

merely instructors but "facilitators of learning," to use Tom Larson's phrase. Students need to know not only how to acquire more knowledge, but how to evaluate what they do know, and how to apply it. They must also learn values that they can rely on, as well as what they need for personal growth and renewal.

Universities also need to find new ways to assist managers in understanding how people work and behave in organizations, and how to change organizational cultures. A great deal of theory and some case studies have been provided by political science, business and public administration schools, and other departments. But managers need more than theory—they need help! They need to learn how to apply knowledge in a specific context. Perhaps this is a role that transportation centers can usefully play. To do so, however, they must get off the campus and inside the transportation department or authority. They must learn first-hand the bureaucratic dynamics and they must experience the organization "system" in order to be helpful. Only then will they be in a strong position to help the manager lead his organization toward new levels of performance.

Finally, it seems to me that our university programs must emphasize the importance of human resources. Employers must also do so. The best companies—"in search of excellence"—know that their success depends on the quality of their employees. This point is so obvious I hesitate to talk about it. But, in fact, I think our universities have neglected their first responsibility—not merely to educate and train transportation professionals and managers, but to help the industry realize how absolutely critical our human resources are. For all the change that has occurred, and will occur, I suggest that the nurturing of our human resources is an enduring requirement. It, above all, is the key to excellence.

Let me add a note of concern—that we must find ways to restore the public service ethic. It is not a matter of

"personnel management," but of preserving the honored tradition of civil service. Even if some of our politicians are losing sight of this, I hope our universities do not.

Let me close with a few quick thoughts. First, the crisis or opportunity facing this industry holds the promise of a new era of cooperation and collaboration between universities and employers. Many signs of this already exist. But our common plight suggests that education and industry both can reap great benefits by new and more flexible forms of interaction: research programs, training grants, internships, job rotations, and other mechanisms.

Second, the transit program clearly needs a strategic research study that will harness the best educators and administrators in a hard-headed look at current and future research needs. Instead of intramural squabbles among TRB, APTA, UMTA, and the universities, we need to sit down in an orderly way to look at what is going on and what is required—and then make it happen.

Last, let me suggest a different kind of study, one that might be called a human resources strategic plan. It would start with the deliberations of this conference, and involve academic, private, and public people. It would profile in far greater depth than I can the changing professional requirements of the transportation industry. It would include a special emphasis on where our future leaders are coming from, as does the Clark Kerr study of university presidents. And it would help colleges and universities understand how better to help future transportation officials acquire the education and training they need.

I started on a discouraging note. The challenges appear enormous. But we have a pretty good record over the past several decades, and by meeting here we can certainly define the problem and, hopefully, set an agenda. We know that we have our work cut out for us. There may be no more important subject in surface transportation. Let's go to it!



Above: A press conference to announce the publication of *TRB Special Report 204-55: A Decade of Experience*, was held in November 1984. Dr. Alan A. Altshuler (center), Dean of the Graduate School of Public Administration, New York University, and Chairman of the Committee for the Study of the Benefits and Costs of the 55 mph National Maximum Speed Limit, explained the charge to the committee as mandated by the Surface Transportation Assistance Act of 1982 and outlined the study findings and recommendations. Speaking at the press conference and responding to reporter questions are study committee members (left to right): Darrell V. Manning, Director of Idaho Department of Transportation; Altshuler; and Joseph M. Clapp, Senior Vice President, Roadway Express, Inc., and 1984 Chairman of the TRB Executive Committee. *Below:* At another briefing open to the public, Thomas B. Deen, TRB Executive Director, introduces Clapp, Altshuler, and Manning, who presented the results and recommendations of the study, followed by a question-and-answer session. *Facing page:* More than 75 members of the press from this country and abroad attended the briefing held in November at the National Academy of Sciences building in Washington, D.C. *Facing page (inset):* The full report of the Study on the Benefits and Costs of the 55 mph National Maximum Speed Limit, *TRB Special Report 204-55: A Decade of Experience*, is available from the Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418; telephone 202-334-3218 (price \$14.00).

