

Transportation Education and Meeting the Challenge

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This conference convenes at a critical time for the surface transportation industry. A series of factors are converging to shape what could be a looming crisis for universities and employers alike, or an opportunity of equally great potential.

The convening of this conference, bringing together transportation officials and practitioners, consultants, and educators in the first serious look at the dimensions and ramifications of the subject, may itself be one small but significant step toward seizing the opportunity. John Gardner reminds us that great opportunities come disguised as insoluble problems, and the familiar Chinese proverb states, "A journey of a thousand miles begins with a single step." This conference can constitute that beginning step.

Tonight I want to set the stage for the deliberations of this conference by describing the environment of the recent past and contrasting it with the environment of the near future. I will also try to characterize the kind of transportation professional, and the kind of transportation education, that will be needed in the future. Finally, I will suggest a modest proposal for future research and action.

First, the problem: the biggest challenge in surface transportation is the rebuilding of our infrastructure and its expansion to serve future growth. We must also produce a new generation of professionals to replace the post-war generation that is retiring--professionals equipped to design and manage the rebuilding. A third dimension of the problem is that the requirements for the future professional, the environment in which he or she works, will be different in the future, making it hard to determine which education and training programs are best. The problem is sorely aggravated by two other important facets: 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, 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.

I urge you to face the challenge squarely--and I 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 repeatedly 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; 25 percent of high school age children drop out and do not graduate from high school; and reform and renewal are extremely hard to achieve in such a large, diverse, decentralized and fragmented industry.

Now a new report informs us that quality in our colleges and universities is slipping badly. Graduate record exam scores have declined over the past two decades, especially in subjects that require high verbal skills; students are majoring in increasingly narrow specialities; faculty are not paid well and have lost space, equipment, and staff; and the physical plant is deteriorating.

Another study informs us, in words that fit the transportation industry, that university presidents are quitting faster and are harder to replace. The common problem appears to be growing responsibility without any commensurate increase, perhaps even decreases, in authority. Clark Kerr headed a commission for the Association of Governing Boards of Universities and Colleges that reported that average tenure for a university president has declined from 11 years in 1960 to 7 years today (that is still higher than urban transit general managers). The commission found that one-half of the number 2 and number 3 people do not want the top job.

Many of you are affiliated with universities and colleges and may have opinions about these trends as well as how they affect the transportation industry. Certainly, they paint a gloomy picture in my mind. Recently, a friend involved in the search for a major transit general manager post remarked to me: "There's not much seasoned talent out there. . . ." When I quote a recent newspaper article stating "there is really a terrific shortage of talent for serious jobs," you might think it related 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.

In the paper, "Transportation Education--University Degree Programs," elsewhere in this report, Beimborn reminds us that it is only 16 years to the 21st century. College freshmen today in the class of 1988 will spend most of their working lives in the first third of that new era. Before we try to imagine what the transportation 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 in this room 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;
- Bay Area Rapid Transit (BART) had not opened;
- Conrail and Amtrak did not exist;
- The Urban Mass Transportation Administration (UMTA) was created in July 1968 but offered only a small capital, planning, and research budget;
- There were but a few transportation centers or education programs;
- The emphasis was on new construction and expansion;

- * Transportation decisions were still largely private and were not yet the subject of much political, public, and media attention, with few exceptions;
- * Surface transportation was heavily regulated at the state and federal levels;
- * The environmental impact assessment (EIS) was not even a gleam in the Sierra Club's eye;
- * The energy crisis simply had not occurred; gasoline sold at 35 cents a gallon; and
- * The computer was hardly a household word, and its use was just beginning in the public sector.

Stop and think for a moment--just 16 years ago we were pre-computer, 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. And I have not even mentioned social changes such as the civil rights movement, the women's movement, the desire for personal growth, more single-parent families, and other changes.

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 into highway agencies or transit companies at high levels. Transit companies relied heavily on veterans who came up through the ranks of operations and maintenance, plus 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 36 years from now? What changes are coming, that we cannot possibly foresee, of the magnitude of those that have transformed our industry since 1968?

I cannot answer those questions. What I can offer are a few factors already visible that continue to alter and transform the nature of the transportation industry. One is the computer--once applied primarily to financial transactions, but now useful for transit scheduling, for parts inventories, for computer-aided design, for quick communication permitting decentralized control, and for many, many other applications.

Another industry-shaper is maintenance. It is now vividly clear that preoccupation with new construction and technology resulted in expensive neglect of existing assets. It is also clear that we can no longer afford such neglect. Maintenance of roads, trackbeds, parts, vehicles--even maintenance of human assets--is vital to a healthy transportation industry. Making maintenance important and training people who can be leaders in maintenance are desperately needed.

A third trend is conservation of energy, natural resources, money, and people. This is the 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 we have a growing emphasis on business-like practices emphasizing cost and budget. Choices will be even tougher in the future.

Another continuing trend is increasing public exposure of transportation issues. We know it will continue because these issues and decisions are important to society. Citizens care where the road will be built and 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 instead of allowing UMTA to decide them because transit investments make a difference to communities. Boards of directors and state legislators intervene deeply into what used to be management issues, partly because we have not helped them govern by policy, but also because budget, personnel, maintenance, and project control all matter to voters. And policy board members are understandably unwilling to leave such important matters entirely to the staff.

Finally, the transportation industry is being shaped today and tomorrow by a growing appreciation for the value of human resource development. This takes at least two forms: first, the transportation profession is becoming increasingly diversified. 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, variety, responsibility, and 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 such opportunities.

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 do not foresee the kind of change marked by the automobile and the airplane earlier in this century occurring. Our transportation world will, I believe, continue to rely heavily on the private automobile, the bus, the rail car, and the jet airplane in varying combinations, or roadways, to transport us. Television and the computer may reduce the need for movement. But delivering goods and moving people safely in an increasingly densely populated and economically interdependent world will make heavy demands on us.

What kind of professional do we want? What skills, education, abilities, and attitudes are we looking for? The transportation 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 facets of our ideal employee profile: he or she must be equipped by education and temperament to deal with change. He or she 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 frightened by change. I do not believe that they have served the industry well. I believe that we, employers, universities, faculties, and bosses, may have failed them by not reeducating them or helping them adapt.

The 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 appears to be essential. It can provide an understanding of the more technical disciplines; it demands good communication skills, and it 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 them 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 that involve the allocation 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 understanding how organizations affect individuals. Only if a manager can grasp this can he or she begin to shape and change the organizational culture. The effective manager must learn to think in new ways, to lead his or her subordinates to think in new ways, and to improve an organization's performance rather than accept and continue in the accustomed organizational patterns and results.

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

In addition, an essential part of the ideal employee's profile must be the ability to learn. He or she must have an eagerness, a curiosity, a willingness, and an attitude open to learning. He or she must know that a formal education has a half-life of 10 years or less. He or she must know that renewal is necessary. He or she must appreciate the value of teamwork with coworkers. He or she must know the importance of fundamentals such as personal health and integrity.

Now, with these broad strokes about the employee of the future, what can be said about preparing him or her? 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, especially given this audience of experts. But, having come this far, allow me to sketch the profile of the ideal university program.

Some of those deficiencies I mentioned earlier must be corrected. The transportation industry will not excel if its professionals do poorly and are not properly trained in written and verbal communication. I know this sounds simplistic--but I do not believe it can be overemphasized. As an employer, I have tried to hire only people who can write concisely, clearly, and correctly, and who can make a logical presentation.

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

Research is 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 it did in 1970. Or to 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 (1) led by TRB 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 the ideal university. It must update professionals, it must offer retraining for those who want to change specialities, it must refresh and renew worn-out managers, and it must broaden and heighten the perspectives of public and private employees alike. It can especially serve to encourage new forms of public and private collaboration.

Universities must also recognize that they do not "provide" an education; at best, they should seek to teach students how to learn. Faculty become not merely instructors but "facilitators of learning," to use Thomas 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 in 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. If they wish to play such a role, however, they must leave the campus and go 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 appears that our university programs must emphasize the importance of human resources. Employers must do the same. The best companies--"in search of excellence"--know their success depends on the quality of their employees. This point is so obvious I hesitate to talk about it. But I believe our universities have neglected their first responsibility, not merely to educate and train transportation professionals and managers, but especially to help the industry know 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.

A few quick thoughts in closing. First, the crisis or opportunity facing the transportation 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 can both 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.

Third, 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, similar to the Clark Kerr study of university presidents. And it would help colleges and universities understand how better to help young men and women acquire the education and training they need.

I began 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 set an agenda. We know we have our work cut out for us. There may be no other subject in surface transportation that is more important.

REFERENCE

1. America's Highways: Accelerating the Search for Innovation. Special Report 202. TRB, National Research Council, Washington, D.C., 1984.