

Supplying Transportation Education

SUMMARY OF PAPERS

Lester A. Hoel

Today my task is to summarize six papers on the topic "Demand for Transportation Education." Each paper is summarized separately. The authors and their topics are as follows:

- Transportation Education--University Degree Programs, Edward Beimborn
- Transportation Education: Technical Training and Continuing Education, David Cyra
- Efficient Utilization of Transportation Research and Educational Resources, William E. Spreitzer
- Transportation Research and Its Link to Education, Robert E. Paaswell
- Education and Training Needs of Women in Transportation, Lillian C. Liburdi
- Transportation Careers for Minorities, Katie Dorsett and Julian Benjamin

TRANSPORTATION EDUCATION: UNIVERSITY DEGREE PROGRAMS

Beimborn begins by stating that transportation education today can be characterized in four ways: (a) most programs are small and diverse, (b) they follow a centered approach, (c) research is the main educational technique, and (d) they function similar to a deregulated industry. There are probably no more than 25 U.S. schools with an active program, presumably graduate, although some undergraduate, in transportation and only a handful with more than five full-time faculty in transportation. The total Ph.D. output in transportation in the United States, according to Beimborn, is usually less than 10 per year. Transportation programs are also diverse; some schools have programs in traffic, planning, highway design, materials, policy analysis, and safety.

Transportation is an oddity at most universities, because it does not fit neatly into an established organization. Many schools have, therefore, created transportation centers that usually restrict their activity to research, whereas the academic programs remain in traditional departments. Centers vary in size from those with staffs of 10 or more and research budgets in the millions to simply paper organizations. Research is a tool used to educate both students and faculty in transportation. Education and research are synonymous.

Beimborn compares transportation programs to recently deregulated industries, such as airlines. There are a group of schools that have been in existence for a long time and are similar to the established carriers. A second group is similar to new entrants; some enter the market and remain, whereas others leave after a period of time.

Beimborn speculates that the newer programs are more innovative, whereas the older ones are perhaps more set in their ways.

The three major problems facing university transportation programs today are the job market, level of support, and the capability to maintain relevancy. The wide fluctuations in the job market make it difficult to run a program because there is not the continuity of demand that ensures a steady influx of students. Low salaries, compared with other professional fields, also discourage young people from entering this field. Outside support for faculty research is also uncertain.

Many transportation research programs are out of touch with the users of their product and have lost their capability to do research that is useful to the transportation industry. Beimborn believes that we need to return to the time when education and practice were closer to each other, and that we must work harder to ensure that our results are relevant and useful.

Future directions for university transportation programs include development of closer contacts with users of university research, special emphasis on continuing education, establishment of a more rational funding base, and greater emphasis on innovation and creativity.

Beimborn states that we need to revitalize our universities as the sources of new ideas and approaches to dealing with transportation problems. Our current students will spend most of their working lives in the 21st century, and we must prepare them to deal with the challenges of the future.

TRANSPORTATION EDUCATION: TECHNICAL TRAINING AND CONTINUING EDUCATION

Cyra states that continuing education and technical training are used interchangeably to refer to professional education that meets the demands of the workplace and provides skill enrichment. He notes that continuing education will be more important and relevant as the need to maintain knowledge and skills during a person's career continues.

Continuing education processes involve six elements: (a) inquiry, (b) needs assessment, (c) program development, (d) instruction, (e) work-site performance, and (f) training evaluation. Continuing education is a collaborative effort among skill builders, students, employers, and educators. There are three learning situations available and each should be included in the educational process. These are the inquiry mode, which is used where outcomes are uncertain and new ideas or procedures are being worked out; the instruction mode, which is the traditional teaching situation, dissemination of skills or knowledge with structured participation from students; and the performance mode, which occurs after the inquiry and instruction modes are applied in professional activity.

There are seven principles of adult learning that are helpful in understanding the continuing education process. Learners must want to learn. The learning environment should be comfortable. There should be mutual respect between students and instructors, and students should feel free to express themselves, to disagree, to supplement with their own experiences, ideas, and opinions. Students should perceive the goals of the learning experience as consistent with their own objectives. Program planning should involve input from the potential market in order that this input and interest be guaranteed, and the learner should actively participate in the learning process, which should make use of the experience of the learners. Finally, goals should be defined, and the learner should have a sense of progress that these goals are being achieved.

According to Cyra, continuing education in transportation is facing the challenge "to be a consummation devoutly to be wished, rather than a burden to be borne." Transportation practitioners are not clamoring for continuing education, perhaps, because of a genuine lack of interest or a failure of the academic community to address their needs. The following actions could alter this condition. Transportation professional associations should be encouraged to take increased responsibility for fostering a zest for learning among their members. Professional attitudes of pride should be encouraged among all workers. Relevance of programs should be made clear, especially those that teach nontechnical skills not traditionally associated with the job.

A systems approach should be used in structuring continuing education in transportation, and the three modes of learning should be taken into account when planning continuing education programs. Transportation professional associations should collaborate with employers and government agencies in planning and providing training. Principles of adult learning should be incorporated into program development. Lectures are not sufficient but must be supplemented with opinions and experiences of the learner that reflect confidence and trust between the teacher and the student. A continuing education professional is in the information technology transfer business and, as such, must have the ability to communicate and relate comfortably with different kinds of people.

Finally, continuing education is the responsibility of each member of the transportation community. Identification of needs and then implementation of a program must come from a natural collaboration of all segments of the transportation community.

EFFICIENT UTILIZATION OF TRANSPORTATION RESEARCH AND EDUCATIONAL RESOURCES

Spreitzer notes that transportation educators, researchers, and practitioners are concerned about the level of support for transportation. The pendulum will swing, he notes, if experience is a guide, and improved funding and the demand for trained professionals will return. In the interim, the challenge is to make creative and effective use of existing resources.

Several premises underlie this paper: the demand for trained personnel should lead the supply; fundamental conflicts exist between research objectives and applied opportunities, especially in universities; the responsibility for major support of basic research remains with the federal government; and the research community consists of high-, medium-, and low-quality personnel. The highly skilled will always have support. The least capable should be weeded out, and those in the middle face the greatest funding challenge.

Finally, Spreitzer states that griping and commiserating about the current lack of funds is simply counterproductive. Universities should become involved in consulting or contract work during times of financial shortages and declining markets for long-range research because contacts made will build exposure and credibility and could result in opportunities for basic research. Spreitzer notes that timely topics have generated financial support for research; for example, the Strategic Transportation Research Study initiated by TRB is certainly in that category.

Bootstrapping is another way to get started, and it could come from seed money grants, building block support from other contracts, or entering into new areas through professional and technical societies. Research with industry can be ex-

citing and stimulating as theories are tested in a real world environment. Consulting for state and local sponsors in established areas can lead to support for newly developing topics.

Finally, Spreitzer summarizes by stating that the present paucity of funding for transportation research is natural, temporary, and probably deserved. The elimination of less capable investigators from the transportation research field is healthy. The challenge is for deserving investigators to do what is necessary to justify the importance and value of their proposed work.

TRANSPORTATION RESEARCH AND ITS LINK TO EDUCATION

This paper deals with that aspect of transportation research that is conducted at universities and colleges. It covers the objectives, conduct of research in an academic setting, research needs and support, and the future of university research.

The objectives of transportation research and the conduct of research in an academic setting are described thoroughly. Emphasis is placed on the types of organizations that conduct research; the role of universities in conducting theoretical and applied research; the academic setting for research, which is continuity, range of disciplines, and the utilization of students; and the measures used by universities to evaluate the research product of its faculty.

Within universities, research is conducted in many ways but always with a unique product--a master's thesis or a doctoral dissertation. This is a training function that teaches the student the rigors of research, focuses him or her on a problem in immaculate detail, helps the student to develop expertise in an area, and assists the student to become a fledgling professional by making a contribution to the field through a written treatise.

Paaswell offers the following conclusions: Transportation research is an integral part of academic programs at universities and colleges. It is normally conducted by a team that consists of at least one faculty and one student, often more of both and often interdisciplinary.

Transportation research has a beneficial impact on academic programs. It provides new ideas and theories for use in formal curriculum and training for both graduate and undergraduate students in the demands of their future profession and in the methods of conducting rigorous inquiry.

Transportation research today is shifting from dealing with problems concerning the building and development of our infrastructure to problems of managing, operating, and extending its life.

Transportation research at universities should be dealing with longer term needs of the population, including the impacts of rapidly changing demographics, a shifting economy, and the growing role of computers and communication in the workplace. Academic transportation research has been influenced by short-run pragmatically stated national, state, and local needs. Academic transportation research has been responsive, and there are many examples of its contribution.

Academic research responds to its own reward structure. Promotion and tenure are often based on the quality and quantity of publications and the ability to obtain sponsored research. In recent years, the pressure to obtain sponsored research per se has begun to outweigh the academic merit of much of the research. What is lacking at traditionally strong transportation institutions is the development of new research programs and research agendas that will address longer term, innovative transportation agendas.

The problem of developing such programs comes not from a lack of interest by faculty and students, but from a lack of encouragement by the institutions themselves. Transportation research must again capture the uniqueness of inquiry that academic institutions can provide.

EDUCATION AND TRAINING NEEDS OF WOMEN IN TRANSPORTATION

The focus of this paper is whether women, as participants in the transportation industry, are achieving success comparable to male practitioners who work in this field and whether female industry practitioners have educational and training needs that differ from their male counterparts. Also, the question is raised: How many female practitioners are there and what steps should be taken to assure the attractiveness of transportation as a career for women?

The author offers the premise that the transportation industry, with its competitive pressures, must capitalize on all its resources, the most critical of which is human capital.

No major effort has been initiated to assess the skills that contribute to a successful transportation career or when technical versus managerial competence is critical to success. Also, there have been no analyses of successful male transportation managers' backgrounds that could be useful for role model and career planning purposes.

In 1970, 18 percent of the nation's workforce consisted of women in full-time positions and 11 percent in part-time positions. In 1980, 35 percent of the workforce consisted of women in full-time positions and 12 percent in part-time positions. By 1984 women comprised 45 percent of all workers.

Women surveyed by an American Public Transportation Association Task Force cited real or perceived barriers to career mobility because of their sex, stereotypical ideas and moods, negative attitudes toward women in top management positions, inability to relocate, and educational disparities. Women cited being confined to nonoperational administrative positions in personnel, marketing, and community service, which perpetuate the status quo. Women employed in transit desire more exposure to all facets of the industry, and they place great emphasis on availability of educational and career development programs.

Training courses were not listed as a significant factor in the background of these women, although 82 percent had taken training courses during their career. Experience and personal contacts were ranked highly.

Women questioned the need for academic training in transportation and whether the degree relates to job performance and success or whether the requirement is a means to discriminate. Other concerns were whether degree holders possess basic job skills, industry-specific skills, or functional skills. At the entry level, it was believed that an employer looks for basic job skills and evidence that the individual will prosper and that the industry skills and history and culture of the business are learned on the job.

Knowledge is important to success in a transportation career, but many women believed that they have been denied or deprived of opportunities to learn on the job.

Many women believed that, even with the requisite training and education, skill level and ability, they were frequently not offered the opportunity to compete because of job qualification requirements or their lack of stature in the organization.

If we value our human capital, we should examine why women appear not to be achieving success comparable to their male counterparts. Initiatives suggested are an examination of the education and career paths of transportation and non-transportation industry executives to determine factors of success. What specific educational backgrounds are likely to lead to success? How many women are in various transportation industries and what positions do they hold? Why are women underrepresented in managerial roles in transportation? What are the barriers to career development for women?

Evaluate the support structure, including mentoring and role models. What are the opportunities for promotion and growth? And determine if there are differences in the process for men and women and, if so, why? These steps should be viewed as an investment in the future and an effort not to be taken lightly but one to achieve greater growth and stability for people and businesses.

TRANSPORTATION CAREERS FOR MINORITIES

Minorities have played a major role in the development of transportation systems, both as users and as employees. They drove the carriages during slavery, built and repaired the railroads, navigated ships, invented a self-lubrication device for train steam engines and the first traffic light, made the beds, and cooked and served meals on transportation carriers.

Opportunities have been primarily at the entry or low level of the career ladder, and opportunities for professionals have been limited in all modes. Participation of minorities in the transportation industry has been directly related to the civil rights movement. The results have been passage of laws and executive orders on nondiscrimination and the White House initiative on historically black colleges.

The time has come for minorities to seek their rightful place among professionals in the transportation industry, and they can and should occupy more of these positions. Approximately 72 percent of all managerial, administrative positions are held by white males, and only 3 percent are held by blacks. These figures are 20 percent higher for minorities than 10 years ago, but still show an underrepresentation in managerial positions. There is evidence that the situation is even more pronounced in the transportation industry.

There is good potential for graduates throughout the transportation industry but the greatest number of positions are in motor freight, and the higher salaries are in physical distribution management. This implies that academic programs for minorities must include carrier and physical distribution management. University programs provide training in three basic areas: transportation planning, career and physical distribution management, and transportation engineering.

The needs for professionals in each of these areas is changing, and these changes must be reflected in curriculum design. Historically black colleges enroll more than 60 percent of all black students. They provide points of access and offer better odds for retention and attainment for blacks than do other institutions.

Few historically black colleges have transportation programs. Three undergraduate degree programs in transportation exist at North Carolina A&T University, Virginia State College, and Florida Memorial College. Three have master's programs in transportation: North Carolina A&T, Morgan State, and Texas Southern Universities. Academic programs at minority campuses tend to overemphasize public

sector training; however, graduates who accepted positions in freight transportation were given starting salaries twice that of graduates in the public sector.

Because programs that assume advanced mathematical skills, such as engineering, will necessarily exclude the majority of students with average math skills and because business programs require competency in a wide range of skills, not to mention the marketability of their graduates, it is suggested that transportation programs for minorities be located in a school of business and emphasize carrier and physical distribution management.

The other approach is a multidisciplinary one followed by many universities; for example, Morgan State University has adopted this approach. These two strategies for preparing minority transportation professionals have advantages and disadvantages that parallel the strategies at nonminority colleges. A business curriculum requires more business-oriented prerequisites and has the advantage of greater strength in administration and in the transportation management market.

The multidisciplinary approach provides transportation courses from the outset and will attract an interdisciplinary student body. Only time will tell, according to the authors, which approach provides the better option for minorities who want to pursue careers as transportation professionals.

The role of historically black colleges is to train minorities for these positions, but this has been limited to a handful of programs. Although these programs are geared to careers in urban transportation, there should be an effort to focus on freight transportation where salaries are higher and opportunities are better. More programs are needed in these areas at minority institutions and more minorities need to be recruited at institutions with established transportation programs.