

REFERENCES

1. R.P. Schmitt and E.A. Beimborn. Examination of Techniques to Enhance the Utilization of Research Results. TRB, Transportation Research Record 738, 1979, pp. 24-31.
2. B. Mark, P.H.P. Ho, and C.S. Papacostas. Express Bus Use in Honolulu: A Case Study. TRB, Transportation Research Record 606, 1976, pp. 6-11.
3. C.S. Papacostas and G. Lum. A Partial Bus Patronage Composition Survey. Department of Transportation Services, Honolulu, HI; Univ. of Hawaii, Honolulu, 1978, Rept. CETP-TR-78-4.
4. C.S. Papacostas and W. Yoshioka. Recreational Use of Mopeds in Honolulu with Legislative Background. Presented at First National Moped Conference, Metropolitan Association of Urban Designers and Environmental Planners, Anaheim, CA, May 1978.
5. C.S. Papacostas. Honolulu's Handi-Van: Use and Implications. Traffic Quarterly, July 1980.
6. C.S. Papacostas and G. Schnell. Initial Reactions to a Central Business District Bus Transit Mall in Honolulu. TRB, Transportation Research Record 746, 1980, pp. 43-47.

Overall Assessment of a Statewide Certificate Program in Transportation

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The Certificate Program in Transportation offered between 1977 and 1979 by the Consortium of the California State Universities and Colleges and the California Department of Transportation is described and analyzed. This program was intended for mid-level management employees and focused on the planning, design, operation, and management of public transportation systems. The program's curriculum design and mode of delivery are described; results of an evaluation based on perceptions of students, faculty, and administrators are reported; and lessons to be learned from the program's experiences are derived and discussed in terms of future efforts of a similar nature. Major conclusions include the following: (a) educational programs of this nature should be based on the sponsoring agency's specific organizational needs; (b) the course content and level of instruction should be based on the interests and capabilities of the students; (c) the mechanisms for delivery of courses should be as simple as possible; (d) specialized programs require specialized faculty, which may be a serious constraint; and (e) since innovative educational programs in transportation are apt to be expensive, organizations that wish to sponsor them should be willing to pay a premium price.

This paper describes and analyzes the Certificate Program in Transportation offered between 1977 and 1979 by the Consortium of the California State Universities and Colleges (CSUC) under a contract with the California Department of Transportation (Caltrans). Although its official statement of purpose was quite broad, the actual focus of the program was on public transportation. Its primary purpose was to assist Caltrans in its transition from a basically highway-oriented organization to a broad-based multimodal agency; it was to do this by broadening the perspectives of the Caltrans mid-level management employees by increasing their awareness of some of the issues involved in the planning, design, operation, and management of public transportation systems.

Although developed in cooperation with Caltrans and intended mainly for Caltrans personnel, the program was open to professionals from other agencies. Indeed, their participation was particularly desired since it was felt that Caltrans students would profit from exposure to the views of other transportation professionals.

The program consisted of a cycle of five three-unit courses to be offered over five 10-week sessions. The course descriptions, condensed from those in the consortium's 1978-1980 catalog, are presented below:

COURSE TS-400. Transportation Systems in a Contemporary Context

Modal characteristics and review of transportation technology, land use and transportation interaction, principles of transportation planning, introduction to transportation and traffic engineering, evaluating transportation system alternatives, local and regional transportation plans.

COURSE TS-410. Analytical Techniques in Transportation Studies

Study design, basic quantitative capabilities in problem solving, computer modeling in transportation, survey methodology, operations research in transportation, maps and graphics use in transportation analysis and presentation, environmental-impact analysis in transportation.

COURSE TS-420. Efficient Use of Existing Public Transportation Systems

Developing for more efficient use of transport facilities, economic strategies, management and control of motor vehicles, relation of roads to transit systems, providing for pedestrians and bicyclists, urban goods movement.

COURSE TS-430. Transportation System Functional Design and Development

Collection, distribution, and internal circulation services; routing, scheduling, and dispatching of transit vehicles; fare-collection systems and policies; passenger information systems and services; park-and-ride, shuttle-transit, and express-bus service; paratransit systems and implementation; application of effectiveness evaluation to transit strategies; rural transportation planning, systems, and implementation.

COURSE TS-440. Transportation Systems Operational Management

Transit system management procedures, techniques for

improving transit management efficiency, transit management and labor relations, policies and decision making in the transit industry, marketing transit services, maintenance practices.

A single cycle of instruction was offered at each of the following five locations: San Diego, Los Angeles, San Bernardino, San Francisco, and Sacramento. Near the end of the first cycle of instruction, an evaluation of the program was performed (1). Although the formal evaluation document recommended that a second cycle of courses be offered, Caltrans declined to fund the second cycle.

In this paper we describe the program and the planning that produced it, the results of its evaluation, and some of the lessons to be learned from its successes and failures. We discuss the program's curriculum design and the practicality of carrying out programs of this type.

CURRICULUM DESIGN

The Certificate Program in Transportation was proposed by the Caltrans Division of Mass Transportation (DMT), a headquarters-level staff unit whose primary role is to serve as a resource for advancing public transportation policy (2). The educational need perceived by DMT officials resulted from a shift in the mission of Caltrans to increase its responsibilities in the area of public transportation. In particular, DMT officials felt that many of the Caltrans mid-level managers lacked an awareness of and an appreciation for nonhighway modes and that perhaps they also lacked some of the skills and information needed to deal with them.

From the beginning, the program was conceived as being statewide in scope and involving some sort of academic credit--preferably at the graduate level. Even though the responsibilities of Caltrans in the area of public transportation vary considerably among the state's major metropolitan areas, it was decided to develop a uniform statewide curriculum. Delivery of the program, however, would be decentralized and would be administered at the local level through the training programs of participating Caltrans districts.

Since the proposed program was viewed as being academic in nature and as involving some sort of academic credit, it seemed appropriate that its official sponsorship be through some university. The Joint Center for Transportation Studies (JCTS), a San Diego-area organization that had previously studied educational needs for Caltrans, suggested that the Consortium of CSUC would be the appropriate sponsoring agency.

The CSUC system is one of three systems of higher education maintained by the state of California. (The other two are the University of California and the California Community College System.) The consortium is an extension program attached to the CSUC Chancellor's Office; its function is to coordinate and sponsor statewide external degree and certificate programs that are actually carried out by local campuses. The consortium appeared to be an ideal sponsoring agency for the Caltrans certificate program because of its degree-granting powers, its statewide scope, and the availability of CSUC campuses in each of the state's major metropolitan areas.

In accordance with normal consortium policy, academic planning for the Certificate Program in Transportation was carried out by an academic program committee. This committee started out as an ad hoc group composed of representatives of the consortium, DMT, the Caltrans Division of Administrative Services (which is responsible for statewide coordi-

nation of the Caltrans training programs), and transportation professionals from the San Diego area associated with JCTS. Later, this group was augmented by representatives of a variety of transportation-related disciplines (primarily faculty from CSUC campuses) who were invited to participate by the consortium.

In devising the course descriptions, the committee was guided by its understanding that graduate-level courses were expected and by the suggestions of the DMT representatives concerning course content. Also, at this point, the consortium considered the certificate program to be the initial step toward an external master's degree program, so certificate courses were designed to be compatible with such a program. In including specific topics in the courses, the committee relied primarily on its own wisdom as to what was important--little information was available to the committee concerning either the specific needs of the Caltrans districts or the interests and backgrounds of the prospective students.

The rationale for the course structure adopted by the committee was as follows: The first two courses (TS-400 and TS-410) were seen as the core of the program. They were supposed to be taught at an upper-division undergraduate level and would not count as credit toward the master's degree (should one be instituted). Their purpose was to spark the interest of the students and bring them up to date in the analytical techniques and terminology to be used in subsequent courses. In particular, the course in analytical techniques (TS-410) was expected to be a review course for most of the prospective students. The third course (TS-420) was a condensation of what had originally been a two-course sequence that focused on techniques for transportation systems management (TSM). The fourth course (TS-430) was to focus on the design and technical operation of transit systems, and the fifth (TS-440) was to deal with the management of transit systems. These last three courses were to be taught as upper-division courses acceptable for graduate credit.

The course descriptions developed by the academic program committee were intended as guides to instructors rather than detailed syllabi. It was expected that one of the ongoing functions of the committee would be to work with instructors in developing syllabi to ensure comparability among the different locations. In practice, difficulties and delays in staffing coupled with problems in interpreting student reaction to classes prior to the formal evaluation tended to undermine this effort. The content and level of instruction of the courses as actually taught depended mostly on the individual instructors and varied considerably from course to course and location to location.

PROGRAM DELIVERY

Administration

The Certificate Program in Transportation was carried out on a decentralized basis by participating Caltrans districts and CSUC campus extension programs. Local administrative responsibilities were shared by Caltrans district coordinators, who represented the district training officers, and by local program directors, who represented the campus deans of continuing education. Program directors and Caltrans coordinators shared responsibility for scheduling courses and recruiting faculty; in addition, the Caltrans coordinators were responsible for selection of students and for physical arrangements for the classes. At one point, JCTS was engaged to

market the program on a statewide basis to students who were not from Caltrans. Following the failure of this effort, however, the program directors became responsible for marketing the program locally.

Financial Arrangements

The primary source of funding for the certificate program was \$90 000 provided by Caltrans through two contracts with the consortium. Officially, this money was to pay tuition of \$60 per credit unit (the consortium's maximum rate) for a guaranteed minimum of 20 Caltrans students at each of the five locations. In order to fund the development of the program, Caltrans paid the consortium \$15 000 in advance.

It was discovered early in the planning of the program that \$90 000 was inadequate to fund development of the program and the implementation of the first cycle; actual expenses were expected to be on the order of \$135 000. This meant that each location would have to enroll at least 10 more students. As it turned out, expenses were even greater than expected; at some locations it appears that an average enrollment of 35 students would have been needed to meet all expenses. In fact, only one of the five locations was ever able to attract 10 or more students other than those from Caltrans, and it was unable to retain this number through the full cycle of instruction.

The impact of the program's inadequate funding was felt mainly by the extension programs of the participating campuses. The budget for the program was developed to use funds provided by Caltrans to meet faculty salaries and the consortium's expenses. This left the overhead expenses of the campus extension programs and any unexpected expenses to be met by tuition from the students who were not from Caltrans.

Staffing

Professional personnel needed to operate the program included local program directors and faculty. Program directors were chosen by the campus extensions, and the faculty were then selected by the program directors and the Caltrans district coordinators. There were no uniform criteria for the selection of faculty, and procedures appear to have varied from site to site. Several of the campuses were unable to hire program directors who had experience in transportation; this and the lack of qualified prospects, the unattractive pay, the poor working conditions, and the lack of a systematic selection process created difficulties in attracting competent and well-motivated faculty.

It was originally assumed that most faculty--at least most of the instructors in charge of the courses--could be recruited from the participating CSUC campuses. At the same time, it was thought that, due to the considerable professional experience of the students, practitioners should also be used, at least as guest speakers. As the program progressed, it became apparent that there were too few on-campus faculty in transportation-related disciplines to adequately staff the courses and also that the students had difficulty in relating to academic instructors. Consequently, each local program tended to switch from the use of academic faculty to the use of practitioners. Recruitment of both academic faculty and practitioners was hampered by the normal recruitment policies of the consortium and the campus extensions, particularly their inflexible and comparatively low pay scales.

Faculty recruitment was further complicated by a lack of coordination with campus schedules and by a

policy of not buying faculty time from the campuses because of the higher benefit rates involved. This meant that academic faculty as well as practitioners had to teach the courses in addition to their regular duties.

Finally, recruitment of guest speakers was hampered by the lack of funds specifically budgeted for that purpose. This meant that guest speakers had to be paid out of instructors' salaries or from operating budgets that were already badly strained.

Scheduling

The certificate program was planned to be offered at all five locations simultaneously. As the program progressed, however, no attempt was made to coordinate scheduling on a statewide basis. Most scheduling details were actually determined on a local basis by the program directors and Caltrans coordinators.

Classes were offered during working hours at locations provided by Caltrans. It was recognized at the planning stage that scheduling classes during working hours and identifying the program so strongly with Caltrans might discourage students who were not from Caltrans, but it was thought to be necessary if Caltrans was to guarantee minimum enrollments.

Selection of Students

Selection of Caltrans students was the responsibility of the Caltrans district coordinators. Despite a great deal of emphasis on program uniformity during the planning phase, no effort was ever made to provide statewide guidelines for student selection. Actual practices varied greatly, as did key characteristics of the resulting student bodies, especially their educational backgrounds. Selection procedures ranged from no screening at all to ordering certain employees to attend. The most common method, however, was to recruit students on a volunteer basis but by using some sort of screening.

One important aspect of the student selection process was the lack of any restriction against the enrollment as students by Caltrans employees involved in the administration of the program. Indeed, four of the five Caltrans district coordinators were so enrolled. This created a situation in which some instructors felt that their academic control of the classes (including their grading practices) was being undermined.

PROGRAM EVALUATION

The consortium's normal procedures require that all programs be evaluated annually. In accordance with this policy, the consortium commissioned an evaluation of the Certificate Program in Transportation. This evaluation was conducted during the spring of 1979, near the end of the first cycle of instruction. The evaluation was based primarily on the perceptions of students, faculty, and administrators in the program.

Evaluation Methodology

Information used in the evaluation of the program (1) was obtained from questionnaires administered to students and faculty and interviews with academic program directors and Caltrans coordinators. This information is summarized as follows:

1. Student questionnaire
 - a. Student socioeconomic profile

Table 1. Mean assessment scores for individual courses and for overall program.

Location	Course Number										Overall Program	
	TS-400		TS-410		TS-420		TS-430		TS-440			
	N	Score	N	Score	N	Score	N	Score	N	Score	N	Score
San Diego	14	2.19	14	4.00	14	1.57	14	2.07	14	2.36	14	2.71
Los Angeles	16	2.31	15	2.87	14	3.79	16	1.44	-	-	16	2.44
San Bernardino	9	2.67	10	3.00	10	2.50	-	-	-	-	10	2.90
San Francisco	16	3.25	17	1.94	17	1.53	17	1.53	-	-	16	2.25
Sacramento	12	2.17	12	2.75	12	2.91	12	2.91	-	-	12	3.00

Note: N = number of students enrolled for each course.

- b. Student evaluation of course objectives for each course completed
- c. Overall evaluation of instructional quality for each individual course completed
- d. Perceptions concerning the entire five-course curriculum
- 2. Faculty questionnaire
 - a. Information concerning student performance and preparation
 - b. Attitudes concerning the strengths and weaknesses of the five-course curriculum
 - c. Attitudes concerning the appropriateness of course objectives for courses taught by the faculty member
 - d. Attitudes concerning class format
 - e. Information concerning faculty expertise and professional affiliations
- 3. Program directors and Caltrans coordinators
 - a. Procedures by which faculty were selected and recruited
 - b. Coordinative and cooperative efforts between the campus and the Caltrans district office
 - c. Association with the central administration of the consortium
 - d. Efforts to recruit students other than those from Caltrans for the certificate program
 - e. Fiscal and budgetary considerations
 - f. Substantive comments concerning the curriculum
 - g. Criteria for selecting participating Caltrans students

Other information used in the evaluation included course syllabi (when available), faculty vitae (when available), student grades, and documents that related to the program, such as the program proposal and memoranda of understanding among the various agencies involved.

Not all courses had been completed at all five locations at the time of the evaluation; consequently, more information was available for some courses than for others. Table 1 shows the locations at which each course had been completed by the time of the evaluation.

Caltrans representatives in each local office coordinated the administration of the questionnaire for Caltrans students. The other students were contacted through the central administration of the consortium. The response rate from Caltrans students was fair, averaging 66 percent overall, but it varied considerably from location to location (from a low of 39 percent to a high of 83 percent). Response from the other students was nonexistent; consequently, the views of these students could not be included in the evaluation. Administration of faculty questionnaires was coordinated through the program directors on each campus; response to these was relatively poor (8 responses out of 15 faculty who had completed a course at the time of the evalu-

ation). With one exception, all program directors and Caltrans coordinators were interviewed.

Student Characteristics

Based on responses to the questionnaires, the typical Caltrans student who participated in the program was a white male in his middle 40s with a little more than 20 years of experience in the transportation field and about an equal number of years of service with Caltrans. Educational levels were quite variable. Statewide, 75 percent of the respondents were college graduates and 19 percent held master's degrees. The percentage of college graduates varied among the participating districts from 50 percent to 94 percent and the percentage of master's degrees from 7 percent to 31 percent.

Student Perceptions

Reaction of students to the certificate program on the whole was favorable but hardly enthusiastic. Students were asked to express their degree of satisfaction with the program on a numerical scale from 1 to 5, with 1 being most satisfied and 5 most dissatisfied. Table 1 summarizes the mean assessment scores for each course and location. The overall mean assessment scores ranged from 2.25 in San Francisco to 3.00 in Sacramento. It should be noted that the absolute values of the numerical ratings, both for the program as a whole and for individual courses, seem to have depended more on student attitudes and classroom dynamics than on course content or instructors. This is particularly clear in the cases of San Francisco and Sacramento, in which three of the four courses evaluated at each location had been taught by the same instructor.

Students were also asked whether they would have been willing to participate in the program under a variety of assumed conditions. Only 8 percent reported that they would have participated if they had had to pay full costs and if the courses had been held on their own time. Only 18 percent would have paid the full tuition if the courses had been on state time, and no more than 63 percent would have participated if tuition and books had been fully subsidized but the courses had been taken on their own time. Clearly, most students felt that the program had some value but did not feel that it was really worth what it cost.

Students were also asked to express satisfaction or dissatisfaction with individual courses, to rank the courses according to their value, and to state whether they felt that the courses contributed to their short-term and long-term professional goals. Reactions to instructors tended to be overwhelmingly important in the assessment of the courses; thus, no clear pattern of reactions to course content could be determined. This problem is compounded by the fact that course content and the level of instruc-

tion also depended heavily on the instructors; as a result, there was little consistency from location to location in the content and level of individual courses. On the whole, however, the more-practical courses (TS-420 and TS-430) appear to have been the most popular and the course in analytical techniques (TS-410), the least popular. The introductory course was moderately popular at most locations. The management course had been taught at only one location at the time of the evaluation; consequently, no conclusions could be drawn concerning it.

For the most part, student perceptions whether particular courses contributed to their professional goals were closely related to student satisfaction with the courses, which was reflected in the numerical assessment scores and the course rankings. There was an almost universal tendency to perceive courses as contributing more to long-term professional goals than to short-term ones.

The most striking feature of the students' reactions to individual instructors was that they preferred practitioners to instructors who had academic backgrounds. The students' reasons for disliking academic instructors varied. In some cases, there was a clash over the rigor of the mathematics used in the courses. Some academic instructors stressed modeling theory and mathematics, particularly basic statistics. Students tended to find these topics irrelevant to their daily tasks and to perceive these instructors as too theoretical. In other cases, however, academic instructors were perceived by the students as being not knowledgeable, in particular, as being not up to date. Also, students seemed to prefer an anecdotal style of teaching--a style more prevalent among practitioners than academicians.

Students' opinions were also sought on other issues related to the design and delivery of the certificate program. Since the program had originally been conceived as part of a master's degree program, students were asked whether they felt that academic credit for the courses was important. On a statewide basis, 45 percent responded positively; positive responses varied by location from a low of 20 percent to a high of 67 percent.

Other questions sought student perceptions about the mix of student backgrounds in the classes. This was considered important because exposure to professionals of varied backgrounds was included in the program proposal as an integral part of the educational experience. Most students felt that the mix of Caltrans students was adequate (81 percent statewide), but students were sharply divided from district to district over whether a more-extensive interagency mix of students was desirable. Positive response to this question ranged from a low of 33 percent in Sacramento to a high of 73 percent in Los Angeles.

Faculty Perceptions

Due to the small number of faculty who responded to the questionnaire, knowledge of faculty perceptions is somewhat sketchy. It appears that faculty perceptions of the academic preparation of students, their level of performance, the extent to which they carried out assignments, and their interest and motivation were quite mixed. This was especially true of student academic preparation; some academic instructors rated the students as very poorly prepared for graduate-level work, particularly in terms of their mathematical backgrounds. This appears to have depended more on the instructor's expectations concerning student backgrounds and on their concept of what was involved in graduate-level coursework than on the students' actual backgrounds. The two

districts in which these comments were most pronounced, however, did have high percentages of students who were not college graduates.

With one notable exception, the mixed reactions of instructors to students were not reflected in the grading of the courses. Grade-point averages for individual classes (with the one exception) ranged between 3.14 and 3.96 on a 4-point scale. These averages seem to reflect the instructors' understanding that most, if not all, students were to receive A's and B's (because these grades are common for graduate education) and not the instructors' assessment of the overall performance of the class.

Faculty were also asked to comment on the overall curriculum design and on the administration of the program and were asked whether they would be willing to participate if a second cycle of instruction were held. Again, answers were mixed. However, it is striking that, despite the fact that some faculty members who responded to the questionnaire made very negative comments about various aspects of the program, all were willing to teach a second cycle.

Perceptions of Program Directors and Caltrans Coordinators

Program directors and Caltrans coordinators were asked about their relationship to one another and about their opinions regarding faculty, course content and curriculum, and financing of the program. In addition, Caltrans coordinators were asked whether the program should continue for a second cycle in their districts.

With one exception, program directors and Caltrans coordinators reported that there was good communication among them and that they worked together well.

Program directors' comments concerning faculty were mostly about the mechanics of recruiting faculty; besides describing the process of recruitment, several commented on some of the difficulties encountered. These included inadequate pay, inconvenient scheduling of classes, and lack of time for instructors who were working full time elsewhere to develop and teach classes.

Comments by program directors on course content and curriculum tended to be very sketchy. This was to be expected since several were not familiar with the transportation field.

Comments by Caltrans coordinators concerning faculty, course content, and curriculum tended to reflect student perceptions. This is hardly surprising, since four of the five coordinators were also students in the program.

Both program directors and Caltrans coordinators strongly disapproved of the financial arrangements for the program. It seemed to be unanimous that the JCTS marketing contract was a mistake. Also, most program directors and coordinators questioned the need for continued involvement by the consortium and expressed a preference for direct arrangements between local Caltrans districts and campus extension programs. The recommendations of the Caltrans coordinators concerning continuation of the program varied: One coordinator recommended that the program be dropped, another recommended that it be continued but not immediately, and the other three recommended continuation. These recommendations seem to have been based primarily on the existence (or lack thereof) of unmet demands among prospective students in their districts and not on their opinions concerning the quality of the program.

LESSONS LEARNED

Previous sections have described the planning and

delivery of the Certificate Program in Transportation and reported the results of an evaluation sponsored by the agencies that provided it. In this section we will discuss the lessons of general applicability that can be drawn from the experiences of the certificate program. We will focus on (a) the format and content, (b) the mode of delivery, and (c) the practicality of programs of this sort.

Format and Content

The question of whether the format and content of the program were adapted to Caltrans' needs is difficult to answer, primarily because the need for the program was never stated in very specific terms. The need for the program was presumably created by a broadening of Caltrans' mission to include responsibilities in the area of public transportation. It is certainly plausible that this shift in mission affected the responsibilities of Caltrans' mid-level managers. It might have (and probably did) create a need for new attitudes (the broader perspectives referred to previously), and it may also have created a need for new skills or new information.

The appropriateness of the program's format and content depends on the extent to which each of these needs was important. The content of the program was geared primarily toward teaching skills (especially analytical skills) and secondarily toward conveying information. The traditional classroom format was also consistent with these purposes. The program was not especially suited to overcoming psychological barriers to acceptance of Caltrans' new role, if such existed. At most, Caltrans employees might have been exposed to a variety of points of view, but there was little in the format or design of the program that could have helped them assimilate these or work out their feelings toward them. On the other hand, if all that had been needed was new information, a simpler format--a series of conferences, for instance--might have sufficed. Thus, the appropriateness of the format and curriculum design depended on the extent to which Caltrans' mid-level managers needed to master new skills.

A major defect in the planning of the program was a lack of specific information about Caltrans' day-to-day functioning and how increased responsibilities in the public transportation field might be altering its activities. As a result, the program's planners did not know what new skills, if any, were needed. Since there was no analysis of Caltrans' needs in these areas, it is not possible to say that the program design was inappropriate; however, it is probably significant that the students tended to dislike the analytical portions of the courses and to find them irrelevant. One important lesson to be learned from the certificate-program experience is that planners of similar programs should carefully consider the ways in which changes in organizational missions affect the requirements of specific jobs and should tailor curricula and course content to identifiable needs for new skills. When there are needs other than new skills, program formats other than the traditional classroom should be considered.

A second point concerning curriculum design is that Caltrans' educational needs related to public transportation, whatever they really are, probably differed from district to district. Certainly the districts involved in the program differed in their relationships with planning agencies and transit operators and, to some extent, in their specific duties that involved public transportation. Consequently, there may never have been a need for a common statewide curriculum design. The program

would certainly have been cheaper (and might have been more effective) if planning had been decentralized.

If the certificate program's planners were ignorant of Caltrans' specific educational needs, they were equally ignorant of the potential students' backgrounds, interests, and abilities. An underlying assumption in the planning of the program was that students would be willing and able to perform at the advanced-undergraduate or graduate levels of instruction. The planners were greatly surprised by the students' lack of familiarity with basic mathematics and analytical techniques. As a consequence, courses were not taught at the level that had been anticipated, and the certificate program's academic credit was not considered acceptable for regular degree programs. The lessons from this are that planners of similar programs should carefully consider the backgrounds, capabilities, and interests of their prospective students and that they should be extremely cautious in suggesting that off-campus training programs grant academic credit that compares with that of regular degree programs.

Mode of Delivery

The program's delivery was characterized by its decentralization and the involvement of university extension services. The chief effect of the decentralization was to make staffing difficult, since each local program was expected to recruit faculty from a single metropolitan area. In the planning stage, it had been naively supposed that faculty could be recruited from a wide variety of disciplines and specialties; in fact, the course descriptions involved narrow (but sometimes diverse) specialization. Moreover, because it was focused on public transportation, the program involved areas of expertise that were comparatively rare even within the transportation community. Consequently, none of the local programs had an adequate pool of potential faculty to draw from and, in one case (that of Sacramento), faculty had to be imported from outside the local area.

Despite the staffing problems created by decentralization, it is unlikely that a more-centralized program would have been more appropriate. Although the potential faculty pool would have been greater, the cost of bringing the students and faculty together might have been prohibitive. Given the scope of the program (a total of about 15 000 h of student contact), it is difficult to see how it could have been offered on other than a decentralized basis.

The major rationale for involvement of the university extension services in the delivery of the program was that this was essential if potentially transferable academic credit was to be granted. At the outset, it also seemed appropriate to include the university system because of its experience in planning programs of this type and because it was expected that a majority of the program's faculty would be drawn from the CSUC system.

As it turned out, these expectations were largely in error. Academic credit proved to be a relatively unimportant feature of the certificate program. The attempt to provide credit was largely an unrealistic goal.

The lesson to be learned from this is that the involvement of university extension services in training programs sponsored by large transportation agencies should be carefully justified in the planning of such programs. Other modes of delivery, such as organizing the program in house and contracting directly with instructors, may be more effective unless academic credit is appropriate and desirable (an unlikely prospect).

Other questions that relate to the delivery of the certificate program have to do with the details of the program. It is clear that there was room for improvement in several matters of detail. Among these were the lack of standards for the selection of students and faculty, the administrative arrangements that allowed students to be involved in the administration of the program, and the unrealistic schedules (which did not leave time for breaks between classes).

Practicality

Could the certificate program as originally envisioned have been carried out within its actual resource limits? It seems clear that the answer to this question is no. First, the pool of potential faculty was too small to permit the degree of specialization implied by the course descriptions; second, funding for the program was obviously inadequate.

The funding problem stemmed in part from the high cost of the program. This was in spite of the fact that the policies of the consortium and the campus extensions held the actual costs of instruction below what might have been desirable from the standpoint of quality. The main sources of the extraordinarily high costs were the costs of developing the program (all of which were budgeted against the first cycle of instruction) and the costs of state-wide coordination. Had the program continued and had its administration been fully centralized, revenues would probably have covered operating costs (even allowing for more-reasonable costs of instruction) and might eventually have repaid the cost of development. Unfortunately, it was never reasonable to assume that the program would continue indefinitely. At most, there might have been enough demand from Caltrans employees to support one or two additional cycles of instruction at two or three locations. Consequently, the decision to assign all development costs to the first cycle of instruction was prudent, but the decision to proceed with the program once the costs were known may have been unwise.

The lesson to be learned from this is that transportation-related educational programs are apt to have high costs, especially if they are highly specialized or innovative. Innovative programs involve high development costs; specialized programs may have low demands and short lives in which to absorb development costs.

SUMMARY

This paper has assessed an innovative educational program that focused on public transportation and was intended for managerial employees of a large state department of transportation. For the most part, this assessment has been critical of the Certificate Program in Transportation. This is not because the program was a total failure but because, by using better planning, it might have been much more effective and perhaps considerably cheaper. The major lessons to be learned from its experience are simple but fundamental to the success of any innovative educational effort of this sort. They are that (a) educational programs should be based on the sponsoring agency's specific organizational needs, (b) the course content and the level of instruction should be based on the interests and capabilities of the students, (c) the mechanism for the delivery of courses should be as simple as possible, (d) specialized programs require specialized faculty and this may be a serious constraint, and (e) innovative educational programs are

apt to be expensive; organizations that wish to sponsor them should be willing to pay a premium price.

Discussion

George E. Gray

The authors purport to give an overall assessment of the Certificate Program in Transportation conducted through the joint efforts of Caltrans and the Consortium of CSUC. I found their paper deficient as an overall assessment. In my view, it does not adequately or impartially address the program results (among other things). The degree of program success from the standpoint of the contractee was largely ignored. In addition, I found that the authors presented the findings given in the consortium's required annual program evaluation report (1) in a biased and prejudicial manner.

It is interesting to note that this official evaluation report recommended that the program be run for a second cycle at most of the five sites. It was not recommended for continuation at one small site, primarily because of its size and therefore reduced need for more training of this type. The authors give the impression that, overall, the program was not a success. Such judgments are always subjective, at least to some extent, but in this particular instance I find it difficult to understand why they did not view the program from the perspective of the originators and sponsors before forming this judgment. The only official Caltrans input to the evaluation was through the coordinators. Although four of the five coordinators did recommend that the program be continued, these employees, mainly because of their district orientation, could not be expected to reflect the opinions of the program held by all the originators of the effort.

In this discussion I will focus on what I consider the items of major importance and not dwell on the many comparatively minor items. In their discussion of the latter, the authors stray from the official evaluation findings or from my understanding of the program or both. I will discuss the content and the results of the program.

First, it should be recognized that the program under discussion was one of several interrelated ones undertaken by Caltrans during the period 1973-1978. At that time, Caltrans was providing training to cover new responsibilities through the following programs and opportunities:

1. Certificate Program in Transportation Planning: A centralized program given through the University of California--Davis;
2. Certificate Program in Environmental Planning: A centralized program given through the University of California--Davis;
3. Public Transportation--State of the Art: A one-week lecture and symposium gathering for top-level and mid-level management employees given four times that used a large number of outside experts, both academicians and practitioners;
4. Bay Area Urban Technical Institute: A hands-on one-week course given three times a year since 1977; it is closely coordinated with the five major public transit operators in the San Francisco area and stresses the functions of these organizations and the overall role of the Metropolitan Transportation Commission;

5. Degree program: For several years there has been considerable liberalization of criteria for state participation in external educational programs in transportation; this included a master's degree program of the University of California--Davis given at several locations in the Sacramento area by television;

6. Transportation Planning Improvement Program: This involved loaning employees to various organizations that ranged from local planning agencies to major transit operators and included Bay Area Rapid Transit, Alameda-Contra Costa Transit, Southern California Rapid Transit District, Orange County Transit, port of Oakland, Metropolitan Transportation Commission, Southern California Association of Governments, state of Maryland Department of Transportation, Urban Mass Transportation Administration, and about 15 others; costs were often shared but frequently the state covered all the employee's salary and normal overhead; assignments have generally been for six months but several have been for well over a year;

7. Leaves of absence: Several key employees have been encouraged to accept leaves, which can be as long as two years, to work in related transportation fields; most leaves have been to work with planning agencies but recently transit organizations have also been involved; and

8. Educational opportunities developed and presented by others: There has been strong support for various transportation workshops, seminars, and courses given by the University of California, often developed in cooperation with Caltrans.

In addition to the above specific training programs, Caltrans has an active management transportation reading program and a liberal policy of temporarily loaning employees within the organization to provide on-the-job training. It has organized and presented a number of specific workshops, such as a recent one that focused on commuter rail services, and did have an active information program centered on the department's publication, Transguide, which was updated regularly.

The reason this list of Caltrans' training opportunities is given is to dispel the impression that one receives from the authors that the certificate program was a stand-alone effort. More important, I want to make the point that to provide training in an area of emerging responsibilities for an organization as large as a state department of transportation requires a very diverse program. Admittedly, our efforts have been neither consistent nor particularly well coordinated over a long period of time. There are a number of reasons for this; the major one is government's lack of long-range commitment to such programs, which have results that are difficult to evaluate and therefore to defend through the budget process. In my opinion, no training program that places all of its proverbial eggs in one basket can expect a high degree of success, especially when the incubation period of the training "eggs" is often an unknown since it involves an attitudinal change as much as enlarged or improved technical competence or both.

My most serious single objection to this paper is the lack of evaluation input from the program's sponsor at the top management levels. This input would have provided a more-objective assessment of the value of the results. Overall, the results, especially when reviewed in early 1981, are very gratifying. A large percentage of the state participants have become involved in non-highway-oriented aspects of the department's activities. A quick review of the employees enrolled in the program in San Diego, for instance, shows that those

who participated in this educational program tended to show a higher degree of promotion than those who had not participated. They also exhibited a high incidence of movement away from the more-traditional highway roles toward emerging new roles that involved other modes. For the most part, the involvement in transit by Caltrans' San Diego district is being spearheaded by those who were enrolled in this program. Although it can be argued that the total range of the department's transportation activities was probably not greatly enhanced by the program, the department at least had a larger group of employees than had previously existed who had been exposed to transportation in a broader sense.

I will confine the rest of my comments to the three major areas discussed by the authors in the section headed Lessons Learned.

In the subsection on format and content of the program, I found that the points raised were mostly well taken. However, it must be recognized that the state's role in transportation modes other than the highway mode is still evolving and that to expect an organization to be able to identify its future needs succinctly in new areas when it is undergoing such a massive change in responsibilities is naive--it is simply not possible when legislative actions each year result in changes in responsibilities. The intent in developing this program was not to be so specific when formulating course content as to lock the program in to what might become redundant topics. In my opinion, our main failing in this area was in placing too much emphasis on technical skills to the detriment of addressing the various points of view in the public transit field.

It is interesting to note that in this section the authors argue for more program flexibility. This is not consistent with the earlier discussion but it is in line with the program originator's intent.

The problems caused by differing student backgrounds are certainly real and should have been considered more seriously. However, since the program accepted employees with diverse backgrounds (engineers, planners, right-of-way agents, etc.), even a detailed identification might not have changed the results. The choice was between a program designed for a specific group (i.e., planners) or a broader approach. We consciously chose the latter.

With regard to the subsection on mode of delivery, as previously discussed, Caltrans has developed in-house programs of this type before and in-house development is an alternative that has some attractive features. However, that alternative was not pursued in this case for three reasons:

1. We wanted to attempt an innovative consortium concept since, among other things, it provided an opportunity for participation by persons other than Caltrans employees.

2. The department did not have the staff time to organize an in-house program of such magnitude in five locations in a short time.

3. We wanted to provide an opportunity to obtain academic credit for at least a portion of the program.

Although the authors discount this last factor as of no interest or importance to students, the following data, taken from the formal evaluation report (1), give a different picture:

	Percentage Who Had Master's Degree	Percentage Who Thought Academic Credit Important
Campus San Diego	7.1	38.5

<u>Campus</u>	<u>Percentage Who Had Master's Degree</u>	<u>Percentage Who Thought Academic Credit Important</u>
Los Angeles	26.7	50.0
San Bernardino	20.0	20.0
San Francisco	31.2	43.7
Sacramento	8.3	66.7

As for the practicality of the program, the failure to estimate program costs must be shared by all parties involved, and the lesson as given in the last paragraph of this subsection is, in my opinion, valid. Caltrans is currently developing a similar program, Certificate Program in Rail Transportation, and we will now have a better base for estimating program development.

To sum up, in my opinion, the authors are not consistent with the facts in several instances and do not adequately address the certificate program from what may be the most important perspective--that of the organization that originated the innovation. I urge any who have a strong interest in this particular program to obtain a copy of the official evaluation report for study before they arrive at any conclusions.

Authors' Closure

There are several reasons why we did not assess the program from the point of view of its originators and sponsors (i.e., Caltrans' top-level management personnel). First, the program was officially sponsored by the consortium (not by Caltrans) and the Caltrans representatives were by no means the only source of advice in its design. We do not feel that their point of view should be the only one considered, and it should not necessarily be the major one. Second, the study design for the consortium report was negotiated among consortium and Caltrans representatives and one of us. The reason that Caltrans personnel other than the district coordinators (and, of course, the students) were not interviewed was that the Caltrans representatives did not suggest that they should be. Third, we believe that actions speak louder than words. Caltrans (presumably its top-level management personnel) refused to fund the second cycle despite the positive recommendation of the consortium's evaluation report. Further, it is important to note that the recommendation to fund a second cycle was made primarily on the advice of the majority of the Caltrans district coordinators. If the program was successful and there was further student demand, why was it not repeated? We feel that Gray could have done us (and the readers) a greater service by explaining the reasoning behind the decision not to fund the second cycle instead of offering us his personal opinion that the program was successful.

We are of course gratified that Gray was pleased with the results of the program. We feel that the benefits he cites are rather vague, but then it may be that, as a sponsor and originator, his goals were vague. Indeed, one of the main points in our critique of the planning of the program is that goals were quite nebulous and conflicting. Under these circumstances (as we pointed out), it is difficult to judge whether the program was successful or not, since we (Banks as a member of the academic program committee and Rea as the evaluator for the consortium) were never sure exactly what the program was supposed to achieve. In any event, to say that a particular individual was or was not pleased by

the results still begs the following questions: (a) Was this the best way to achieve the desired results? (b) Were the results worth the cost?

In addressing the specific lessons to be learned from the program, Gray seems to be in substantial agreement with us. One major difference, however, is whether academic credit was an appropriate and realistic goal. Our position on this issue is as follows. In order to be meaningful, academic credit must represent a definite and appropriate level of student achievement. Although it is difficult to define this level of achievement without reference to specific course objectives and methods of measuring academic achievement, those of us who teach regularly have a good sense of what this achievement entails and whether it is being attained. Accordingly, if we believe that a particular program is maintaining an adequate academic standard, we will be willing to accept its credit toward a university degree; otherwise, we will not.

In the case of the Certificate Program in Transportation, it was assumed at the outset that graduate-level credit would be granted and that it would be transferable, at least within the CSUC system. As the program progressed, it became clear that the level of instruction was falling well below what is normally expected of graduate courses and that the credit granted by the consortium would not be accepted by the CSUC campuses. One reason for this is that less control over student backgrounds (particularly educational level) was exercised in the selection of students than had been envisioned in the planning phase. However, we doubt that this was the only reason for the low level of instruction and we further doubt that any program of this sort is likely to meet the usual academic expectations for graduate courses.

In light of this discussion, the question of whether students desired academic credit is really moot. We do not think that the tabular material Gray gives supports the conclusion that students found the academic credit very attractive. (Of course, it is common in regular university programs that all our students seek academic credit.) The key point is that no meaningful academic credit was in fact granted, and we have no evidence that this caused widespread student dissatisfaction except in Sacramento.

In short, the involvement of universities in programs such as the Certificate Program in Transportation is based largely on the desire to grant transferable academic credit. At the same time, however, it is unlikely that these programs can be conducted at a level that will warrant such credit (at least at the graduate level). Consequently, since academic credit is a dubious goal, nonuniversity providers should be considered to give this type of program.

It also appears that there may be some misunderstanding of our comments regarding the specific needs that Caltrans had hoped this program would meet. The point we intended to make was that the mode of instruction adopted for the certificate program was best suited to teaching specific technical skills. We do not imply that it was necessarily realistic for Caltrans to identify such skills. It is our opinion that (a) it is difficult to motivate students to learn skills if they do not think they will have occasion to apply them and (b) if, as Gray believes, less technical content would have been appropriate, then more consideration should have been given to other modes of instruction. We do not think that the traditional classroom is the most appropriate setting for exposure to diverse viewpoints or for achievement of attitudinal changes.

REFERENCES

1. L.M. Rea. Evaluation Report: Certificate Program in Transportation. San Diego State Univ., San Diego, CA, March 1979.
2. Transportation Guide. Division of Mass Transportation, California Department of Transportation, Sacramento, Nov. 1976.

Role of Outreach Activities in Transportation Education

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In order to respond to the educational needs of transportation professionals, transportation operators, and the general public, an outreach program has been established within the University of Wisconsin system. The program, operated by the university's Office of Statewide Transportation Programs (OSTP), brings the expertise of the university to the community to aid in the solution of pressing transportation problems. The program is modeled after the county agricultural extension service, the agents of which form a bridge between the university and the agricultural industry. Two major aspects of the program involve (a) formal short courses, seminars, conferences, and workshops and (b) informal one-to-one assistance. Experience since the establishment of OSTP in 1976 has shown that universities that have a transportation faculty can fulfill an important educational function that is not covered by traditional course offerings and degree programs.

Traditionally, educational programs offered within universities at undergraduate and graduate levels have been aimed at preparing individuals for their chosen careers. These programs follow well-defined curricula and meet professional personnel needs in many fields. Recently, however, there has been an increasing awareness of the need to develop innovative programs that reach practitioners and members of the community directly. Such programs occur outside the classroom and include the concept of continuing education as well as technical and community-assistance programs that involve a broad spectrum of activities.

One means by which such programs can develop is through an approach patterned after the county agricultural extension service, the agents of which provide assistance and advice to farmers in growing their crops and raising livestock. The agricultural extension service involves one-to-one assistance by bringing together technical expertise from a university and persons in agricultural industries who are facing day-to-day problems. This paper will describe how such an effort is developing in the University of Wisconsin system under the auspices of the Office of Statewide Transportation Programs (OSTP) of the University of Wisconsin--Extension.

OSTP is in the Division of Urban Outreach, a unique entity in the University of Wisconsin system because it is part of both the University of Wisconsin--Extension and the University of Wisconsin--Milwaukee. OSTP works closely with faculty and staff from the University of Wisconsin--Milwaukee, chiefly through its Center for Urban Transportation Studies, and with other units of the University of Wisconsin system in order to provide a program in transportation that is widely available to the community.

The program attempts to create an environment in which open communication among participants can occur. The purpose of these efforts is not simply to educate but also to achieve a better understanding of the issues at hand. This in turn leads to decision making that is more effective and more in the public interest. OSTP'S transportation education

program consists of two basic components: an educational component carried out through conferences, workshops, and short courses that address topical issues in transportation and a community-assistance component that takes many forms and involves both formal and informal activities.

During its first year of operation, OSTP had a budget of \$80 000 and a requirement to generate an income of \$8000. OSTP now has a staff of four--a director, a conference coordinator, a community-assistance coordinator, and a secretary. The overall budget is now \$110 000 and the income requirement is \$27 000. This income requirement is satisfied primarily through registration fees charged to conference attendees. In this paper, the activities of OSTP and the overall philosophy of the program will be discussed.

PHILOSOPHY OF THE PROGRAM

OSTP was established in September 1976 by the Division of Urban Outreach of the University of Wisconsin--Milwaukee and the University of Wisconsin--Extension to respond to increased educational needs in transportation within the Milwaukee metropolitan area and the state of Wisconsin. The philosophy of OSTP is based on the premise that the resources of the university can be applied to community needs in transportation in a variety of ways. This philosophy recognizes the importance of community input; without it, many needs would not be addressed.

The philosophy of the outreach program consists of the following six basic principles and beliefs:

1. There is a fundamental relationship between the university and the community of which it is a part. Communities benefit from increased educational opportunities and from the application of knowledge obtained through the university. The university benefits because its faculty and staff gain practical experience that is reflected in future outreach activities and traditional educational offerings. Thus the community represents a dynamic laboratory that provides important input to the educational function through, for example, timely case studies from local settings. As a consequence, students who take part in this process are exposed to real-world transportation-related issues within the community.

2. Transfer of information, research, and education can best occur when there is close communication between those who are faced with problems and those who have the capability to lend assistance in solving them. The closer the university can be linked to the community, the higher the probability is that the education and research done at the university will be relevant and useful to the community. Close communication between university and