

Facilitator's Report

**TRANSPORTATION EDUCATION
AND TRAINING WORKSHOP**

Mariott Hotel, April 18, 2002

Prepared for:



Transportation Association of Canada

TAC EDUCATION AND TRAINING WORKSHOP

FOREWARD

In 2001, The TAC Board of Directors made the education and training needs of its members a key priority and approved the creation of the Education Council. One of the objectives of the Council is to identify the specific needs and gaps in education and training within the transportation sector and to explore the opportunities and future directions that are available to the Association. The Education Council Working Group organized an Education and Training Workshop in April 2002 to commence work in this area.

The input that was received from the transportation industry stakeholders at the workshop in Ottawa on April 18, 2002 is captured in this report. The findings from this report will be shared both with TAC's Education Council and the newly formed multi-stakeholder Education Coalition as well as others from the industry that are confronted with education and training issues. Some of the issues identified during the workshop will be addressed directly by the Education Council, while others will interest members of the Coalition depending on their nature and scope. The Coalition will provide opportunities to talk about areas for collaboration amongst various organizations and to identify the best way of addressing issues that may need the combined efforts of several specific departments or organizations. It is hoped that this report will help address some of these education and training issues that are facing the transportation industry in Canada.

If you have any questions in regards to this report, please contact the Secretary of the Education Council at the Transportation Association of Canada.

OUTLINE

Page

1.	WORKSHOP BACKGROUND AND PROCEDURES	1
2.	EXECUTIVE SUMMARY	3
3.	RESULTS OF BREAKOUT SESSIONS	6
4.	ANALYSIS AND IMPLICATIONS OF FINDINGS	13
4.1	Marketing Priorities	14
4.2	Recruitment Priorities	16
4.3	Education Priorities	17
4.4	Training Priorities	18
5.	APPENDICES	21
5.1	Workshop Agenda	23
5.2	Discussion Guide	24
5.3	List of Speakers	26
5.4	Speaker Presentations	27
5.5	Report on Canadian Transportation Education and Training Needs: A University Perspective	47

1. WORKSHOP BACKGROUND AND PROCEDURES

In January of 2002, the *Transportation Association of Canada (TAC)* engaged Michael C. Saykaly of Optima Consultants to facilitate a workshop among its members. Mr. Saykaly consulted on the workshop objectives and agenda and crafted a moderator's schedule of discussion themes to guide the afternoon breakout sessions. He facilitated the April 18th workshop, presented a *flash report* to the *TAC Education Council* on the following morning, and prepared this report.

This report presents an executive summary of the key highlights and implications from the workshop, a section consisting of the input from forty transportation professionals, followed by a section on the facilitator's analysis. We append the workshop agenda and the discussion guide.

The report is based on input from transportation professionals drawn from academia, private industry, associations, and various governments from different regions of Canada. These participants took part in the one-day workshop. They were invited to provide input to *TAC* and its *Education Council* to establish how *TAC* and its transportation industry partners should deal with the key challenges facing the industry.

Here follows the context of the workshop. During the morning, attendees heard from seven speakers. Executive Director Michel Gravel provided an overview of the situation in which it is expected that future growth in the economy combined with the deterioration of infrastructure and the impending retirement of transportation professionals may well lead to workforce shortages in the transportation sector. Six other transportation professionals from diverse backgrounds served as panel speakers and provided other valuable perspectives. These speakers are listed in the *Workshop Agenda* (appended). The result of these presentations was to stimulate discussion among participants in four afternoon breakout sessions. (The reader may obtain a copy of these presentations from TAC.)

During the afternoon, the forty professionals, divided into groups of ten in four separate discussion groups, and wrestled with eight questions concerning priority actions that the industry and its partners should undertake. (The workshop agenda and the moderator's discussion guide are appended to this report.) The four moderators of the sessions were Sue Killam and Katherine Forster from TAC, Tim Smith from the

Cement Association, and Steve Goodman from CSCE. Participants were asked to group their input under four categories of priorities: *recruitment, education, training, and miscellaneous*.

2. EXECUTIVE SUMMARY

In this section, the facilitator presents the key conclusions he draws from the discussion sessions and offers them for consideration to TAC and its partners. The reader may directly review the input provided by participants in the workshop discussion sessions (see next section entitled *Results of Breakout Sessions*). A more detailed analysis is provided in the subsequent section entitled *Analysis and Implications of Findings*.

- At the outset, participants at the sessions were asked to brainstorm on the top priorities facing the transportation industry in the areas of *recruitment, education, and training*, and to provide other comments under the *miscellaneous* category. It was noteworthy that many crucial concepts and suggestions proposed by participants either transcend or inter-connect recruitment, education, and training. We think that TAC and its partners should acknowledge the crucial prerequisite role of a **marketing priority**. It is apparent that development of an overarching marketing plan is pre-requisite to cost-effective action in the areas of recruitment, education, and training.
- Our assessment of participants' comments leads us to the following conception of marketing: The transportation family of interests encompasses a multi-sector industry. Development of an **overarching marketing vision** will ensure that status, role, prestige, coherence, and effectiveness be enhanced for all member stakeholder groups, including transportation companies and consultants, related academics, and government departments. Marketing planning will result in a **superior level of integration** and cohesion for this diverse transportation community, enabling it to credibly and cost effectively organise **compatible strategies** regarding recruitment, education, training, *and retention* to assure sustainable succession planning.
- As part of a more conscientious marketing approach, transportation stakeholders need to increasingly focus on effective recruitment and **relevant education programs**, courses, workshops, and seminars to instill needed skills for entry level staff. Moreover, management should increasingly address **effective training and retention** of in-service professionals. Staff should be endowed with progressively higher

levels of skills for career advancement. Also, management should embrace the emerging technological skills needed by the Canadian economy.

- In effect, an initial grasp of the marketing dimension of the transportation family of interests is a prerequisite for coherent and **comprehensive workforce planning**. Sustainable **succession planning** requires a conceptual marketing framework, not mere piecemeal action in the areas of recruitment, education, or training. Such planning will allow for priority building in the areas of funding and organising recruitment **and retention** of staff, the education of new entrants, and the continuing education of in-service professionals.

Here are the **priority marketing actions** that go beyond recruitment, education and training:

- **Determine who speaks for the transportation industry.** Develop a **coherent voice** that will **credibly** represent the industry. Industry, government, and academia should coalesce scarce resources to craft an overarching goal and promote a unified communications program. Communications should target member stakeholder groups with pre-tested messages that work. Communications should also work with media to reach targeted groups in the public (e.g., schools, students, and guidance counsellors) to enhance transportation's prestige and contribution to society. Build a budget for both internal and external communications.
- Transportation stakeholders should construct an industry **inventory tree of all staff positions** by sector, level, and region. This inventory should indicate not only actual staff positions, but also staff **shortages** and **surpluses**. This inventory should **include salary / wages** for each position, and projections should demonstrate the **total revenues** overall, by sector, by region, and by position. Annual **changes in staff numbers** by position should be tracked. This comprehensive inventory should be placed on a universally accessible **website** and kept current. **Link stakeholder websites** to this inventory. By building and maintaining this marketing tool, various transportation professionals charged with overall planning, and the planning of recruitment, education, training, and retention will be able to access this tool.

- Become more mindful of **transportation culture**, how it is perceived, and its influence on recruitment and retention. Stakeholders should measure both stakeholder and public perceptions (and misperceptions) about the industry. Then create priority areas of action to correct the transportation culture, and to communicate information to correct both stakeholder and public misperceptions of the industry. For example, the industry should better convey, internally and externally, that **transportation professionals include not only engineers**, but also many other professions (e.g., statisticians, economists, urban planners, etc.). Similarly, the industry should communicate **that transportation is more than roads**. (Notwithstanding TAC's mandated constraints, its strategic link to the *Education Coalition* reflects a broader alliance of interests related to transportation.)

Following the next section that presents the input of participants at the workshop, we conclude with a more detailed analysis of the top priority actions that TAC and its partners should undertake in the areas of recruitment, education, and training.

3. RESULTS OF BREAKOUT SESSIONS

In this section, we present the input provided by approximately forty transportation professionals who took part in a Transportation Education and Training Workshop. Here follow the key points from four breakout sessions in which about ten professionals from various transportation sectors and regions participated in each session. The professionals were invited to provide input to TAC and its Education Council to establish *recruitment, education, and training* priorities. Moderators of the sessions used a discussion guide to orient the discussions. This guide is appended to this report.

Overall Priorities

Based on the discussions overall, it is very clear that participants consider issues, barriers, and challenges related to **recruitment** as being far more important than issues related to education and to training. In fact, at the conclusion of the sessions, we asked for a show of hands as to which of the three should be the most important priority of the Education Council. Over one half of participants selected **recruitment** issues as the top priority area, whereas the remaining participants were divided fairly equally between choosing education issues or training issues as the top priority.

Below we present participants' suggestions for *recruitment, education, training, and miscellaneous* priorities. The first few entries under each topic, including many bolded terms, are those most likely to be tagged by participants as their top priorities. The reader should note that, in many cases, participants in the different breakout sessions brought up similar or overlapping concepts and suggestions under different categories. In this section, we have left them in place. (In the next section, *Analysis and Implications*, we organise these ideas and provide the facilitator's interpretation for consideration by TAC and its partners.)

Recruitment Priorities

- Make transportation industry more *attractive* to potential recruits and to society at large.
- Serious problems with **retention**, not only recruitment.
- The transportation industry should **modify the transportation culture** to render it more attractive to potential entrants (e.g., possibility to work in a challenging environment, career oriented - not just a job) and to promote retention.
- Industry should not only target students for recruitment, but also existing **trades professionals**.
- Industry should construct an industry **inventory of all staff positions** by sector, level, and region. This inventory should also indicate staff **shortages** and **surpluses**.
- The inventory could include **salary / wages** for each position at each level and by region. Projections could be made to demonstrate the total revenues overall, by position, and by level. All information should be accessible on a website for transportation economists, all stakeholders, and the general public.
- **Annual changes in staff numbers**, by position, level, and region, should be tracked and recorded on the website.
- Overall **succession planning** should be integrated with recruitment priorities.
- Introduce mentoring opportunities for retired professionals / in-service professionals to foster a positive image for the industry among the general public, and for students at both the primary and secondary levels.
- Stakeholders should influence youth at a very early stage by visiting children in the school system (primary and secondary), and influence those who mould the consciences of children (e.g., guidance counsellors, teachers, parents, and children themselves).
- Reach kids early through summer camps.
- Engineering recruits are seen by some as stable employees that stay. Industry has to work harder to attract and retain other groups of employees.
- Stakeholders should evaluate rival salaries and incentives for each position, level, and region. As necessary, industry should inaugurate competitive salaries and incentives.
- Co-ordinate with government and academia to ensure availability of programs to enhance prestige of transport careers.
- Develop appealing transportation career profiles.

- Develop Co-op programs.
- Industry should do a better job in planning a strategy for the future.
- Industry needs a communications plan to sell the need for a recruitment strategy to company financial people.
- Construct an inventory of best practices regarding recruitment priority areas. Profile success stories from recruitment experience. Integrate with website.
- Publicise the opening for technicians and technologists. College graduates can grow in the job. Can't do P.Eng. work, but can do a lot of work under P.Eng. supervision.
- Critical staff shortage in construction sector.
- Middle management is under represented.
- Shortage of professional engineers in transportation consulting.
- Cyclic funding for infrastructure also has significant impact on consulting business.
- Shortage of trades people in the transit industry. Three-tier shortage: inspectors, trades, engineers- all are hurting.
- Need to recruit and retain professionals with a background in transport management, policy, regulation, economics, communications, accounting, business administration, etc.

Education Priorities

- As a prerequisite, industry should **clearly specify staffing needs by sector, level, and region**. (See inventory concept under *Recruitment Priorities*.)
- In conjunction with government and academia, industry should determine the priority transportation skill sets needed by entry level staff, by sector and level. **Funding should reflect the priority skill sets needed** (e.g., courses and provision of scholarships).
- Inventory of **best practices** regarding education priority areas for action. Profile success stories in the education sphere. Integrate with website. Promote these through vehicles (TAC, National Transportation Week, NSERC - Natural Sciences and Engineering Research Council). (Also mentioned under *recruitment, training and miscellaneous* priorities.)
- Overall **succession planning** should be integrated with education priorities.

- This should include specific job-related skills as well as **soft skills** (interpersonal skills, communications, management, and economics).
- **Obtain commitments** by universities, colleges, and other technical institutes to offer the needed educational programs.
- Co-ordinate with all stakeholders a **concerted communications program** to induce youth to enter the transportation education programs (e.g., advertising, scholarships, etc.).
- Mentoring: Bring in more industry representatives (retired and in-service) to teach / present slides to children in the primary and secondary school systems. *Education priorities* should also include sensitisation programs to influence younger children, their parents, and guidance counsellors. (Also mentioned under recruitment).
- Valorise the *career* attributes, not only those for a given entry level *job* (e.g., *Golden Seal* recognition).
- Entry level skills needed are not being taught: Cohesive planning by industry to induce academia to re-focus on transforming curriculum to instill knowledge and skills needed by industry.
- Need multidisciplinary approach. Need more comprehensive skills : computers, software (Excel, programming).
- Priority subjects: ITS, traffic planning, communication skills, rehabilitation of degrading infrastructure, life cycle costing, optimal allocation of resources, safety, etc.
- Many professors lack practical experience with the transportation industry.
- Funded chairs / funded masters and doctoral programs and projects, not just in engineering, but in other areas related to transport economics, business administration, mathematics, science, high tech, etc.
- (Related to recruitment) Identify industry needs for workforce planning, and communicate these needs to academia.
- Not enough emphasis is placed on current technologies: ITS and human factors.
- Engineering challenge: engineering basics take enough time and effort. Some universities are adding a fifth specialisation year.
- Should work with outside stakeholders to promote interest in sciences and mathematics in high school. This will increase the pool of potential students who could be drawn to transportation studies.
- Universities should place more emphasis on teaching by academics, not only on research activity.
- The education curricula need to be updated with current transportation innovation to reduce the gap

between what is taught and what is practised. We should better ensure relevance of the curricula.

- Education should stress importance of transportation to the economy.
- Should emphasise more the supply chain, logistics and construction.

Training Priorities

- Comprehensive **database of staff positions**, by sector and by level, with indicated employment, shortages, and surpluses. (Also related to recruitment priorities.)
- **Inventory of industry stakeholders, roles, and websites.**
- **Incentive program**; provision of training incentives for targeted employees.
- **Partnership** between industry, government and academia to prioritise, organise, fund, provide, and monitor the on-going training.
- Monitoring of **continuing education** to ensure its relevance.
- Inventory of **best practices** regarding training priority areas for action. Profile success stories in the education sphere stories (e.g., C-TEP). Integrate with website.
- Overall **succession planning** should be integrated with recruitment and education priorities.
- Construct **inventory of available training** (e.g., courses, workshops, and seminars).
- Supplement formal academic courses with practical workshops on emerging topics, and other brief courses, both on-site and off site.
- Overcome company management's resistance to funding or co-funding training of in-service professionals to gain needed skills. (Demonstrate cost of *not* training).
- Priority subjects: Project management, new technologies, sensitising management that continuing education requires practical support from management - funding, compensated time-off for training, ITS, traffic planning, communication skills, rehabilitation of degrading infrastructure, life cycle costing, optimal allocation of resources, safety, etc.
- Neglected areas of training: human factors, bridge maintenance, asphalt technology, PCC (Portland Cement Concrete) technologies, BP (best practices), information sharing, environmental issues, management and leadership training soft skills (communication, inter-personnel relations, etc.), logistics training, asset management, financial budgeting and forecasting, core technological knowledge, safety,

liability and due diligence.

- Make travel dollars available to attend off-site training.
- Companies' accountants should be encouraged to invest in training.
- Workplace educators should show management the value of training.
- Staff need compensated time-off for training.
- Construct career path for employees that define steps on the path: management should facilitate these steps.
- Training offerings should include the most cost-effective approach based on: brief workshops and seminars, face-to-face sessions, e-mail communications, and long-distance learning over the Internet.
- Inventory of all courses available at education institutions and with others providers, including Internet, e-mail, on-site, etc.
- Build TAC coalition to access memberships and partnerships to identify and co-ordinate needs and to develop training opportunities.
- Create Website resource directory of training opportunities.
- Target tradespeople for training and integration into the transportation industry.
- Introduce industry sabbaticals for intensive opportunities to up-grade skills.

Miscellaneous Ideas

- **Determine who speaks for the industry.** Develop a **coherent voice** that will **credibly** represent the industry.
- Come to terms with the considerable **difficulty of predicting** staffing needs, shortages, and surpluses.
- Promote legislation to ensure sustained and dedicated funding for transportation research.
- Apply a levee on capital programs for research transportation purposes.
- Recycle retirees for mentoring projects, e.g., PR, public presentations, positive reference models to present in schools. (See mentoring concept under *Recruitment and Education Priorities*.)

- Also, senior staff should mentor younger employees.
- Joint task force by industry, government and academia regarding future of transportation.
- Employ successful models to promote fundraising and training.
- Media involvement; create a coherent, unified voice to influence media to enhance transport's prestige and contribution to society. Build a budget for a media campaign, TV ads, etc.
- Develop a marketing pitch for the industry.
- Address low workforce morale.
- Construct a clearinghouse of information sources for the industry.
- Become more mindful of transportation culture, how it is perceived, and its influence on recruitment and retention.
- Stable employment is negatively affected by the seasonal nature of work.
- Importance of employee recognition programs, status.
- Communicate the importance of a life-long learning environment.
- Blend multi-modal learning with mentorship and pre-employment apprenticeship.
- Formulised knowledge management sharing strategy.
- Link stakeholder websites.
- The public perception that small government is desirable is interfering with getting more government financial support.
- Employers should be encouraged to expand scope within jobs (career orientation?) to better attract and retain staff.
- Promote career symposiums (convention centre).
- Good proactive planning can help industry get away from crisis management (succession planning).
- Profile success stories to enhance the prestige of careers in transportation.
- *Fickle factor* of student fads.

4. ANALYSIS AND IMPLICATIONS OF FINDINGS

In this section, the facilitator presents an analysis of findings regarding priorities based on the input of participants in the workshop breakout sessions. The proposed implications reflect, in part, an interpretation of findings offered for consideration to TAC and its partners.

At the outset, participants at the sessions were asked to brainstorm on the top priorities facing the transportation industry in the areas of *recruitment, education, and training*, and to provide other comments under the *miscellaneous* category. It was noteworthy that many crucial concepts and suggestions proposed by participants either transcend or inter-connect recruitment, education, and training. We think that TAC and its partners should acknowledge the crucial prerequisite role of a **marketing priority**. It is apparent that development of an overarching marketing plan is pre-requisite to cost-effective action in the areas of recruitment, education, and training.

Our assessment of participants' comments leads us to the following conception of marketing: The transportation family of interests encompasses a multi-sector industry. Development of an **overarching marketing vision** will ensure that status, role, prestige, coherence, and effectiveness be enhanced for all member stakeholder groups, including transportation companies and consultants, related academics, and government departments. Marketing planning will result in a **superior level of integration** and cohesion for this diverse transportation community, enabling it to credibly and cost effectively organise **compatible strategies** regarding recruitment, education, training, *and retention* to assure sustainable succession planning.

As part of a more conscientious marketing approach, transportation stakeholders need to increasingly focus on effective recruitment and **relevant education programs**, courses, workshops, and seminars to instill needed skills for entry level staff. Moreover, management should increasingly address **effective training and retention** of in-service professionals. Staff should be endowed with progressively higher levels of skills for career advancement. Also, management should embrace the emerging technological skills needed by the Canadian economy.

In effect, an initial grasp of the marketing dimension of the transportation family of interests is a prerequisite for coherent and **comprehensive workforce planning**. Sustainable **succession planning** requires a conceptual marketing framework, not mere piecemeal action in the areas of recruitment, education, or training. Such planning will allow for priority building in the areas of funding and organising recruitment **and retention** of staff, the education of new entrants, and the continuing education of in-service professionals.

4.1 Marketing Priorities

Here are the suggested **priority marketing actions** that go beyond recruitment, education and training:

- **Determine who speaks for the transportation industry.** Develop a **coherent voice** that will **credibly** represent the industry. Industry, government, and academia should coalesce scarce resources to craft an overarching goal and promote a unified communications program. Communications should target member stakeholder groups with pre-tested messages that work. Communications should also work with media to reach targeted groups in the public (e.g., schools, students, and guidance counsellors) to enhance transportation's prestige and contribution to society. Build a budget for both internal and external communications.
- Transportation stakeholders should construct an industry **inventory tree of all staff positions** by sector, level, and region. This inventory should indicate not only actual staff positions, but also staff **shortages** and **surpluses**. This inventory should **include salary / wages** for each position, and projections should demonstrate the **total revenues** overall, by sector, by region, and by position. Annual **changes in staff numbers** by position should be tracked. This comprehensive inventory should be placed on a universally accessible **website** and kept current. **Link stakeholder websites** to this inventory. By building and maintaining this marketing tool, various transportation professionals charged with overall

planning, and the planning of recruitment, education, training, and retention will be able to access this tool.

- Become more mindful of **transportation culture**, how it is perceived, and its influence on recruitment and retention. Stakeholders should measure both stakeholder and public perceptions (and misperceptions) about the industry. Then create priority areas of action to correct the transportation culture, and to communicate information to correct both stakeholder and public misperceptions of the industry. For example, the industry should better convey, internally and externally, that **transportation professionals include not only engineers**, but also many other professions (e.g., statisticians, economists, urban planners, etc.). Similarly, the industry should communicate **that transportation is more than roads**. (Notwithstanding TAC's mandated constraints, its strategic link to the *Education Coalition* reflects a broader alliance of interests related to transportation.)

The following points should be borne in mind by stakeholders when acting on the above mentioned marketing actions:

- Come to terms with the considerable difficulty of **predicting** staffing needs, shortages, and surpluses.
- Overall **succession planning**.
- Recycle retirees for **mentoring projects**, e.g., PR, public presentations, positive reference models to present in primary and secondary schools, and influence those who mould the consciences of children (e.g., guidance counsellors, teachers, parents, and children themselves).
- Employers should be encouraged to **expand scope within jobs** to better attract and retain staff.
- Promote career symposiums.
- Good proactive planning can help industry get away from crisis management.
- Profile success stories to enhance the prestige of careers in transportation.
- Develop appealing transportation **job descriptions** for each position and add to the website inventory.
- Develop appealing transportation **career profiles** and add to website inventory.

4.2 Recruitment Priorities

Based on the discussions overall, it is very clear that participants consider issues related to **recruitment** as being far more important than issues related to **education** and to **training**. Participants provided many comments during the discussion of recruitment. *Recruitment* refers to the constellation of issues regarding the conception and measurement of entry level staffing needs by sector and region, including appropriate measuring methodology, so as to ensure effective construction of sustainable alliances between industry, government, and academic stakeholders. Participants' comments pertain to issues of *barriers to recruitment* and their removal, fundamental and existential problems (e.g., challenges facing women), and calls to action. Also, participants underscore the importance of linking **retention** with recruitment. In our judgement, here follow the top recruitment priorities:

- As mentioned under *marketing priorities*, the construction and maintenance of a **comprehensive industry inventory** of staff positions, including shortages and surpluses, and salaries and wages will help in planning with partner stakeholders the recruitment of new staffers and trades professionals from allied fields outside of transportation.
- Overall **succession planning** should be integrated with recruitment priorities.
- The transportation industry should **modify the transportation culture** to render it more attractive to potential entrants (e.g., possibility to work in a challenging environment, career oriented – not just a job) and to promote retention of valuable in-service staff. Regarding potential entrants, introduce **mentoring** opportunities for retired professionals / in-service professionals to foster a positive image for the industry among the general public and post secondary students.
- Engineering recruits are seen by some as stable employees that stay. Industry has to work harder to attract and retain other groups of employees.
- Stakeholders should evaluate rival salaries and incentives for each position, level, and region. As necessary, industry should inaugurate **competitive salaries** and incentives.
- Co-ordinate with government and academia to ensure availability of programs to enhance prestige of transport careers.
- Develop appealing transportation **career** profiles.
- Develop Co-op programs.

- Industry needs a communications plan to sell the need for a recruitment strategy to company financial people.
- Construct an inventory of **best practices** regarding recruitment priority areas. Profile **success stories** from recruitment experience. Integrate with website.
- Publicise the opening for technicians and technologists. College graduates can grow in the job. Can't do P.Eng. work, but can do a lot of work under P.Eng. supervision.

4.3 Education Priorities

Education relates to the formation of **entry level staff** by universities and colleges. As with the notion of *marketing*, it includes all the prerequisite planning by industry to ensure that staffing requirements and skill sets are determined credibly so as to ensure the development of viable and sustainable alliances between industry, government and academia to offer relevant educational and vocational programs.

- As a prerequisite, those charged with education planning should ensure that the marketing inventory should be adapted to fulfill the needs of education planners. (See inventory concept under *Marketing Priorities*.) Specifically, the website inventory should link with a **comprehensive inventory of available and relevant academic programs**, courses, seminars, workshops, etc. provided by colleges, universities, and other sources.
- In conjunction with government and academia, industry should determine the priority transportation skill sets needed by entry level staff, by sector and level. Funding for courses and provision of scholarships should reflect these priority skill sets. To ensure a sustained capacity to educate, there should be **funded chairs for graduate studies**. These funded chairs / funded masters and doctoral programs and projects should not be limited to engineering, but also offered in other areas related to transportation – economics, business administration, mathematics, science, high tech, etc.
- The needed entry-level skills are not being taught: Cohesive planning by industry to induce academia to re-focus on transforming curricula to instill knowledge and skills needed by industry. Education curricula should include **specific job related skills and current technologies** (ITS, traffic planning, rehabilitation of degrading infrastructure, life cycle costing, optimal allocation of resources, safety, etc.), as well as **soft skills** (interpersonal skills, communications, management, economics, etc.).

- Obtain commitments by universities, colleges, and other technical institutes to offer the needed educational programs.
- Overall **succession planning** should be integrated with education priorities.
- Address the fact that many **professors lack practical experience** with the transportation industry.
- Inventory of **best practices** regarding education priority areas for action. Profile **success stories** in the education sphere. Integrate with website. Promote these through vehicles (TAC, National Transportation Week, and NSERC – Natural Sciences and Engineering Research Council).
- Engineering challenge: engineering basics take enough time and effort. Some universities are adding a fifth specialisation year.
- Should work with outside stakeholders to promote interest in **sciences and mathematics** in high school. This will increase the pool of potential students who could be drawn to transportation studies.

4.4 Training Priorities

Training relates to the on-going up-grading of skills of in-service professionals in transportation fields. As with the notion of *marketing*, it includes all the prerequisite planning by industry to ensure that requirements are determined credibly by *sector*, by *level*, and by region so as to ensure the construction of viable and sustainable alliances between industry, government and academia.

- Comprehensive **database of staff positions** by sector and by level, with indicated employment, shortages, and surpluses. (Also related to overall marketing, recruitment and education priorities.) Link database to stakeholder websites.
- Inventory of industry stakeholders, roles, and websites.
- Construct a comprehensive inventory of all transportation related courses available at education institutions and those sponsored by other providers, including via the internet, e-mail, on-site, etc.
- **Incentive** program; provision of training incentives for targeted employees.

- **Partnering** between industry, government and academia to prioritise, organise, fund, provide, and monitor the on-going training.
- Monitoring of **continuing education** to ensure its relevance.
- Inventory of **best practices** regarding training priority areas for action. Profile **success stories** in the education sphere stories (e.g., C-TEP). Integrate with website.
- Overall **succession planning** should be integrated with recruitment and education priorities.
- Construct **inventory of available training courses, workshops, and seminars**. Explore alternatives for training delivery.
- Overcome company **management's resistance to funding** or co-funding training of in-service professionals to gain needed skills. (Demonstrate cost of *not* training).
- Supplement formal academic courses with **practical workshops on emerging topics**, and other brief courses, both on-site and off site. Training offerings should include the most cost-effective approach based on: brief workshops and seminars, face-to-face sessions, e-mail communications, and long-distance learning over the Internet.
- **Priority subjects**: Project management, new technologies, sensitising management that continuing education requires practical support from management - funding, compensated time-off for training, ITS (Intelligent Transportation Systems, traffic planning, communication skills, rehabilitation of degrading infrastructure, life cycle costing, optimal allocation of resources, safety, etc.
- **Neglected areas of training**: human factors, bridge maintenance, asphalt technology, PCC (Portland Cement Concrete) technologies, BP (best practices) knowledge management, information sharing, environmental issues, management and leadership training soft skills (communication, inter-personnel relations, etc.), logistics training, asset management, financial budgeting and forecasting, core technological knowledge, safety, liability and due diligence.
- Make **travel dollars** available to attend off-site training,
- Staff need compensated time-off for training.
- **Construct career path** for employees that defined steps on the path: management should facilitate these steps.
- Build TAC coalition to access memberships and partnerships to identify and co-ordinate needs and to develop training opportunities.
- **Target tradespeople** for training and integration into the transportation industry.

- Introduce **industry sabbaticals** for intensive opportunities to up-grade skills.
 - Senior management and senior staff should **mentor younger employees**.
 - Communicate the importance of a **life-long learning environment**.

- Blend multi-modal learning with mentorship and pre-employment apprenticeship.