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December 1976

Survey of Logger Training

D.A. Scott and P.L. Cottell

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Foreword

This study of logger training in Canada was undertaken in the summer of 1975 in response to expressed industry concerns regarding the adequacy of current training activities for meeting projected manpower requirements in the forest industry. The desirability of importing logger training methods developed in Sweden was also suggested as a suitable question for FERIC to evaluate. These questions required better information on the numbers of forest workers needed in the industry, the numbers currently being trained, and the variety of training programs underway in Canada (including aspects of trainee selection and evaluation, course content, and instructional methods).

A survey was designed to reach a wide variety of industrial and institutional logger training programs across the country, through telephone contacts and on-site visits. The survey included a mail questionnaire sent to a representative sample of logging firms to assess current and planned training activity and the degree of success experienced. Assisting in the survey were: P.P. Tse and B.A. McMorland, Western Division, FERIC; students M.J. McDonald and R. Dawson, Faculty of Forestry, University of British Columbia; and L. Mailloux, Eastern Division, FERIC.

Many people in industry, community colleges and the Canada Manpower Department gave generously of their time to describe their programs and outline training problems as they saw them. They showed enthusiasm for the task of training in the logging industry, and offered many constructive suggestions for improvement.

Impressions of forest worker training in Sweden were gained in connection with the June 1975 FAO/ECE/ILO Symposium on Multi-Purpose Logging Machines. The assistance of Dr. C.-J. Bredberg and Mr. I. Johansson, Royal College of Forestry, Garpenberg, Sweden, and Mr. J. Hermelin, Forest Extension Service, New Brunswick Department of Natural Resources, in arranging visits to training facilities in Sweden is gratefully acknowledged.

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Summary

The objectives of a 1975 FERIC survey were to examine the status of logger training in Canada, and to evaluate the adequacy of current and planned training activities in meeting the needs of the forest industry. Representatives of industry and institutional training programs in most provinces were contacted, as were several training institutions in Sweden.

The report describes the general structure of logger training in Canada, and reviews various Canada Manpower programs which influence training activity. Only one-half of the firms surveyed reported that they made use of Canada Manpower financial support, and only one-third of the courses offered had such support. Better utilization of training funds available from the federal government requires: a) increased awareness among forest companies of funding programs for which they qualify; b) flexibility in governmental regulations so that firms are encouraged to apply.

Training programs seemed to suffer from a lack of communication and co-ordination with people in other, similar organizations. This applied to techniques for trainee selection and evaluation, curriculum development and teaching, as well as access to reference materials and instructional aids. There is a need for more contact and sharing of experience among specialists in logger training (for example, technical seminars, news bulletins). An up-to-date central reference library containing information on training programs and teaching materials would be helpful.

The selection of trainees was identified as a major problem; there are few reliable guidelines for choosing individuals who are likely to be successful in a logging occupation. This helps account for the high attrition rate of training course graduates. Industry data indicated that an average of only 43% of graduates were retained in the forest industry for one year. Canada Manpower statistics showed only 29% of graduates were retained in the forest industry three to four months after completing their training. Research is needed on aptitude testing instruments (for example, the General Aptitude Test Battery) and counselling instruments (for example, the Canadian Occupational Interest Inventory) to help improve the selection of appropriate candidates.

Another likely reason for poor retention of trained workers is the frequent inattention to placing graduates in jobs. Supervisors in both training institutions and industrial operations have a stake in providing a more supportive environment for the new workers. However, training programs should not be held responsible for turnover of new workers that is attributable to poor job or community conditions, or to better economic opportunities. Solutions to these problems lie elsewhere.

Estimates differ regarding the size of, and trends in, the logging labour force, making it difficult to assess the adequacy of present and planned training efforts. If Canada Manpower projections are accepted (that is, an average of 3,165 new logging employees required annually to 1982), then current forest industry training levels appear about right (9,000 people trained per year, with a retention of one-third from FERIC estimate). However, more efficient selection and training would mean a substantial saving in training resources.

An examination of forest worker training in Sweden provided many useful comparisons. Most impressive were the thoroughness of student preparation in the two-year "forestry line" within the secondary school system, and the co-ordination of programs across the country. There is clear opportunity for the worker to progress through several training levels, in combination with vocational experience. This structure, while admirable, may not be feasible in Canada because of greater geographic diversity and the complexities of the federal-provincial division of responsibility in educational matters. Nevertheless, there are opportunities for adapting to Canadian conditions innovative instructional techniques developed in Sweden.

Sommaire

Une enquête de FERIC menée en 1975 avait pour but d'analyser l'état de la formation des travailleurs de la forêt au Canada et de déterminer dans quelle mesure les programmes de formation actuels et en voie d'élaboration répondent aux besoins de l'industrie forestière. Des personnes engagées dans les programmes de formation de l'industrie et des organismes gouvernementaux dans la plupart des provinces ainsi que des representants de plusieurs instituts de formation suédois ont alors fait part de leur expérience.

Le rapport analyse la structure générale de la formation des travailleurs forestiers au Canada et passe en revue divers programmes du Centre de Main-d'oeuvre du Canada qui exercent une influence sur les activités de formation. Seulement la moitié des compagnies interrogées ont affirmé qu'elles avaient recours à l'appui financier du Centre de Main-d'oeuvre du Canada et seulement le tiers des cours dispensés bénéficiaient d'un tel appui. Pour que les fonds affectés à la formation par le gouvernement fédéral soient mieux utilisés, il faudrait que: a) les compagnies forestières soient plus au courant des programmes de financement dont elles peuvent profiter; b) le gouvernement assouplisse ses règlements de sorte que les compagnies soient encouragées à présenter une demande.

Il semble que l'on ait à déplorer un manque de communication et de coordination entre les personnes et les organismes engagés dans les programmes de formation. Ceci s'avère exact pour les techniques de sélection et d'évaluation des stagiaires, l'enseignement et la mise au point des plans d'etudes ainsi que l'accessibilité aux ouvrages de référence et aux auxiliaires pédagogiques. Il importe que les spécialistes en formation des travailleurs de la forêt aient des rapports plus fréquents en vue de partager leur expérience (par exemple, des séminaires techniques, des bulletins d'information). Il serait profitable de mettre sur pied une bibliothèque centrale de référence regroupant les données les plus récentes sur les programmes de formation ainsi que le matériel didactique disponible.

La sélection des étudiants constitue un problème majeur; on ne dispose pas de critères sûrs permettant de choisir les

individus susceptibles de faire carrière dans le secteur forestier. Ceci explique en bonne partie le faible taux de persévérance parmi ceux qui ont complété un cours. Les données de l'industrie démontrent qu'en moyenne, seulement 43% d'entre eux occupent un emploi dans l'industrie forestière durant plus d'un an. Les statistiques du Centre de Main-d'oeuvre indiquent que seulement 29% des diplômés travaillent encore dans l'industrie forestière trois ou quatre mois après avoir terminé leur formation. Des recherches s'imposent en vue de mettre au point des instruments de mesure des aptitudes (par exemple, la batterie de tests d'aptitude générale) et des mécanismes de consultation (par exemple, l'inventaire canadien des choix de carrières) qui faciliteront la tâche de sélectionner des candidats valables.

Le faible taux de persévérance dans le secteur forestier semble également découler d'une carence au niveau de l'orientation et du placement des personnes qui ont complété les cours. Les responsables des cours de formation et de l'exploitation industrielle devraient apporter aux nouveaux travailleurs appui et encouragement. Toutefois, on ne doit pas imputer aux programmes de formation la responsabilité de certains abandons qui sont en fait la conséquence de conditions d'emploi ou de contexte social défavorables, ou de l'attrait qu'exercent d'autres secteurs de l'économie. Il faut chercher ailleurs la solution à ces problèmes.

Les experts ne s'entendent pas quant au volume et aux tendances de la main-d'oeuvre forestière, ce qui complique la tâche d'évaleur le bien-fondé des activités de formation actuelles et projetées. Si on se base sur les projections du Centre de Main-d'oeuvre du Canada (c'est-à-dire une augmentation annuelle moyenne de 3,165 emplois forestiers d'ici 1982), on peut conclure que les cours de formation actuellement dispensés par l'industrie forestière suffisent à la demande (d'après les estimations de FERIC, 10,000 personnes reçoivent une formation chaque année, dont le tiers font carrière dans l'industrie). Cependant, on pourrait realiser des économies substantielles grâce à une sélection et à une formation plus efficaces.

L'analyse des méthodes de formation des travailleurs forestiers qui on cours en Suède a permis de tirer plusieurs conclusions judicieuses. On doit s'incliner devant la preparation approfondie

que reçoivent les stagiaires lors de la "concentration forestière" d'une durée de deux ans, dispensée dans le cadre du cours secondaire, et devant la coordination des programmes dans l'ensemble du pays. Le travailleur a la possibilité d'acquerir de l'experience en passant par divers niveaux de formation que viennent compléter des stages pratiques. Mais il est possible que cette structure exemplaire ne puisse être appliquée au Canada à cause de la plus grande diversité géographique et de la complexité du partage des pouvoirs entre les gouvernements fédéral et provinciaux dans le secteur de l'éducation. Quoi qu'il en soit, le Canada peut s'inspirer avec profit des techniques pédagogiques d'avant-garde mises au point en Suède.

INTRODUCTION

In recent years, people have questioned the success of both industrial and institutional programs for the occupational training of loggers in Canada. Across the country, shortages of trained loggers persist in most job categories. Effective training seems to be a necessity for reducing manpower shortages, although it is not a sufficient corrective for turnover attributable to job conditions or to the prospect of better economic rewards in other industries.

The various approaches to logger training have to be examined to find out which are working, which are not, and why. To respond to this need, FERIC conducted a survey in 1975 of logger training practices in Canada. The survey was to answer these questions:

1. What is the current status of logger training in Canada?
2. How adequate is the quality of logger training in Canada, and how can the quality of training be improved, if necessary?
3. Is current logger training activity sufficient to meet projected manpower needs of Canadian industry?

The survey activities included:

1. A telephone survey of personnel directly involved in logger training;
2. On-site visits to selected institutions (vocational schools) and firms (logging companies) conducting logger training;
3. A mail questionnaire sent to active logging firms;
4. Discussions with regional and federal officials regarding the role of Canada Manpower in logger training;
5. On-site visits to selected logger training institutions in Sweden.

The survey contacted industry and institutional training personnel in every province except Prince Edward Island. While not all of the training programs and people could be included, an effort was made to reach as many as possible. The survey included only logger training courses with formal programs. The less formal, on-the-job training that occurs each time a worker is instructed in the performance of the job is important, but outside the scope of the survey. Neither did the survey include training offered by manufacturers and distributors of logging equipment.

The interview and questionnaire results were confidential as to particular individuals, institutions or firms, to ensure frank discussion of training problems. Co-operating firms and institutions are not identified in the report, nor are any of the training programs described in their entirety. Instead, the report draws together observations of the various practices used in different training programs, to discuss their adequacy in meeting logger training needs.

SURVEY METHODS

Telephone Survey and On-Site Visits

This part of the study employed a standard series of questions asked of persons involved in institutional and industry-based logger training. Respondents detailed the courses currently being offered, or the last course which had been offered. Information from the telephone contacts was used to select firms and institutions having distinctive training programs that would justify on-site visits.

The survey began with forest industry consultants of Canada Manpower in each of their five regions (Pacific, Prairie, Ontario, Quebec and Atlantic). They suggested the names of people in firms and training institutions who were involved in formal training of loggers in each region. These people, in turn, suggested others who should be contacted. This procedure is non-random, and does not produce results which can be generalized. Nevertheless, it can give insight to the procedures and problems of important "cases" in Canadian logger training.

In all, the survey contacted 22 firms and 11 training institutions, including on-site visits to 8 firms and 8 institutions. These 33 organizations conducted a total of 60 training courses which were either on-going, or had been completed within the last five years. All except two firms had trained loggers within the last two years.

The courses offered for similar occupations were grouped (Table 1). These groups are used throughout the report for summarizing information on training courses. Most of the 33 organizations surveyed concentrated training on the basic entry occupations in logging. However, a substantial proportion of the firms contacted offered training in more complex mechanized occupations.

TABLE 1 — Logger Training Courses Surveyed, By Occupational Category.

Type of Training Course	Occupations Trained For	No. of Firms	No. of Institutions
High Lead	Chokerman; Chaser; Rigging Slinger; Hook Tender; Yarding Engineer; Tension Skidder Operator	0	1
Cut/Skid	Power Saw Operator; Bucker; Skidder Operator	17	9
Machine Operator	Loader Operator; Limber Operator; Log Dump Operator; Tractor Operator; Grader Operator; Slasher Operator	9	1
Mechanical Harvesting	Feller-Buncher Operator; Forwarder Operator; Processor Operator; Harvester Operator	8	1
Mechanic	Heavy-Duty Mechanic	4	0
Supervisor	Logging Supervisor; Forestry Supervisor; Foreman; Engineer	0	0
Other	Industrial First Aid; Warehouseman; Rock Driller; Swamper; Boat Operator	3	1
	Total[1]:	41	13

[1] Totals exceed the number of organizations sampled because some offered more than one type of course.

Mailed Questionnaire Survey

The questionnaire (Appendix I) mailed to Canadian logging firms was designed to estimate:

1. the extent of logger training activities in the industry over the past five years;
2. 1975 training activity in the industry;
3. training activity proposed for 1976 and beyond;
4. the success of past training activity;
5. the extent of Canada Manpower financial support of industrial logger training.

Firms receiving the questionnaire comprised a random sample (Appendix II) of forest products companies engaged in logging, drawn from:

— the 1975 Directory of the Forest Products Industry[2];
— the list of member companies of the Woodlands Section, Canadian Pulp and Paper Association (CPPA);
— the FERIC mailing list.

Of the 69 questionnaires sent, 49 (71%) were returned. The return rate was acceptable, and the sample constituted 5.8% of firms in the sampling frame. The sample was unbiased with regard to provincial representation (Appendix II).

[2] The Directory of the Forest Products Industry. Miller Freeman, San Francisco. 1975.

LOGGER TRAINING IN CANADA

The Structure

Logger training in Canada takes place in publicly-supported vocational schools, or regional colleges, which come under the jurisdiction of the provincial departments of education, and in private logging firms. A large portion of the financial support for their programs comes from the federal government, through Canada Manpower, and from individual provinces. Provincial support of logger training at institutions varies considerably, but generally provides for the operating costs of the school and the instructors' salaries. Industry support of institutional training may include provision of timber stands for logging instruction, items of equipment, and participation in advisory or selection committees.

Training programs funded by Canada Manpower[3] must have their curricula certified by the appropriate provincial authority, typically provincial departments of labour or education. This federal-provincial division of authority

[3] Information was obtained from Canada Manpower regional industrial consultants for forestry, and federal Canada Manpower personnel including representatives from the Manpower Research Projects Group, Planning Branch, Counselling Service, and federal forestry consultants. Other sources included pamphlets produced by Canada Manpower and the Canada Manpower Annual Report for the Fiscal Year 1973-1974.

exists by legislative requirement. The effect of provincial control over training curricula depends upon the amount of authority the particular province decides to exercise. Thus, curriculum approval can range from acceptance of a simple one-page outline by some provinces, to total curriculum control by other provinces.

While Canada Manpower supports both institutional training and training in industry, its responsibility does not include actual development of training courses. This is the responsibility of the training institution or firm establishing the training program. In some provinces, Canada Manpower personnel aid in curriculum development on a consultative basis.

Canada Manpower and Industrial Training

Canada Manpower provides financial support for industrial training through its "Training In Industry Program". A brief description of the procedure is presented below.

1. An individual employer interested in establishing a training program contacts the local Canada Manpower Centre, and provides the industry consultant at the Manpower Centre with a training proposal. If the employer does not have a fully developed training proposal, the Manpower Centre consultant can assist in developing one. The training proposal can provide for upgrading existing employees, or for training unemployed or disadvantaged people.
2. The completed training proposal is reviewed at the local Canada Manpower Centre. If the proposal is approved, Canada Manpower and the employer sign a training contract. Canada Manpower will pay up to 100% of the course costs (salaries of instructors, rental of training premises, texts, manuals, equipment) and from 40% to 85% of the trainees' wages. Trainees with "Special Needs" are supported at the 85% rate. These are people who have difficulty securing or retaining employment.

   Trainees who were unemployed prior to entering training, but who do not fall into the Special Needs group, are supported by Canada Manpower at a 60% rate. For purposes of determining the eligibility for the 60% support rate category, the unemployed are those who have been without work for a minimum of five days prior to having been referred for training *and* who lack marketable skills. Also eligible for 60% support are "persons whose employment is threatened because of technological, economic, or other changes and who can be re-trained for other employment".

   All other trainees are supported by Canada Manpower at the 40% rate. The maximum support available (1976) was $147.00 per week.
3. Canada Manpower financial support of industrial training **excludes:** (1) production equipment such as chainsaws or skidders; (2) production equipment rental charges; and, (3) indirect wage costs such as holiday pay, insurance, pension plans, and unemployment insurance. Employers who have signed contracts with Canada Manpower retain the right to select trainees.
4. In training programs supported by Canada Manpower the training objectives must have priority over production objectives. Canada Manpower will provide assistance in instructor training through a five-day course in Instructional Techniques (such courses are given at Canada Manpower Centres or are specially developed for a group of employers).
5. The training contract signed by Canada Manpower and the employer can include 10% of the total agreed to in the contract as developmental costs for the training program.
6. The course content of the proposed training program must be approved by the appropriate provincial government agency. Canada Manpower will aid the employer by providing the necessary forms and names of persons in the provincial government who must be contacted.
7. Training courses supported by Canada Manpower can have a maximum duration of 52 weeks or 1,820 hours, and a minimum of 30 hours. During the training, the employer is expected to maintain proper accounts and records.
8. Training contracts can be signed with employer associations, following the procedure outlined above.
9. Local Canada Manpower Centres can provide more detailed information concerning the establishment of an industrial training program.

The firms surveyed by mail were asked about the extent of Canada Manpower support of their programs. About one-third of the courses

received such support (Table 2), and this proportion was anticipated to remain constant. However, more **firms** expected they would receive Canada Manpower support for training in the future than at present.

Although financial support is available from Canada Manpower and many courses may qualify, approximately one-half of the reporting firms were training loggers without this assistance.

TABLE 2 — Canada Manpower Financial Support of Logger Training.

Period	No. of Courses	No. of Firms	Percent of Courses Supported	Percent of Firms Supported
Past Five Years	75	25	32.0	44
1975	49	16	32.6	50
Future	63	18	33.3	56

Canada Manpower and Institutional Training

Canada Manpower supports vocational training in various provincial institutions through the "purchase" of class spaces. The spaces are filled by persons chosen and referred to the program by Canada Manpower counsellors. The training institution must accept these referrals, but can fill any remaining spaces as it sees fit.

Canada Manpower financial support for vocational training in all industries throughout Canada totalled $401 million in fiscal year 1974-75. Of this, $4.1 million went to support training in logging occupations — two-thirds for institutional programs, and one-third for industry-based programs.

Other Canada Manpower Training Services

1. Training Development Projects. In 1975, the funding program for Training Development Projects was in its fourth year. Projects whose goal is the improvement of training are eligible. Projects may involve curriculum development, better selection and placement techniques or other activities which could improve training. The budget for this program in the 1974-1975 fiscal year was $5 million.

   Contracts for Training Development Projects are generally signed between Canada Manpower and the province in which the project is to be carried out. These projects offer ways to improve training within the forest industry.
2. Outreach. The Outreach program is designed to "facilitate the effective availability of Manpower programs and services to individuals and groups who do not have adequate access to these programs and services". Firms could use this program to develop training programs for disadvantaged groups.
3. Counselling Services. The Canada Manpower Counselling Services Directorate administers personnel testing, and can provide test materials, scoring and analysis services. This commonly employs the General Aptitude Test Battery (GATB), which is available to individuals and organizations through the GATB External Users Program. External Users may obtain these services for personnel selection, placement and research, provided suitably qualified persons administer the tests and interpret the results. Local Canada Manpower Centres have facilities for administering the GATB to candidates.

Canada Manpower is also completing the development of a new procedure for assessing vocational interest — the Canadian Occupational Interest Inventory (COII). This instrument is intended for use in counselling, to advise potential trainees and others of the likelihood that they would be interested in a given line of work.

Norms (standard acceptable scores) are not yet available for logging occupations for either GATB or COII, although they have promise[1] for use in selection and counselling in this field.

[1] A limited test of portions of the GATB is reported in: Cottell, P.L., Barth, R.T., Nelson, L., McMorland, B.A., and Scott, D.A. Performance variation among logging-machine operators: felling with tree shears. Technical Report No. 4, FERIC, Vancouver. 1976.

Program of Instruction

Training Activity

In the mailed questionnaire, logging firms indicated their past, current and planned training activities (Table 3).

TABLE 3 — Logger Training Activities of Firms Surveyed.

	Yes	No	Percent[1] Yes
Trained in Past 5 Years?	25	21	54%
Training in 1975?	16	30	35%
Planning to train in 1976?	18	28	39%

Only about one-half of the firms had conducted any logger training during the last five years. A slight increase from the 1975 level was planned for 1976.

By comparison, Armitage[2] in 1947 reported a survey of CPPA member companies which indicated that 43% had intensive training programs, 16% conducted some training and 41% had no training programs. He concluded that CPPA companies needed to increase their training activities — an interesting comment in view of the lower training levels shown in Table 3. Carruther's survey[3] of 68 CPPA companies or company divisions indicated that 53% of the firms offered "woodlands training to operators", and 52% offered supervisory (including executive) training. Fifty-four percent had offered training in the past five years, which agrees with Table 3 above.

Courses

Tables 4, 5, and 6 summarize additional information on past, present and planned future training activity of the FERIC mail survey respondents. The courses reported are categorized into basic training, upgrading for experienced workers, and on-the-job training where trainees work with experienced men under production conditions. The tables show, for each occupational group trained, the number of courses, length of training period, and number of candidates admitted.

Table 4 provides information on only the last completed training course for each firm, to avoid repetition where courses may have been given several times.

Table 5 shows that in 1975, the length of the instruction period and number of trainees varied widely across course types, and even within a particular course type. The data agreed generally with what one would expect, considering the differing levels of difficulty of the occupations being taught. For example, basic training for mechanics varied from three to five years, reflecting the presence of apprenticeship programs. The length of courses for operators of mechnical harvesters was much shorter, on the average, than for machine operators or even cut/skid crews. Given the complexity of harvesting equipment such as feller/bunchers, harvesters, processors, and forwarders, one might expect that courses for operators of mechanical harvesting equipment would average longer than 4.7 weeks. The greater previous experience of mechanical harvesting trainees may account for this pattern.

From the data in Table 5, it was estimated[4] that the forest industry trained nearly 6,600 persons in basic logging during 1975, and about 10,000 over all training categories.

When past and current training are compared (Tables 4 and 5), it seemed there formerly were relatively more cut/skid courses. The proportion of mechanical harvesting courses has increased (6/49 or 12% currently, versus 6/75 or 8% previously), although the difference was not statistically significant. Formerly, courses for mechanical harvesting were longer, and machine operator courses shorter.

The responding firms planned to increase the number of training courses in 1976 (Table 6), and at the same time reduce course length and increase the number of trainees. An explanation for this projected increase may be the anticipated

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[1] Some firms did not answer all questions. Percentages based on number of responses to each question.

[2] Armitage, R.S. "Training of woods labour and personnel". CPPA, Woodlands Section. WSI No. 903 (B-2). 1947.

[3] Carruthers, D. Analysis of the questionnaire on training. Proceedings: Conference on training and development, Vancouver. CPPA. 1974.

[4] The 49 returned questionnaires represented a 5.8% sample of Canadian forest products firms. The weighting factor was thus 1/.058 = 17.24. The average number of trainees per course in basic training was 10.58 over 36 such courses. For the sample, the number of trainees was estimated as 10.58 x 36 = 380.88. Hence, the estimate for the industry was 17.24 x 380.88 = 6,566 trainees. The estimate for all courses was calculated similarly as: 11.8 trainees per course x 49 courses x 17.24 = 9,968 trainees.

TABLE 4 — Logger Training Courses Offered Within Past Five Years. (From questionnaire survey.)

COURSE TYPE	NUMBER OF COURSES				AVERAGE LENGTH (WEEKS) AND RANGE				AVERAGE NUMBER OF TRAINEES AND RANGE			
	Basic	Up-Grade	On The Job	Total	Basic	Up-Grade	On The Job	Total	Basic	Up-Grade	On The Job	Total
High Lead	5	—	11	16	4.3 1-8	—	N.A.	4.3 1-8	3.2	—	25.5 1-50 (9 N.A.)	9.6 1-50
Cut/Skid	15	4	3	22	8.4 1-16	N.A.	N.A.	8.4 1-16	34 5-120	8 (3 N.A.)	1	28 1-120
Machine Operator	8	1	4	13	5.5 2-12	N.A.	N.A.	5.5 2-12	13 1-35	N.A.	1 (3 N.A.)	11 1-35
Mechanical Harvesting	2	2	2	6	11 2-20	N.A.	N.A.	11 2-20	26 12-40	8	N.A.	17 8-40
Mechanics	2	3	—	5	156	12.5 5-20 (1 N.A.)	—	84.4 5-156	8 1-15	20 (2 N.A.)	—	12 1-20
Supervisory	3	—	2	5	7.7 4-15	—	N.A.	7.7 4-15	10.3 10-11	—	N.A.	10.3 10-11
Other	5	—	3	8	13 9-15	—	N.A.	13 9-15	12.8 5-20	—	50 (2 N.A.)	20 5-50
All Courses	Total: 75				Average: 16.9 weeks Range: 1 - 156				Average: 18 trainees Range: 1 - 120			

N.A. = Not available.

TABLE 5 — Logger Training Courses Offered, 1975. (From questionnaire survey.)

COURSE TYPE	NUMBER OF COURSES				AVERAGE LENGTH (WEEKS) AND RANGE				AVERAGE NUMBER OF TRAINEES AND RANGE			
	Basic	Up-Grade	On The Job	Total	Basic	Up-Grade	On The Job	Total	Basic	Up-Grade	On The Job	Total
High Lead	4	—	2	6	9 8-10	—	N.A.	9 8-10	2 1-3	—	50	11.4 1-50
Cut/Skid	9	1	—	10	8 2-22	N.A.	—	8 2-22	16 2-35	8	—	15 2-35
Machine Operator	9	—	1	10	10.3 4-26	—	N.A.	10.3 4-26	8.8 1-35	—	N.A.	8.8 1-35
Mechanical Harvesting	3	2	1	6	4.7 2-10	N.A.	N.A.	4.7 2-10	9 3-12	8	N.A.	9 3-12
Mechanics	4	3	—	7	169 156-208	8.7 2-16	—	100 2-208	13.8 1-25	5.3 4-8	—	10.1 1-25
Supervisory	2	—	1	3	4	—	N.A.	4	10	—	N.A.	10
Other	5	—	2	7	6 1-9	—	N.A.	6 1-9	9.5 1-20	—	50	17.6 1-50
All Courses	Total: 49				Average: 28 weeks Range: 1 - 208				Average: 11.8 trainees Range: 1 - 50			

N.A. = Not available.

TABLE 6 — Logger Training Courses Planned For 1976. (From questionnaire survey.)

COURSE TYPE	NUMBER OF COURSES				AVERAGE LENGTH (WEEKS) AND RANGE				AVERAGE NUMBER OF TRAINEES AND RANGE			
	Basic	Up-Grade	On The Job	Total	Basic	Up-Grade	On The Job	Total	Basic	Up-Grade	On The Job	Total
High Lead	6	—	5	11	3.8 1-8	—	N.A.	3.8 1-8	6.5	—	50 (4 N.A.)	12.7 2-50
Cut/Skid	12	1	1	14	10.7 3-22	N.A.	4	9.9 3-22	12.6 1-35	8	N.A.	12.1 1-35
Machine Operator	10	—	2	12	8.4 2-25	—	N.A.	8.4 2-25	11.8 2-40	—	N.A.	11.8 2-40
Mechanical Harvesting	4	2	2	8	4.5 2-8	N.A.	N.A.	4.5 2-8	21 1-40	8	N.A.	16.7 1-40
Mechanics	2	2	2	6	182 156-208	10 4-16 (1 N.A.)	N.A.	96 4-208	15 5-25	15.3 2-40	15	15.2 2-40
Supervisory	3	—	2	5	3.3 2-4	—	N.A.	3.3 2-4	20 10-40	—	N.A.	20 10-40
Other	4	—	3	7	8.5 8-9	—	N.A.	8.5 8-9	12.3 2-20	—	50 (2 N.A.)	21.8 2-50
All Courses	Total: 63				Average: 17.2 weeks Range: 1 - 208				Average: 14.5 trainees Range: 1 - 50			

N.A. = Not Available.

upturn in forest products market conditions.

Twenty-one of the 28 firms that planned not to conduct logger training in 1976 gave reasons for their decision (Table 7).

TABLE 7 — Reasons For "No Training Planned in 1976".

Reason	No. of Firms
Obtain wood from contractors	8
Hire experienced people only	8
Training is too costly	4
Firm inactive	1

Instructors

Educational standards for instructors in training institutions depended upon the requirements of the province in which the training institution was located. In some cases, special training in teaching techniques was not required, while other provinces required that instructors take courses of one to three months duration for certification. In all cases, the pay and fringe benefits associated with the instructor's job were competitive with the industry.

Educational requirements for instructors in industry were less than those in training institutions. It was not uncommon, however, to find industry-based logging instructors who had taken courses in teaching techniques.

Firms and institutions selected logger training instructors on the basis of their industry experience and ability to communicate. The selection was typically done through the use of interviews. In a few instances, instructors were also chosen on the basis of particular qualities which were necessary for the type of training offered. For example, one institutional training program involving primarily native trainees hired instructors who could speak the native language.

Course Preparation

The successful teaching of skills depends upon careful course preparation. What is to be taught, how it is to be taught, and the order in which topics are to be covered are crucial decisions. Such decisions should be made by persons qualified to judge what skills a logger needs in industry. In general, the courses offered by surveyed firms and institutions covered the necessary content adequately, although their approaches to curriculum development varied.

Educational specialists, with the financial support of New Start Inc. (part of the Canada New Start Program funded by the federal Department of Regional Economic Expansion), have developed a step-by-step procedure for preparing a course curriculum[1]. This procedure is called DACUM (from "**D**eveloping **a** **C**urriculu**m**"). One firm and three of the institutions surveyed were using the DACUM approach.

The general topics (communicate, care for tools, etc.) are shown on the right side of the DACUM chart (Figure 1). Each small box represents a lesson. Lessons are given in the time sequence indicated, beginning at the left side of the chart and progressing to the right. Plans are prepared for each lesson; together the lessons lead to the desired level of knowledge of the general topic.

For example, the general topic "utilize wood fibre" included lessons on identification of tree species, harvesting according to the market situation, minimizing waste of tops, stumps, and pile bottoms, measuring log volume and the volume of short-wood piles. The instructor used audio-visual and other aids for presenting the material in the lesson plan (e.g., photographs, bark, twig, and leaf samples, and on-site observation of the various tree species). By comparison, the topic "harvest wood fibre" comprised 24 specific lesson plans.

In addition to providing a rational step-by-step procedure for preparing a course curriculum, the DACUM approach gives guidelines for preparing rating procedures to evaluate the progress of trainees.

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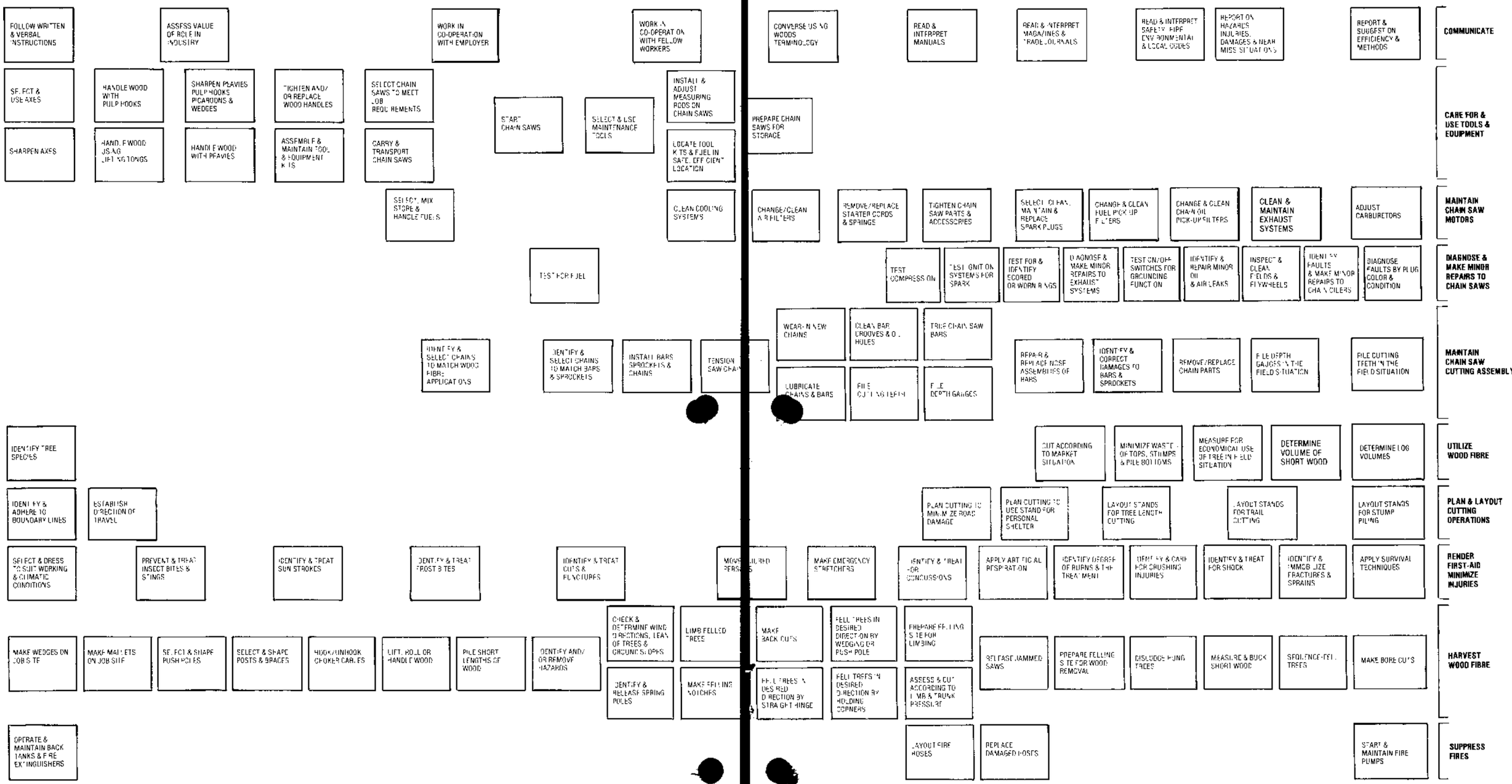
[1] Adams, R.E. DACUM Approach to curriculum, learning, and evaluation in occupational training. Second ed. Nova Scotia New Start Inc., Yarmouth. 1973.

DACUM Chart for Course in Power Saw Operation.

FIG. 1 — DACUM Chart for Course in Power Saw Operation.



The Trainees

Selection

Information about a candidate which is demonstrably related to his potential as a trainee and worker can be used for selection purposes. Procedures for selection include: interviews, aptitude tests and assessment of such characteristics as age, education, vocational interest and previous experience. Selection procedures used by the training institutions and firms contacted varied from simply accepting applications until the course was filled, to use of psychological testing (Table 8).

TABLE 8 — Trainee Selection Procedures.

Procedure	No. of Firms	No. of Institutions
Canada Manpower Referral[1]	15	7
Interview	8	3
"Aptitude"	7	0
Seniority	7	0
Tests	3	1
Physical Standards	2	2
Education Standards	1	1
Age Standards	1	1
Selection by Foreman or Instructor	1	1
Total[2]	45	16

[1] Canada Manpower referrals include, in many cases, the use of interviews and physical standards.

[2] Totals exceed the number of organizations sampled because some used more than one selection procedure.

The most common selection procedure was to accept Canada Manpower referrals, sometimes supplemented by an interview. Three firms and five institutional programs relied solely upon Canada Manpower referrals for trainees, and they applied no further selection procedure. Some firms and institutions indicated criteria (e.g., physical, educational and age standards) they considered in the selection procedure. Presumably, these criteria have been evaluated through biographical information forms, physical and other examinations.

Fewer than one-half of the firms and institutions in the study actually interviewed applicants, and only three firms and one institution engaged in any testing procedures. However, all survey respondents involved in training agreed that their program would be improved if they could receive trainees who were better qualified and motivated to carry out the tasks required of a forest worker.

Several trainers noted that Canada Manpower referrals were frequently unacceptable. This may be because referrals were sometimes based upon priorities other than whether the referred individual had good potential as a logger. "Hardcore" unemployed, the socially disadvantaged, or members of minorities are groups that should receive special attention in the area of employment opportunity. The difficulty came when an individual's belonging to one of these high priority groups was the main reason for his being referred to a logger training program. The impact of inappropriate referrals appeared greatest where Canada Manpower "bought" spaces in institutional training courses. The training organization had to accept referred candidates, even though the trainers may have considered the individuals to be unsuitable. This tended to discourage both the trainers and other, more suitable, trainees. Instructors felt that having no say about the trainees they received was the single most important problem they faced in training.

Another complaint was that counselling provided by Canada Manpower was inadequate. Potential students were reportedly uninformed, or misinformed, about the nature of the training program, course requirements, starting dates and times, and even the school's location.

In one institutional training program, students were referred on a "constant intake" basis; that is, a new trainee was added to the program each time a current trainee graduated or dropped out. According to the trainers, continuous intake was in one way desirable because candidates did not have to wait until a new course began. Unfortunately, this referral policy appeared to be detrimental to the training program. The instructors commented that: (1) not knowing what to expect in terms of the ability of new trainees coming in; and, (2) having to deal simultaneously with trainees at different levels of training in the program, led to an extremely difficult teaching situation.

These comments are not to condemn current referral policies. Many referred candidates have been successful, particularly where the referrals were based upon each individual's interest in logging as a vocation, and his ability to profit from the training and learn the necessary logging skills.

One technique used to reduce the number of unsuitable trainees involved taking all of the new candidates to an actual logging site. Some

of the prospective trainees found that the realities of logging were not what they had expected, and decided to drop out of the training. This saved their own time, as well as needless training expense. Candidates who remained were more likely to be genuinely interested in a logging occupation.

Charging a fee was another approach to screening out unsuited or poorly motivated trainees. At one logging school, some of the students had to support themselves fully during training, as well as pay a modest fee. Other students received the usual Canada Manpower support. Ten percent of "fee payers" terminated their training before completion, compared to 15½% of those who did not pay fees. Sixty-nine percent of the fee payers were placed in jobs, compared to 55% of those who did not pay fees.

Interviews with prospective trainees can help determine which applicants have a desire to work in the woods. Aptitude tests also have potential value. Positions such as heavy-duty mechanic, or heavy equipment operator require aptitudes in areas such as eye-hand co-ordination, visual depth perception, and knowledge of shop arithmetic. These aptitudes can be effectively assessed by testing. The commonly used General Aptitude Test Battery (GATB), while available through Canada Manpower Centres, has been little used by logging firms and logger training institutions. This is partly because adequate GATB norms (scores designed for making selection decisions) are not yet available for logging occupations. As a result, referrals by Canada Manpower to logger training programs cannot yet be based upon tested aptitudes.

Evaluation during Training

The progress of trainees should be monitored during the course to determine whether they have learned the material. The training organizations contacted used a variety of evaluation methods (Table 9).

"Subjective Instructor Evaluation" refers to the instructor's periodic observation of trainees while some task is being performed, to determine each trainee's level of mastery. "Tests" are typically true-or-false examinations used to evaluate the trainee's understanding of specific facts. "Specific Rating Check Lists" refer to rating procedures which involve an assessment of the trainee's performance on specific tasks (e.g., does he step back from the tree once the felling cut is completed?). "General Rating Check Lists" refer to rating procedures to assess factors such as motivation, attention to detail, and willingness to work.

Subjective instructor evaluation and tests were used more than the other evaluation procedures. Among the organizations contacted, specific rating check lists were more common among the training institutions than among firms. None of the institutions made use of production quotas for evaluation.

The most effective evaluation approach is to assess periodically the trainee's performance of specific task components, and to feed back evaluation results to enable the trainee to modify his performance where necessary. A positive effect of using a step-by-step evaluation procedure is that it encourages step-by-step teaching of tasks. The more specific and detailed the evaluation, the more useful such evaluation becomes for both the trainee and the instructor.

Training Success

The criteria used in the FERIC survey to define training success were:

1. Percentage of trainees who successfully complete the training program;
2. Percentage of trainees actually entering employment in the forest industry;
3. Percentage of trainees retained in the woods work force for up to one year following successful completion of training;
4. Length of time for a trainee to reach average levels of production, following successful completion of training.

TABLE 9 — Trainee Evaluation Procedures.

Procedures	No. of Firms	No. of Institutions
Subjective Instructor Evaluation	16	5
Tests	6	7
Production Quotas	4	0
Specific Rating Check Lists	3	6
General Rating Check Lists	3	1
Attendance	1	0
Evaluation of Equipment Usage	0	1
Self-Evaluation	0	1
Total[1]	33	21

[1] Most firms and institutions used more than one evaluation procedure.

Accurate figures for these criteria were scarce and the data (Table 10) should be interpreted with caution, since the degree and direction of bias are unknown. It should also be recognized that logging has traditionally experienced high turnover of personnel, and this is not necessarily the fault of training. Other job factors (e.g., workplace conditions, isolation, lack of community facilities and seasonal demand for labour) influence the performance and retention of workers; these influences cannot be overcome through training.

It was difficult to follow graduated trainees to determine their success as loggers. This was particularly true for institutional training, since few institutions maintained contact with their graduates. After the graduate left his first job, there was seldom a record of where he went. A simple practice would be to keep track of the graduates through their parents.

Follow-up of graduated trainees was more reliable in industry training programs than in institutional programs, but even then it was frequently necessary to rely upon estimates, as no documented figures were available. Training success reported in earlier surveys by Canada Manpower, by CPPA, and the mail survey portion of this study, all suggest that the picture of training success in Table 10 is too optimistic.

(When interpreting "time to average production", recall that institutional training aimed mainly at basic entry occupations. Training in firms included skilled occupations which take longer to master. It is not appropriate to conclude from Table 10 that institutional training resulted in more rapid achievement of average levels of productivity.)

TABLE 10 — Training Success For Firms And Institutions Directly Contacted.

Success Criterion	Firms	Institutions
Graduated from course	81% (17)[1]	67% (10)
Hired by forest industry	76% (13)	62% (7)
Retained in forest industry 1 year	53% (14)	Not Available
Time to Average Production Following Graduation (weeks)	16 (16)	7 (8)

[1] Figures in parenthesis refer to the number of individual firms or institutions supplying data. All percentages are average figures, based on the number of trainees accepted at the beginning of the training program.

Another estimate of training success came from the mail questionnaire survey (Table 11). The results showed that courses for machine operators and supervisors had the highest graduation rates, while courses for mechanics had the lowest graduation rates. Supervisory and high-lead training courses had the highest hiring rates, while courses for mechanics, and cut/skid courses, had the lowest hiring rates. Retention rates after one year for supervisors remained high, while retention rates for mechanics and graduates of cut/skid courses fell to approximately 25% of the original number of trainees. The other courses all showed retention rates of approximately 50%.

TABLE 11 — Success Rates Of Logger Training By Firms[1] (From Questionnaire Survey.)

Course Type	Ave. No. of Trainees at Start of Course	Ave. No. of Graduates	Ave. No. of Graduates Hired	Ave. No. Retained After 1 Year	Time to Ave. Production (Weeks)
High Lead	9.6	8.9 (93%)[1]	8.1 (84%)	4.8 (50%)	19
Cut/Skid	28	19 (68%)	11 (39%)	7 (25%)	25
Machine Operator	11	11 (100%)	6.3 (57%)	5.2 (47%)	7
Mechanical Harvesting	17	11 (65%)	11 (65%)	8.2 (48%)	19
Mechanic	12	6.3 (52%)	5 (42%)	2.7 (22%)	26
Supervisor	10.3	10 (97%)	9 (87%)	9 (87%)	8
Other	20	18.8 (94%)	15.8 (79%)	9.8 (49%)	15
Across All Courses	18	14 (78%)	10 (56%)	6 (33%)	18

[1] All percentages are based upon the number of trainees accepted into the course.

A year after graduation, only one-third of all trainees still worked for the firms which trained them. Thus, a firm wishing to increase, through training, its permanent work-force by 100 workers would have to plan training activities for 300 people in order to account for the expected drop-out rates. A firm wishing to add 100 workers in the cut/skid category would have to plan on accepting 400 trainees to account for the expected 75% drop-out after one year. In fact, forest workers frequently move from one logging company to another, which would tend to reduce the apparent training requirements.

The remaining criterion of training success, the time required for a graduate to reach average levels of production, is not easily interpreted in the absence of other comparative data such as the relationship between the length of a training course and time to average production. The data indicate that graduates of cut/skid courses required approximately six months of experience before achieving average production. Average production levels were reached most quickly (in about seven weeks) by graduates of machine operator courses, which likely reflects their previous work experience.

The figures in Table 11 were compared to results obtained from Canada Manpower follow-up surveys of graduates from training courses supported by Canada Manpower. The latest survey[1] covered the period ending September 1974, and involved graduates completing training between April 1, 1973 and March 31, 1974. Of the trainees contacted three to four months after graduation, only 29% were still employed in the forest industry. This compared with industry figures (Table 11, column 4 ÷ column 2) which indicated 43% retention of graduates after one year.

Data from the Canada Manpower survey indicated that the forest industry had one of the worst rates of retention of training course graduates. Of 23 industries surveyed, the forest industry ranked twenty-first in rate of retention of graduates.

The combination of costly training and low success rates tends to make institutional logger training an unattractive investment from the point of view of federal and provincial funding authorities. Crediting the institutional logging program with the value of students' production may help offset costs. This would have to be done in a way that would not compromise the basic training goal by placing too much emphasis on production. One institution reported that credit received for the value of logs produced offset about 40% of student man-day costs.

[1] Anon. Canada Manpower training program and continuing follow-up survey report on training outcomes. Canada Manpower, Ottawa. 1975.

Problems and Innovations in Training

The on-site visits to logger training facilities revealed several rather widespread problems. All trainers realized the importance, and experienced the difficulty, of recruiting suitable candidates for training. There were certain inadequacies in the training facilities and procedures themselves. And, placement of new graduates in jobs was not usually given enough attention.

The problem of retaining native trainees was noted frequently during the on-site visits. The difficulty seemed to be greatest where native loggers lived long distances from the operations. One institutional training program has tried to deal with this by using a two week on, one week off training schedule. This gave native trainees living in isolated northern areas sufficient time to visit their families. According to school officials, this schedule was more to the liking of the trainees. It also has interesting possibilities for native production crews in industry. The same training institution has hired native instructors. Although the main language of instruction was English, the trainers found that use of the students' native language helped in explaining working techniques.

One interesting innovation in the recruitment of trainees was the establishment of a faller/skidder training course for prison inmates eligible for parole. Inmates accepted into the training program worked on cutting sites within 20 miles of the prison. Classroom lectures were held in the prison. Trainees who successfully completed the first phase of the training program were then granted parole and lived at a half-way house operated by the company. There,

training continued but with greater emphasis on production. Successful performance during the second phase, once parole requirements were met, qualified trainees for parole in the general community with jobs waiting for them as pulp cutters. This program has been successful, with greater than average rates of course completion and industry retention.

One reason companies commonly gave for having no logger training courses was that all logging was by contract and logger training would not benefit the company. Yet, even in this situation the establishment of training may be justifiable on economic grounds. Two of the firms visited provided training to contractor crews in the form of upgrading courses. Each firm used a trailer fully equipped as a portable teaching facility. Courses of approximately two weeks duration gave loggers working for contractors the opportunity to practise and improve logging techniques. The upgrading courses, in the long run, helped ensure that companies had efficient and skilled contract crews available. This tended to lower wood procurement costs, as a contractor with a more skillful crew could produce wood more efficiently. One of the companies providing this training was totally dependent upon contractors for logging.

Upgrading courses for currently employed loggers can be valuable, but, with limited training resources, what is the best way to determine where training will be most useful? Which crews need training most? One firm's approach to this problem was to systematically rate each crew member in pulp cutting crews. A rating check list was used to evaluate: (1) the worker's equipment (e.g., presence or absence of safety pads, hearing protection, chain brake, fire equipment); (2) chainsaw maintenance (e.g., chain filing, chain tension, starter cord condition, air filter maintenance, possession of proper tool kit); (3) working methods (e.g., felling direction, stump height, pile locations, bunching of pieces, wood length, tree utilization, limbing technique). Ratings were made on a four-point scale (poor, fair, good, very good) for chainsaw maintenance and working methods, and on a presence-or-absence basis for equipment organization. Ratings were summed for each worker, then averaged for each crew. Low average ratings for crews indicated that upgrading could be useful. The use of ratings solely as indicators of training needs avoided potential conflicts, since there was no threat to job security.

The instructional materials available to trainees varied considerably in quality from one training facility to another. Some courses included the extensive use of films, written handouts, training pamphlets from equipment manufacturers, and packaged instructional material for special topics, from sources such as St. John's Ambulance. Other courses made little use of these resources, since some instructors were unaware of available training materials and aids. Courses which did not use audio-visual teaching aids tended to rely more upon lectures and demonstrations. Equipment manufacturers, research institutes, and other training organizations produce instructional materials which could be used effectively in logger training.

Several training officials and instructors indicated a need for more standardization of training practices. This could lead to a standard certification of proficiency, widely acceptable to logging firms as evidence of the worker's capability. Standardization could also encourage greater exchange, within and between training institutions and firms, of course plans, materials and instructional aids (e.g., films, video-tape presentations). This could lead to better and more economical logger training.

While desirable, standardization would be difficult to achieve on a Canada-wide basis. Regional differences in forest conditions and logging practices, provincial jurisdiction over training curricula and differences in logging practices between firms within the same region all limit the possibilities for standardizing logger training. Within a region, however, the chances for standardization are better, at least for the core topics. Local needs could still be considered by making adjustments to the basic course outline, and by supplementary instruction in the employing firm. For example, cut/skid training at one firm may include a major emphasis upon chainsaw service and repair. Another firm within the same region may reason that the operator need only know how to service his saw, leaving the saw repairs to company mechanics. Neither procedure is necessarily superior; both firms would be teaching methods which are consistent with company logging practices.

Training for high-lead logging emphasized safe working practices, resulting in an excellent safety record among trainees (only 2 compensable accidents out of 462 students in 1976). Proper use of safety equipment was also evident in most of the cut/skid courses observed. However, at one training institution, instructors had removed kick-back guards from chainsaws because they felt the guards interfered with the

handling of the chainsaw. Students were also felling and limbing without safety leggings, and ear protectors were used infrequently. Training programs for fallers should encourage the use of appropriate protective equipment, consistent with industry practice. Sweden, for example, has made considerable progress in equipping fallers with well-designed protective clothing and equipment. This improved safety in a job which has inherent hazards. There, mandatory use of kick-back guards and chain brakes resulted in a 90% reduction in chainsaw kick-back injuries over a four-year period[1].

One difficulty in the training of machine operators was lack of voice communication between trainer and trainee. It was dangerous for the instructor to be on, or close to the machine. A simple and effective solution observed involved the use of two-way radios. The instructor could instantly inform the student (who was equipped with a head-set) if he was operating the machine improperly. The radio units are specially designed for high background noise situations, and are readily available commercially.

The problems of training operators for complex mechanized harvesting equipment and heavy-duty equipment, such as log loaders, differed from those of training fallers and skidder operators. Feller-bunchers, harvesters, and processors were more subject to costly breakdown due to operator error. Training operators for such equipment was time consuming and expensive, partly because a machine breakdown meant lost production and a period when no practical training could occur, and partly because the machines themselves were so costly. Better preparation of the trainees through a longer period of basic training may be needed to reduce the problem of operator error and resultant equipment breakdown.

The lack of adequate effort in job placement for trained workers was particularly noticeable in institutional training programs. Finding a job was left to the graduate himself. Few companies made an effort to encourage the graduate through his transition to industrial operations. Although many graduates obtained jobs on their own, placement and retention success rates would be better if the training institution, in co-operation with forest companies, were to put more emphasis on job placement for their graduates.

[1] Pettersson, B. 1975. Accident prevention in the operation of new logging machines. Skogsarbeten, Sweden. (Mimeo.) 14 p.

Future Manpower Needs

The Economic Analysis and Forecasts Branch of Canada Manpower maintains a continually updated projection of manpower needs in Canadian industry. These projections, called COFOR (Canadian Occupational Forecasts), were obtained for the purpose of determining the adequacy of industry training plans in meeting anticipated manpower requirements in the forest industry. The COFOR projections can be compared with anticipated numbers of trainees to be accepted into industry training programs.

These comparisons must be made on an overall basis, because the Canada Manpower classifications of forestry positions (foremen, conservation, timber cutting, log inspecting, log hoisting, labouring, and forestry-logging) do not correspond to the breakdown of course types used in the FERIC survey.

There were 71,739 loggers[1] in Canada in 1974 (the base year for the COFOR projections) according to Canada Manpower figures. The estimate for 1982 is 81,629 loggers, a net increase of 9,890. By allowing for expected attrition of

[1] These estimates differ from those of K.M. Jegr and K.M. Thompson in "The Canadian Pulp and Paper Industry: Threats and Opportunities 1980-1990", Pulp and Paper Research Institute of Canada, June 1975, pp. 44, 45. PPRIC estimated that there were only about 50,000 woodsworkers in Canada in 1974, and forecast that 40,000 would be required in 1982. Reasons for the discrepancy between COFOR and PPRIC figures include: different statistical bases (data sources, survey coverage, concepts, definitions, reliability); and, methods used to project future requirements (Corbeil, R.C., Canada Manpower and Immigration; Sturton, C.F., Statistics Canada — personal communications). The COFOR forecast seems to be less optimistic regarding trends in labour productivity, giving higher estimates of the numbers of loggers required.

Jegr and Thompson reported (p. 34, 35) that "almost 95% of all panelists agreed that more training schools for instruction of (logging) operating and maintenance personnel are needed, as well as more up-to-date programs in trade schools and universities. More sophisticated on-the-job training programs were also said to be desirable."

workers through retirement and movement into other industries, the COFOR model estimated that there will need to be 25,320 new entrants to the logging labour force over the period 1974-1982. The industry will therefore need an average annual influx of 3,165 workers from 1974 to 1982.

From the FERIC mail questionnaire survey it was estimated[1] that firms across Canada planned to accept over 9,000 trainees for basic logging programs in 1976. (Only basic training was included in this estimate, assuming that upgrading will usually involve workers who are already in the forest industry.) If one-third of the trainees accepted actually take up logging occupations, current industry training plans would provide about 3,000 new workers annually. This approximates the 3,165 workers required, as estimated by the COFOR model. However, the FERIC estimate may be optimistic; for example, retention of one-third of original trainees after one year may not be achieved.

Also, firms engaged in training may have been more likely to respond to the questionnaire than firms not training. The differing estimates of the size of the logging labour force, and training requirements, point to a need for further work on the definition and survey of labour force levels and trends.

Logger training institutions will provide some additional workers. Other new workers will be hired for "entry" positions and on-the-job training in company operations. Company training programs are flexible, and may be stepped up to meet the need for additional people in logging if this becomes apparent. An attractive alternative is to try to increase the effectiveness of trainee selection. If, through better initial selection, the rate of successful retention of trained workers in the industry were increased from the current 30% to even 50%, projected manpower requirements could be met with a substantial saving of training resources.

[1] The average number of trainees planned per course in basic training was 12.96 over 41 such courses. For the sample, the number of trainees expected was 12.96 x 41 = 531.36. Hence, the estimate for the industry was 17.24 x 531.36 = 9,161 students in basic logging training.

TRAINING OF FOREST WORKERS IN SWEDEN

Swedish logger training facilities were visited to obtain information on current training practices and techniques to compare with Canadian practice in logger training. The training facilities, seen in June 1975 included:

1. Ösa Training School, Östbergs Fabriks AB, Alfta;
2. High School (Forestry Line), Västerby;
3. Swedish Forest Service, Linköping;
4. Swedforest, Färna;
5. Nordfor, Säter;
6. High School (Forestry Line), Varnamo.

These training facilities cover the range of types of institutions from the high school vocational level, to machine operator training (Ösa Training School, Swedforest, Nordfor), and on-the-job instruction for machine opertors, supervisors, and instructors (Swedforest, Nordfor).

The Structure

According to Pettersson[1] "basic training in forestry in Sweden comprises a part of the general educational system. The aim is to offer training at five different levels . . . forest workers, supervisors, forest technicians, graduate foresters, and doctors of forestry . . ." After nine years of comprehensive schooling (Fig. 2), a prospective forest worker or woodlot owner can attend a two-year basic training course (Table 12). This course is one of the 22 options available in the Swedish high school system and is compulsory for entering a forest technician school. "The aim of the training is to provide the

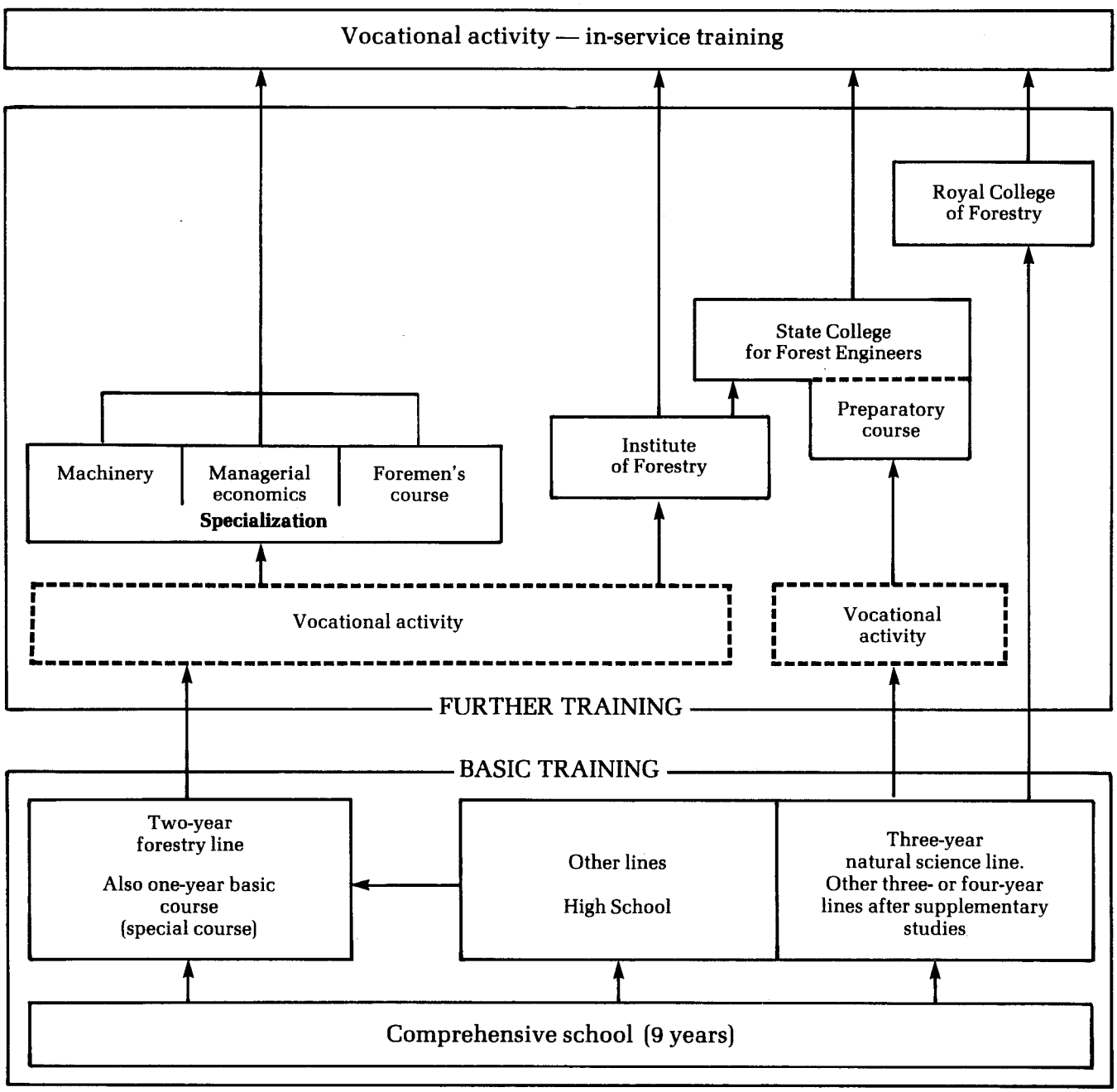
[1] Pettersson, B. 1975. Adapting machines and methods to human limitations and capacity. ECE/FAO/ILO Symposium on Multi-purpose Logging Machines, Sweden. (Mimeo.) 7 p.

basic knowledge and skills necessary for working in forestry as regards silviculture, logging and extraction. After basic training, the pupil can apply for a job or continue with more advanced training."

Pettersson continued: "The majority of Swedish forest workers have not had the opportunity to undergo the two-year training. Most of the cutters are more or less self-taught and have only gone on further training courses of a few days and weeks.

"On the introduction of mechanization, these men will have to be transferred to the job of machine operator. They will then be sent on a shorter, basic training course — so-called re-training — lasting between six and ten weeks. The aim of this training is to make the change-over to machine operator easier and is focussed mainly on technical subjects such as the theory of machines and engines.

FIG. 2 — Training Routes In Forestry — Sweden[1].



[1] Source: National Swedish Board of Education, 1974.

TABLE 12 — Time Schedule, Two-Year Forestry Line[1]

Subjects	One-hour Periods per week	
	Year 1	Year 2
Swedish	4	
Labour market orientation	1	1
Machinery	10-9	8-7
Forestry production	6-5	7-6
Logging	9-8	15-14
Mensuration and wood technology	2	2
Nature conservancy	1	2
Ergonomics	2	1
Physical education	2	2
Lesson at free disposal	1	
English second or third foreign language		
Religious knowledge		
Psychology	3	3
Civics		
Home economics		
Mathematics		
Music or drawing		
Total:	38	38

[1] Source: National Swedish Board of Education, 1975.

"After completion of re-training, the pupil can then be trained for the machine he is to operate."

Thus, the structure of Swedish forestry training is set up on a step-by-step progression in which each trainee enters at the bottom as a basic logger, and can see before him the possibility of advancement to positions of greater responsibility. Other benefits include: stability and co-ordination among institutions and training programs, good student accommodation, and proximity to other training programs which complement the forestry line.

Selection for the two-year high school forestry line is based only upon the student's academic record. One instructor reported that up to one-third of the trainees may turn out to be unsuited to logging, but they cannot be eliminated from the logging course unless they are declared a danger to themselves and others. These students, though they graduate in the forestry line, frequently will leave the logging field once they get into actual vocational experience. Counter-balancing this selection problem is the fact that the students themselves choose their vocational line. The effect of this self-selection may be that highly motivated students will be in the forestry classes, or at least that poorly motivated students will not.

Teachers in the high school forestry line (23 institutions across Sweden) have, as a minimum, forest technician training *and* at least 15-18 weeks of formal teacher training. Teacher training includes instructional techniques, and a standardized approach to basic forestry practises. This standardization is a result of co-operative input from the Swedish Logging Research Foundation, equipment manufacturers, and safety organizations.

The Swedish approach to the training of forest workers has evolved and changed, but even 30 years ago[1] they had a well-coordinated training system. There is little of a comparative structure in Canada even today. However, "Swedish logger training", as a complete system, probably cannot be easily adopted by the Canadian logging industry. This is because Swedish logger training is closely integrated with the Swedish educational system, which provides both an overall structure and readily available training facilities. The training system in Sweden is based upon different social conditions and institutions from those in Canada, different industrial methods, and even different (more homogeneous) forest and terrain conditions. Any overall Canadian logger training system proposed would have to meet specific Canadian conditions, and take into account the federal-provincial division of responsibility for educational matters. However, Canadian logger training could adopt specific training techniques and equipment which have been used successfully in Sweden.

[1] Flodman, B. Training of woodcutters in Sweden. CPPA, WSI No. 911 (B-2). 1947.

Innovative Logger Training Techniques In Sweden

Course content in Swedish logger training appeared systematic, and simplified. This was achieved by breaking the material down into small, easily learned parts (analogous to the DACUM procedure discussed earlier). A variety of teaching aids supplemented this step-by-step procedure:

1. use of study boards set up to illustrate and provide practice in the workings and proper assembly of mechanical components;
2. use of physical models of electrical and hydraulic circuits;
3. cut-away working models of equipment components such as gasoline and diesel engines, hydraulic pumps, and transmissions.

Simulators of varying complexity were used to teach operational skills, without the necessity of using expensive, fully operational equipment in the initial stages of training.

Examples were:

1. plastic pipe to which pegs were attached with Velcro strips for beginners' limbing practice (used to teach the limbing pattern and rhythm necessary for high productivity);
2. manual felling device, consisting of plastic pipe, hinged at stump height, mounted on a metal base. Guide slots in the pipe gave beginners instruction in correct under-cut and back-cut placement, and resulting directional fall of the "tree";
3. machine operation simulators (Ösa School, Figure 3) in which students used a standard machine control panel to perform "operations" shown on a screen in front of them. Errors produced instantaneous feedback, so the student could correct his actions.

Machine operation was taught in a step-by-step fashion. The steps in learning the operation of a forwarder, for example, were:

1. learning to start and control the machine;
2. driving an empty machine on a flat, open training course;
3. driving an empty machine over rough test track;
4. driving the machine at different speeds over a section of trail designed to produce a controlled tip-over;
5. driving the machine loaded over a rough test track.

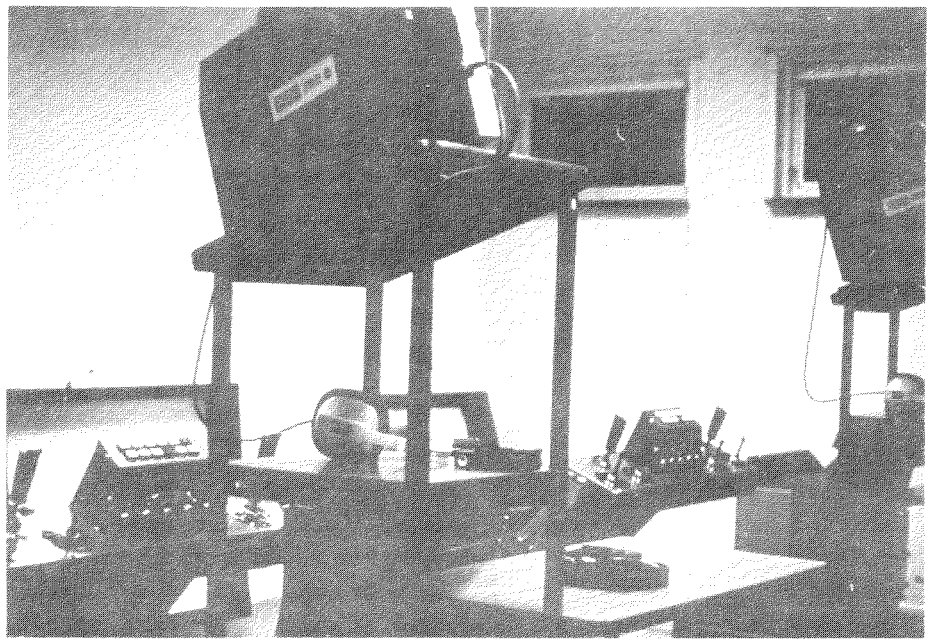


Figure 3 — Simulator For Operator Training, Östbergs Fabriks AB, Sweden.

Knuckle-boom loader training began with stationary machines mounted on concrete pads (Figure 4). Students practised loading short logs into forwarder-type bunks, and unloading them, until they were proficient with the basic controls. They could then progress to mobile equipment, for actual field experience.

Feller-bunchers, with chainsaws removed, were used for student practice in positioning on, lifting, swinging, and dropping trees into bunches. Poles set into holes in the ground (Figure 5) were the re-usable "trees" in this practice exercise. Processors, with limbing equipment and crosscut saw removed, were set up to give the student practice in feeding tree-lengths to the machine (Figure 6). Conveyors recycled the tree-lengths, for a continuous practice exercise.

A promising development in the training of machine operators is the short course put on for inexperienced operators by equipment manufacturers. For example, Östbergs Fabriks AB included in the machine purchase price the cost of a training program for one operator. This training was provided at the Ösa School and followed a training schedule such as illustrated in Figure 7 for the Ösa 705 limber-bucker. Other courses were provided for operators of feller-bunchers forwarders, processors, and for mechanics and supervisors. Centralization of training allowed the school to provide equipment such as simulators which would be prohibitively expensive for individual logging firms.

Equipment manufacturers can provide specific training under standardized, controlled conditions which assure coverage of necessary topics. The reduced production emphasis avoids one major problem — the push to get the new machine into production before the operator is fully familiar with it. Premature exposure of the operator to production conditions is hazardous for both man and machine.

Another approach in Swedish logger training was offered by consulting firms such as Nordfor, at Säter, which provided training programs under contract to individual logging organizations. Training ranged from basic felling to machine operator instruction, with concentration on practical woods instruction using a demonstration approach. Techniques were tailored to fit the client's specific training problems. Nordfor has had worldwide training experience, including training programs in Canada. They were also involved in equipment development, and in some cases offered a training package together with the equipment.

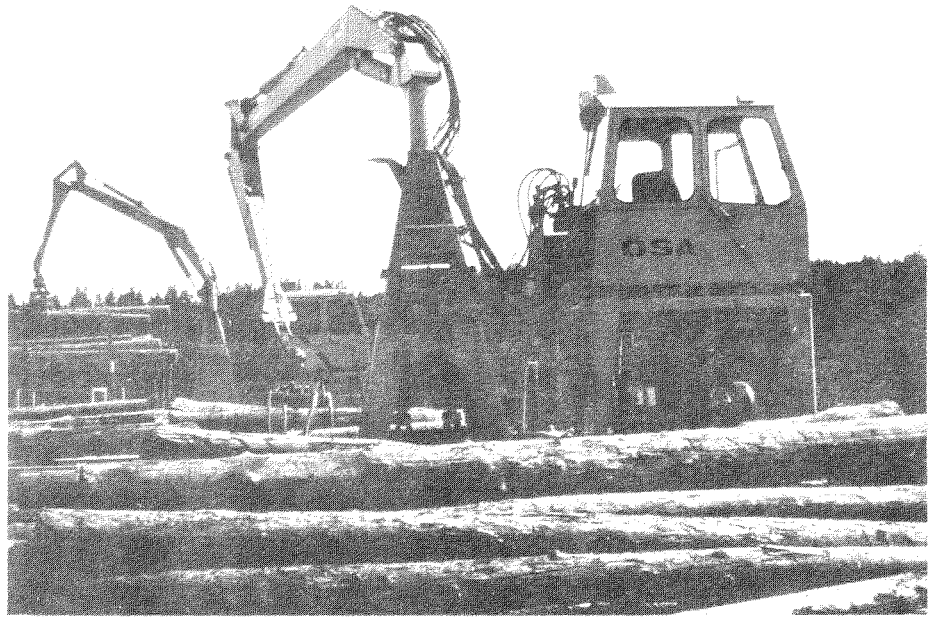


Figure 4 — Stationary Knuckle-Boom Loaders For Student Practice, Östbergs Fabriks AB, Sweden.

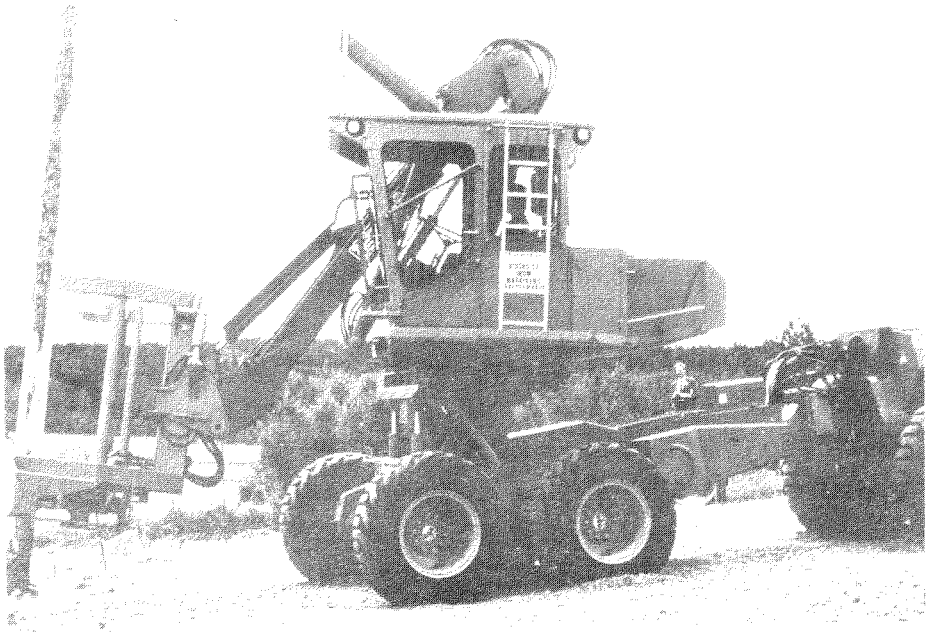


Figure 5 — Feller-Buncher Used For Student Practice In Machine Handling, Östbergs Fabriks AB, Sweden.

In summary, the success of logger training in Sweden is perhaps due more to the co-ordinated training effort that exists than to any single training technique. What can be done in Canada is to begin at the industry level to achieve a higher degree of co-ordination and training organization, using Swedish practices as a model where appropriate. This would help make the Canadian logging industry aware of what can be done in logger training, and perhaps begin a trend toward a more integrated training system in Canada.

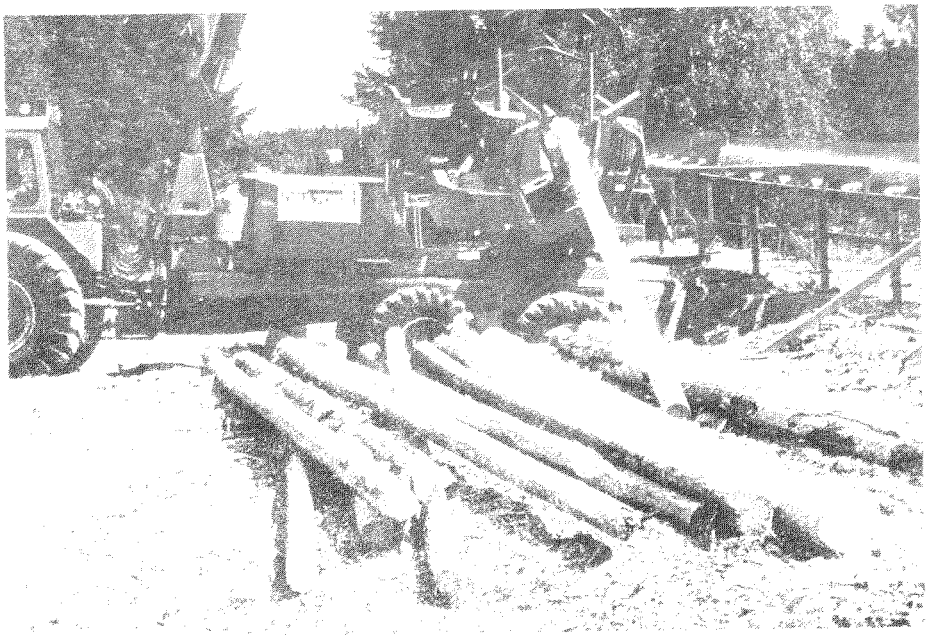
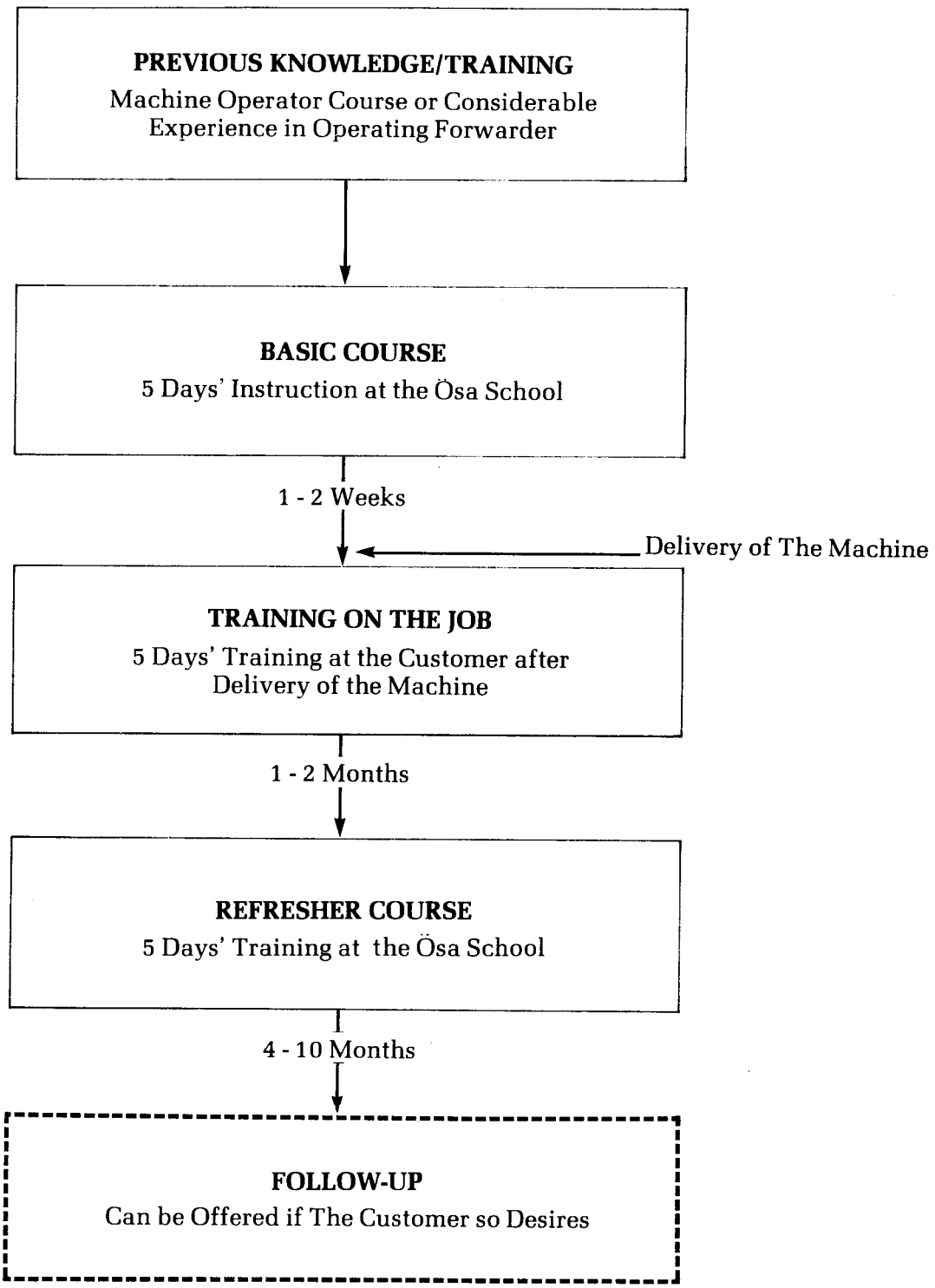


Figure 6 — Student Practice Set-Up For Feeding, Limbing, Crosscutting With The Ösa Processor, Östbergs Fabriks AB, Sweden.

FIG. 7 — Training For Machine Operators At The Ösa School Time Schedule (Ösa 705 Limber-Bucker)[1]



[1] Source: Sundkvist, T. The Ösa School.
Paper presented at the Symposium on Multi-purpose Logging Machines, Stockholm, Sweden, June 1975.

CONCLUSION

This study was undertaken to assess the current status and adequacy of logger training in Canada, including the quality of instruction offered and whether sufficient workers were being trained to meet projected industry requirements.

Industrial training for basic entry positions in logging appeared generally adequate, but there was room for improvement and innovation. Training by logging firms in 1975 represented an impressive effort in light of the market conditions which existed at the time of the survey. However, reported success rates were low — an average of only 43% of graduates remained in the logging industry one year after completing industry-based training. Figures for training supported by Canada Manpower were even lower; only 29% of graduates were working in the forest industry three months after completing their training. Retention rates for basic entry positions were particularly low. For other positions (machine operator, mechanical harvester operator, high-lead crewman, supervisor) retention rates varied from 50% to nearly 90%.

The survey indicated that Canadian logging firms planned basic training for almost 10,000 workers in 1976. Assuming one-third retention for one year after graduation, current training plans by Canadian firms should add about 3,300 workers to the Canadian logging work force annually. The Canada Manpower (COFOR) forecast indicated a required intake averaging 3,165 workers per year in the logging industry to 1982. Thus, training planned by logging firms should meet the industry's overall manpower needs, although this may not be so on a regional basis. Differences between Canada Manpower and Statistics Canada estimates of total numbers and trends in the logging labour force rule out any bolder conclusion regarding the adequacy of training.

There is an urgent need to find reasons for poor retention of trained workers in the logging industry. Improved criteria and procedures for selecting trainees are required, based on objective evaluation of each candidate's potential for, and expressed interest in, logging as an occupation. The General Aptitude Test Battery (GATB) and Canadian Occupational Interest Inventory (COII) could help in meeting this need, and are available through Canada Manpower. Other important influences outside the scope of training (e.g., job conditions, community isolation, economic opportunities elsewhere) also need examination. More training is not the solution to manpower shortages and turnover caused by problems in these areas.

Wider use of up-to-date curriculum development techniques would help assure thorough coverage of required knowledge and skills. Regular evaluation of performance, with feedback to the trainee, could increase training effectiveness. Negative influences, such as clearly inappropriate referral of candidates and constant intake to training programs, should be removed. Financial aid available through the Training in Industry program of Canada Manpower could be utilized more; from the survey, only one-third of logging courses offered by industry received such financial support.

Institution-based logger training, while not as extensive as that of industry, is conducted by community colleges in most provinces. Institutional courses observed were generally restricted to preparation for entry positions. A few institutions offered specialized training for heavy equipment operators and mechanics. All but one of the institutions contacted had some form of Canada Manpower financial support. However, training for logging occupations is expensive and both federal and provincial funding authorities seem unimpressed by the current ratio of apparent benefits to costs. Institutions should consider crediting logger training programs with income from the sale of students' logging production, so long as this did not interfere with training objectives.

The quality of instruction seemed good; however, placement of graduates by training institutions tended to be haphazard, often leaving the job hunting up to the student. A weak point was the process for selecting trainees. Training which began with careful trainee selection was generally more successful, in terms of retention rates, than training courses which did not take such care. Institution-based training probably would be more successful if the staff helped to select trainees, based on candidates' aptitudes and interests.

There was a discrepancy, in some cases, between the material taught in institutional training and the logging skills required by the industry. Institutional training must produce the type of worker the industry needs; institutions should regularly seek the opinions of industry personnel concerning topics that should be covered. Industry advisory committees should help bridge this communication gap.

A lack of co-ordination of logger training within and among regions in Canada was evident, particularly with regard to the development of training materials, and performance evaluation. Logger training could be improved through increased communication among individuals, firms and institutions involved in this field. A technical seminar for specialists, with published proceedings, would be a good start and might best be sponsored by an industry-wide organization such as the CPPA. A larger, continuing project might be the establishment of a training information centre that would maintain a current library of training materials and program descriptions.

Training offered by Canadian equipment manufacturers and distributors was not evaluated in this survey. Some manufacturers already have programs for mechanic and operator training, and this service might be usefully expanded. Manufacturers' handbooks, operating manuals, equipment models and simulators can be valuable tools for personnel development in logging, as experience in Sweden has shown.

Swedish logger training differs in many respects from that in Canada. Basic training in the "forestry line" is an integral part of the Swedish educational system. The training is more prolonged than is usual in Canada, because courses cover a wide range of topics not normally included in Canadian logger training. The overall picture of logger training in Sweden is one of co-ordinated programs offering thorough preparation and continuity. Trainees who choose to enter basic logger training can aspire to, and train for, higher positions in the industry. Co-operation (and some competition) is evident among logging firms, logging equipment manufacturers, the Swedish Forest Service, and educational authorities, in working to meet the training needs of the forest industry. Their approach may not be directly applicable in Canada, because of differences in administrative and educational structures, industrial methods and forest conditions between the two countries. However, Canadian firms and training institutions could readily adapt specific training techniques that have proven successful in Sweden.

Answers to the three questions which initiated this study may be summarized as follows:

1. Both government and industry recognize the importance of logger training to the Canadian forest industry. Although many good programs are in effect, not all regions are adequately covered. Better communication between agencies is desirable.
2. The quality of training, selection of students and placement of graduates vary greatly. Schools could improve their programs by adopting the most successful techniques used by other schools, and by standardizing approaches to basic instruction where feasible.
3. The need for workers in logging varies with economic conditions in the forest industry, and in Canada as a whole. This need is difficult to predict with any accuracy. However, it seems certain that the training of loggers will continue in the forest industry. An essential requirement is to maintain a stable core of experienced trainers, with adequate facilities that can be expanded to meet increased demand.

APPENDIX I — MAIL QUESTIONNAIRE

Forest Engineering Research Institute of Canada
Logger Training Survey

Instructions: Please answer the following questions concerning logger training activities in your company. Where information is not readily available, please give your best estimate. Note special instructions with each question.

CURRENT TRAINING ACTIVITIES

1. Is your company currently conducting logger training? ☐ YES ☐ NO (If NO, go to question 2)

   For **each** position trained (e.g. fallers, truck drivers, skidder operators, heavy duty mechanics, etc.) please answer questions 1.1 through 1.4 (use back of sheet if training more than 5 positions)

1.1	Position:				
1.2	Length of Course:				
1.3	Number of Trainees Accepted:				
1.4	Canada Manpower Support Involved? (YES or NO)				

PAST TRAINING ACTIVITIES

2. Has your company conducted logger training in the past 5 years? ☐ YES ☐ NO (if NO, go to question 3)

   For the **last** training course(s) **completed** in the past 5 years, please answer questions 2.1 through 2.9 for **each** position trained (e.g. fallers, truck drivers, skidder operators, heavy duty mechanics, etc.) (Use back of sheet if trained more than 5 positions)

2.1	Position:				
2.2	Date Course Began: (Month & Year)				
2.3	Length of Course:				
2.4	Number of Trainees Accepted:				
2.5	Canada Manpower Support Involved? (YES or NO)				
2.6	% of Trainees Who Completed Course:				
2.7	% of **Graduated** Trainees Who Accepted Employment With Your Company:				
2.8	% of **Hired** Trainees You Expect to Retain for at Least 1 Year:				
2.9	Length of Time it Takes a Graduated Trainee to Reach Average Production Levels:				

FUTURE TRAINING ACTIVITIES

3. Does your company plan to continue (or establish) logger training in the next year? ☐ YES ☐ NO (if NO, go to question 4)

   For **each** position which will be trained, please answer questions 3.1 through 3.5 (Use back of sheet if plan to train more than 5 positions)

   (NOTE: If you answer questions 3.1 through 3.5, omit question 4)

3.1	Position:				
3.2	Date Course to Begin (Month & Year):				
3.3	Length of Course:				
3.4	Number of Trainees to be Accepted:				
3.5	Canada Manpower Support Involved? (YES or NO)				

IF YOU ANSWERED QUESTIONS 3.1 THROUGH 3.5 GO TO QUESTION 5.

4. Why does your company feel it unnecessary to establish logger training?

5. What do you anticipate will be your manpower needs in 1980?

6. Do you want a copy of the report on the results of this survey? ☐ YES ☐ NO

THANK YOU

APPENDIX II

Sampling Procedure For Mail Questionnaire Survey

The sample was stratified on the basis of provincial percent of contribution to the total timber harvest in 1970 and 1971, the latest years for which figures were available (Table II-1).

TABLE II-1 — Percent Contribution[1] By Province To Total Timber Harvest, Average of 1970 and 1971.

Province	Percent Contribution
British Columbia	46
Quebec	22
Ontario	14
New Brunswick	6
Alberta	4
Nova Scotia	3
Newfoundland	2
Saskatchewan	2
Manitoba	1
Prince Edward Island	1

[1] Source: Canada Year Book, 1973. Information Canada, Ottawa. p. 451.

Questionnaires were sent to 69 firms across Canada, comprising an 8% random sample from the list of firms in the sampling frame. The number of firms sampled in each province (Table II-2) was proportional to the production figures shown in Table II-1. For example, 15 firms (22% of 69) were sampled from Quebec.

TABLE II-2 — Return Statistics Summary.

Province	No. Sent	No. Returned	% Of Final Sample	Expected Return
British Columbia	33	21	43	23
Quebec	15	13	27	11
Ontario	9	5	10	6
New Brunswick	4	4	8	3
Alberta	3	2	4	2
Nova Scotia	3	2	4	2
Newfoundland	1	1	2	1
Saskatchewan	1	1	2	1
Manitoba	0	0	0	0
Total:	69	49	100	49

Forty-nine completed questionnaires were returned, for a satisfactory return rate of 71%. Of the 20 firms which did not respond, two were out of business, and the remaining 18 could not be contacted.

In a sample of this type, there may be bias which could lead to over or under-estimation of the extent of training activities. Potential sources of bias are:

1. disproportionate return rate from different provinces;
2. disproportionate return rate from larger firms and those firms actively engaged in logger training;
3. erroneous answers to questions.

The possible effects of these biases are:

1. provincial return bias: unknown as the direction of the bias depends on the particular province which is disproportionately represented;
2. larger company return bias: would lead to over-estimates of the extent of logger training;
3. incorrect answers: obvious effect but difficult to detect.

A check for bias due to disproportionate provincial return rates was to calculate the expected number of returned questionnaires (Table II-2) by multiplying the total returned by the percent allocated per province in the original sample. A chi-square test showed that the observed returns did not significantly deviate from the expected returns ($\chi^2 = 1.04$; df = 8; n.s.). The conclusion was that the returned sample was an unbiased estimate of the entire population with regard to provincial representation.